tiamo 3.0

Manual

8.101.8078EN

Metrohm

Metrohm AG
CH-9100 Herisau
Switzerland
Phone +41 71 353 85 85
Fax +41 71 353 89 01
info@metrohm.com
www.metrohm.com

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Technical Communication
Metrohm AG
CH-9100 Herisau
techcom@metrohm.com

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1 Introduction

1.1 Welcome to tiamo

Introduction

tiamo = titration and more

tiamo is a control and database software for titrators, dosing devices and sample changers and makes complete laboratory automation possible. It is for that reason that the name ***tiamo*** stands for "**ti**tration **a**nd **mo**re" - ***tiamo*** can do more than just titrate.

tiamo is the successor software to TiNet and Workcell. Metrohm thus provides a uniform software product for laboratory automation. Companies with international operations can use the same software platform at all sites around the globe for the processing of their samples and exchange data and methods without loss.

Overview of the main content

- *Operation of the user interface*
- *Integration of devices and accessories*
- *Method editor*
- *Database and client/server functionality*
- *Import and export functions*
- *FDA compatibility in accordance with 21 CFR Part 11*
- *Comprehensive online help*
- *Available program versions*
- *What is new in tiamo 3.0?*

1.2 Operation

Introduction

The modern **user interface** makes it easy for users to find their way around *tiamo*. All commands and control elements are located where you would expect. The bar on the left edge of the screen gives you access to the five basic elements of *tiamo*:

Workplace *Database* *Method* *Configura-tion* *Manual*

Depending on the access permissions, these buttons are either visible or hidden. The menu bar is in the upper part of the screen. It is also possible for the individual commands to be hidden, depending on the access permissions.

In the center of the screen, you can find the **information windows** with the settings, sample entry masks, live curves or results. This view can be set individually for each user with the aid of the new layout manager. As a result, users see only those windows or buttons they actually need for their work. This reduces the introductory period for routine users to a minimum. Incorrect operation as a result of overcrowded screens is also a thing of the past.

The **method and calculation templates** successfully introduced with the Titrando system are also available in *tiamo*. A wide range of tried-and-tested methods allow any user to create new methods quickly and simply and to use them immediately.

1.3 Device integration

Introduction

tiamo brings together the world of **Titrino devices** and the new generation of the **Titrando system** under the same roof. Compatibility with existing Metrohm devices is not a matter of course in the software sector. The entire product range of the Titrino family, which was already integrated in TiNet, can be used with *tiamo*, and this after more than 10 years on the market! In addition, sample changers which to some extent are no longer included in the sales program, are integrated in *tiamo*. That is how Metrohm secures your investments!

It goes without saying that all of the models of the new Titrando generation, as well as the new sample processors, are compatible with *tiamo*. Thus, the advantages of USB communications, such as plug-and-play or recognition of intelligent dosing systems, can be used with *tiamo* to their fullest extent. Even a mixed operation made up of older RS-232-operated devices and newer USB devices is possible without any problem.

Devices that can be used with tiamo

- **Titrando**
  808, 809, 835, 836, 841, 842, 851, 852, 855, 857, 888, 890, 901, 902, 904, 905, 906, 907
- **Titrino**
  702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799
- **Conductometers**
  712, 856
- **KF coulometers**
  756, 831
- **Sample changers**
  730, 774, 778, 789, 814, 815, 855, 864, 874
- **Miscellaneous**
  846 Dosing Interface, 859 Titrotherm, 867 pH Module, Avantes spectrometer, 089 Photometer, balances, barcode readers, …

1.4 Method editor

Introduction

The graphic **method editor** gets more out of your titration system. With the aid of the numerous templates, methods can be created quickly and easily. For most routine and automated tasks, there are tried-and-tested methods available. Just a few clicks and they are adapted and ready to use.

Additionally, **actions running in parallel** at the same time can now be programmed and linked. Together with the new Titrando system and the Robotic Sample Processors, a sample can be prepared while the previous one is being titrated. This saves time and increases the sample throughput. The crowning feature is the simultaneous processing of several samples. This means that one Titrando can carry out two titrations at the same time. As a result, sample throughput is doubled!

tiamo is flexible and accommodates itself to analysis procedures, and not the other way around.

Overview of functions

- Graphical method editor *(see chapter 5.6.1.2, page 434)*
- Method manager *(see chapter 5.3.1, page 413)*
- Separate management of access permissions for each method group *(see chapter 5.4.2.3, page 425)*
- Templates for method development and calculations *(see chapter 5.2.1, page 400)*
- Plausibility check for methods *(see chapter 5.2.5, page 409)*
- Comments can be added to the methods *(see chapter 5.2.4.2.9, page 408)*
- Parallel runs *(see chapter 5.6.10.3.1, page 1287)*
- Loop functions *(see chapter 5.6.10.4.1, page 1289)*

1.5 Database

Introduction

tiamo is based on an **object-oriented database**, that has proven itself in practice. All program settings, the user administration, methods and templates are stored in the **configuration database** and the determination data is stored in the **determination databases** defined by the user. These databases can be installed locally on the computer reserved for measurements and make up a simple measurement system. *tiamo* is however scalable and grows with operational requirements. As soon as data security and central data management make it necessary, *tiamo* is installed as a **Client/Server configuration**. The *tiamo* database is then installed on a server. All measurement and office computers work as clients. All results are stored centrally in this network and can be accessed and processed by all Client PCs. All clients also access the same pool of methods.

The database has all the major tools necessary for management of, searching for and grouping of results. Quick filters allow the user to search through thousands of determinations within seconds and to display the result clearly. Chart plots give a fast overview of the sequence of results based on time.

All options for **reprocessing** are available to the user.

Overview of functions

- Object-oriented Client/Server database *(see chapter 6.2.3.1, page 1325)*.
- Layout manager for the database view *(see chapter 3.1.7, page 93)*.
- Quick filter *(see chapter 4.5.2.4.3, page 303)*.
- Efficient search functions *(see chapter 4.5.2.3, page 299)*.
- Access permissions control for every database *(see chapter 4.3.5.3, page 203)*.
- Automatic database backup *(see chapter 4.3.5.4, page 204)*.
- Control charts *(see chapter 4.5.2.17, page 341)*.
- Reprocess determinations *(see chapter 4.5.2.6, page 313)*.

1.6 Communication

Introduction

The decisive factor for the acceptance of PC-controlled analysis systems is being able to **integrate** it easily and economically in existing laboratory information systems, central databases and long-term archiving systems.

tiamo is communicative. **LIMS systems** can easily import work lists into the **tiamo** sample table and control them remotely, without extra modules. Data generated in **tiamo** can be exported in XML format. Connection to LIMS systems on the market is thus not difficult. Export to long-term archiving systems such as NuGenesis SDMS or Scientific Software Cyberlab is also supported.

The **Report generator** provides a simple and flexible solution for creating analysis reports. The report generator allows you to freely define the report templates. It is therefore possible at any time to display one or more determinations in a choice of PDF layouts or as a printout.

A special feature is that **tiamo** messages, error messages or results from the method run can be sent to the user by **e-mail**.

Overview of functions

- Import of sample data *(see chapter 3.3.1.6, page 105)*.
- Various export formats , e.g. XML, CSV, SLK *(see chapter 4.4.4.2.1, page 255)*.
- Automatic data export, e.g. to NuGenesis SDMS, Scientific Software CyberLAB, etc. *(see chapter 5.6.8.5.1, page 1260)*.
- Report designer *(see chapter 4.4.1.4.1.1, page 211)*.
- E-mail functions for status messages, error messages or results *(see chapter 2.6, page 87)*.
- Import of external measured values *(see chapter 5.6.3.11.2, page 934)*.

1.7 Conformity

Introduction

tiamo also sets new standards with respect to the fulfilling of **GMP, GLP and FDA requirements**. The latest quality standards and validation procedures were implemented in developing and programming the software. tiamo has been designed to fulfill the **FDA directive 21 CFR Part 11** and the customer-specific interpretations. This is evidenced by a Certificate of Conformity. A centralized user administration defines the access permissions for program functions, methods and results, whereby any number of users with freely definable access profiles are possible. The system administrator can conveniently access the user administration from any tiamo client. Access to the software is password-protected and there is a choice of tiamo or Windows login.

The use of **digital signatures** makes it possible to sign methods and results. There are two signatures available with differing properties. With the first signature (Level 1, Review) the user confirms that he has programmed the method correctly or carried out the analysis correctly. With the second signature (Level 2, Release) the method or result is released and protected against further modifications. It is thus possible to mirror customized workflows in **tiamo**.

All data is organized according to the **version** and protected against unauthorized access, modification or deletion in the database. The database itself controls access to the data in network operation and provides archiving and restore functions.

The **"Audit Trail"** protocols all actions by the user and all major system processes.

Conformity relevant properties of tiamo

- Conformity is priority in development and validation.
- Centralized user administration *(see chapter 6.2.1.1, page 1305)*.
- Detailed access permissions *(see chapter 6.2.1.2.2, page 1307)*.
- Password protection under tiamo or Windows *(see chapter 6.2.2.2, page 1315)*.
- Digital signature on two levels *(see chapter 2.3, page 18)*.
- One signature each for methods and results.
- Documentation of all method and result modifications *(see chapter 4.5.2.14, page 339)*.
- Traceability thanks to detailed Audit Trail *(see chapter 6.4.1.1, page 1355)*.

1.8 Versions

Introduction

tiamo is available in **three sales versions** which differ with regard to the scope and functions. An **upgrade** is possible at any time.

	tiamo 3.0 light	**tiamo 3.0 full**	**tiamo 3.0 multi**
Product	6.6056.301	6.6056.302	6.6056.303
Maximum number of Metrohm instruments per PC	2	unlimited	unlimited
Compatible with FDA 21 CFR Part 11		•	•
User administration	•	•	•
Security settings		•	•
Traceability ("Audit Trail")		•	•
Client/server support			•
Number of licenses	1	1	3
Additional licenses as an option			•
XML data export to LIMS		•	•
Parallel titrations		•	•
Upgrade possible	•	•	

1.9 Online help

Introduction

Calling up the help

tiamo has an extensive and detailed online help that can be accessed in two ways:

- **General call** With the menu item **Help ► tiamo help**, or the symbol the online help with the topic *Welcome to tiamo* is opened. From there you can jump via **Contents**, **Index**, **Search** or personal **Favorites** to the desired topic.
- **Context-sensitive call** With the function key **[F1]** on the keyboard you can jump directly to the topic which will show information on the active element in *tiamo* (dialog window, tab).

Symbols and conventions

The following symbols and styles are used in this documentation:

Device table	Link to another help topic in which information is shown for the marked term.
Method	**Dialog text** Designation for names of parameters, menu items, tabs and dialog windows in the software.
100	Designation for parameter values in input fields.
File ► New	Menu or menu item; Path needed to reach a certain point in the program.
[Next]	**Button**
	Formula editor Formulas can be entered in fields with this symbol, and the formula editor opens when you click on the symbol *(see chapter 2.4, page 24)*.
1	**Instruction step** Carry out these steps in the sequence shown.
	Caution This symbol draws attention to a possible damage of instruments or instrument parts.
	Note This symbol marks additional information and tips.

1.10 What is new in tiamo 3.0?

This chapter describes the changes in tiamo 3.0 compared to tiamo 2.5.

1.10.1 Improvements

General

tiamo 3.0 as 64-bit version

- tiamo 3.0 is installed as 64-bit version.
- If it is updated from an earlier tiamo version, the installation remains in the existing program directory.

New Windows versions

- tiamo 3.0 supports the following Windows versions (only 64-bit):
  - Windows 10 Pro / Enterprise
  - Windows Server 2019
  - Windows Server 2016
  - Windows Server 2012 R2

  The following Windows versions are no longer supported:
  - Windows 8.1 Professional / Enterprise
  - Windows 8 Professional/Enterprise
  - Windows 7 Professional / Enterprise / Ultimate
  - Windows Vista Business/Enterprise/Ultimate
  - Windows XP Professional SP2
  - Windows Server 2012
  - Windows Server 2008 R2
  - Windows Server 2008
  - Windows Server 2003

New versions of third-party software

- tiamo 3.0 runs with Java version 11.
- tiamo 3.0 runs with the FastObjects database version 14.
  Due to the improved performance of the new database version, newly created databases use more disk space.
- Version 3.12 of the USB driver software is installed at the same time as the installation of tiamo 3.0. With the new driver software, tiamo 3.0 can also be installed after the OMNIS Software has already been installed.

Scalability of the software user interface

- tiamo 3.0 adapts to the scaling settings of Windows and can therefore also be used on high-resolution monitors.

1.10.2 Fixed bugs

General

- Not all of the services necessary for running tiamo always functioned correctly after the computer was reactivated from sleep mode.

Program part Workplace

- The method run stopped during multiple execution of database blocks in combination with the **Always execute DATABASE command after track has stopped** parameter in an error track or exit track that was stopped.
- In the **Determination series** run window, the setpoint counter of the statistics was not always reset to **Number of single determinations** for new sample tables after the sample table was reset, as had been defined in the method.
- Intelligent exchange units (IEU) and dosing units (IDU) with corroded contacts were not monitored correctly. No error message was displayed at the time the method was started.
- If a measurement was performed in manual operation and then a method with the same measurement was started in the workplace without closing the window for manual operation, the parameters of the **MEAS** command were not taken into account.

Program part Database

- In the case of a report of a post-processed determination, the reason for change and the change comment were not output in the original report.

Program part Configuration

- If a result with mean value was saved in the **CALC** command, and if the determination was post-processed in the database during the running statistics series, then the change in the post-processing was not taken into account for the following determinations of the same statistics series. Common variables, global variables and titers were described with the wrong values as a result.
- No corresponding entry was created in the Audit Trail after an administrator assigned a new start password for a user.

2 General program functions

2.1 Program parts

2.1.1 Program parts

General program functions

tiamo™ has five different program parts which can be opened by clicking on the corresponding symbol in the vertical bar on the left. The symbol for the opened program part is shown in color, the symbols for the other program parts in black and white. The menus, symbol bars and content of the main window depend on the program part currently opened.

Program part workplace

- Opening/closing workplaces
- Starting single determinations and determination series
- Sample tables

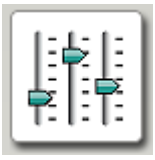
Program part database

- Opening/Closing databases
- Managing databases
- Reprocessing
- Creating report templates

Program part method

- Opening/Closing existing methods
- Creating new methods
- Managing methods

Program part configuration



- Configuring devices, solutions, sensors, common variables and rack data
- Security settings
- User administration
- Program administration
- Audit Trail

Program part manual

- Manual control of devices

NOTICE

Access to the individual program parts can be deactivated in the user administration. In this case, the corresponding symbols are hidden.

2.1.2 Workplace - Desktop

Program part: **Workplace**

Workplace symbol

Clicking on the workplace symbol in the vertical bar on the left opens the program part **Workplace** while, at the same time, the workplace symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of workplaces currently opened *(see chapter 3.2.3.1, page 97)*.

Elements

The desktop of the program part **Workplace** comprises the following elements:

- Workplace-specific menu bar.
- Workplace-specific toolbar.
- Main window in which up to 5 subwindows can be displayed.

2.1.3 Database - Desktop

Program part: **Database**

Database symbol

Clicking on the database symbol in the vertical bar on the left opens the program part **Database** while, at the same time the database symbol is

shown in color. The upper left corner of the symbol contains a black field displaying the number of databases currently opened *(see chapter 4.2.2, page 199)*.

Elements

The desktop of the program part **Database** comprises the following elements:

- Database-specific menu bar.
- Database-specific toolbar.
- Main window in which up to 6 subwindows can be displayed.

2.1.4 Method - Desktop

Program part: **Method**

Method symbol

Clicking on the method symbol in the vertical bar on the left opens the program part **Method** while, at the same time the method symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of methods currently opened *(see chapter 5.2.3, page 402)*.

Elements

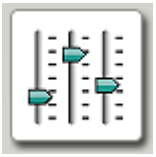
The desktop of the program part **Method** comprises the following elements:

- Method-specific menu bar.
- Method-specific toolbar.
- Main window, in which several methods can be opened but only two methods can be shown at the same time.

2.1.5 Configuration - Desktop

Program part: **Configuration**

Configuration symbol



Clicking on the configuration symbol in the vertical bar at the left opens the program part **Configuration** while, at the same time the configuration symbol is shown in color.

Elements

The desktop of the program part **Configuration** comprises the following elements:

- Configuration-specific menu bar.
- Configuration-specific toolbar.
- Main window in which up to 6 subwindows can be displayed.

2.1.6 Manual control - Desktop

Program part: **Manual Control**

Manual Control symbol

If you click on the **Manual** symbol in the vertical bar on the left margin, the program part **Manual Control** will be opened in its own window, while the **Manual** symbol will be shown in color at the same time.

Elements

The desktop of the program part **Manual control** comprises the following elements:

- *Selecting device*
- *Functions/Parameters*
- *Graphic function*

2.2 Login/password protection

2.2.1 General information on Login/password protection

Program parts: **Workplace / Database / Method / Configuration**

Login into tiamo

tiamo can be configured so that all users have to log in with their **user name** and **password** and this data is automatically checked. This requires a **User administration** to be set up and the corresponding **Security settings** to be made. This data is saved in the configuration database. In the case of client/server systems, this is on the server and applies globally for all clients (central user administration).

FDA-compliant settings

If you are to be in compliance with the FDA, the settings on the **Login/ Password protection** tab in dialog window **Security settings** must be activated according to 21 CFR Part 11 by activating the check box **Set-**

tings according to 21 CFR Part 11. The following conditions will then be complied with:

- A **login with user name and password** is required each time the program is started.
- **User names** must be **unique**. Users entered once cannot be deleted.
- **Passwords** must be **unique** per user. None of the expired passwords already used once by the user may be reused.
- Passwords must be changed according to a defined **validity period**.
- The **number of login attempts** is limited. If this number is exceeded, the user will automatically be set to the status **inactive**.

Actions

If the login is activated, the following actions can be performed:

- *Log in at program start*
- *Manual logout*
- *Automatic logout*
- *Change password*

2.2.2 Login

Program parts: **Workplace / Database / Method / Configuration**

If both the options **Enforce login with user name** and **Enforce login with password** are activated in the **Security settings**, the dialog window **Login** will appear every time the program is started and after each time the user logs out.

User

Entering a short name for the user.

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

NOTICE

Users who log in for the first time or users whose status has been reset from **disabled** or **removed** back to **enabled**, must log in with the **Start password** *(see chapter 6.2.1.3.1, page 1312)* specified by the administrator. Afterwards, the window **Change password** will automatically be opened, in which a new password has to be entered.

[Change password]

Opens the window **Change password**, in which the new password has to be entered and confirmed.

[Cancel]

The login is canceled, the program is terminated.

2.2.3 Manual logout

Menu item: **Workplace / Database / Method / Configuration ► File ► Logout**

A logged in user can logout at any time with the menu item **File ► Logout...**. The logout options defined in the **Security settings** apply. After the logout the **Login** appears, allowing a new user to log in.

2.2.4 Automatic logout

Program parts: **Configuration**

If the automatic logout is activated in the **Security settings**, the user will then automatically be logged out after a definite waiting time if he does not perform any operating functions via the keyboard or mouse. Afterwards the **Login** window opens, in which however only the same user or the members of the same user group can log in.

NOTICE

Users with administrator rights can log in in each case, and an emergency stop is also possible.

2.2.5 Change password

Dialog window: **Login ► [Change password] ► Change password**

NOTICE

In **tiamo**, the password can only be changed if the option **Password monitoring by tiamo** is set in the **Security settings**.

[Change password]

This button in the dialog window **Login** opens the window **Change password**, in which the new password has to be entered and confirmed.

NOTICE

The password always has to be changed before the **Passwords expire every** of the password expires. For users who are logging in for the first time or users whose status has been reset from **disabled** or **removed**removed back to **enabled**, this window is automatically opened after logging in with the **Start password**. For **Old password** you also need to enter the **Start password** specified by the Administrator.

Old password

Entry of the previous password.

Entry	**24 characters**

New password

Entry of the new password. The password options are defined in the **Security settings** on the tab **Login/Password protection**.

Entry	**24 characters**

Confirm password

Confirmation of the new password.

Entry	**24 characters**

2.3 Electronic signatures

2.3.1 Rules for electronic signatures

Program parts: **Method / Database**

In tiamo, methods and determination can be **electronically signed** at two levels. The following rules apply for this:

- **Signature levels**
  Methods and determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.
- **Multiple signing**
  Methods and determinations can be signed several times at each level. All signatures are saved and documented in the Audit Trail.
- **Signing at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.

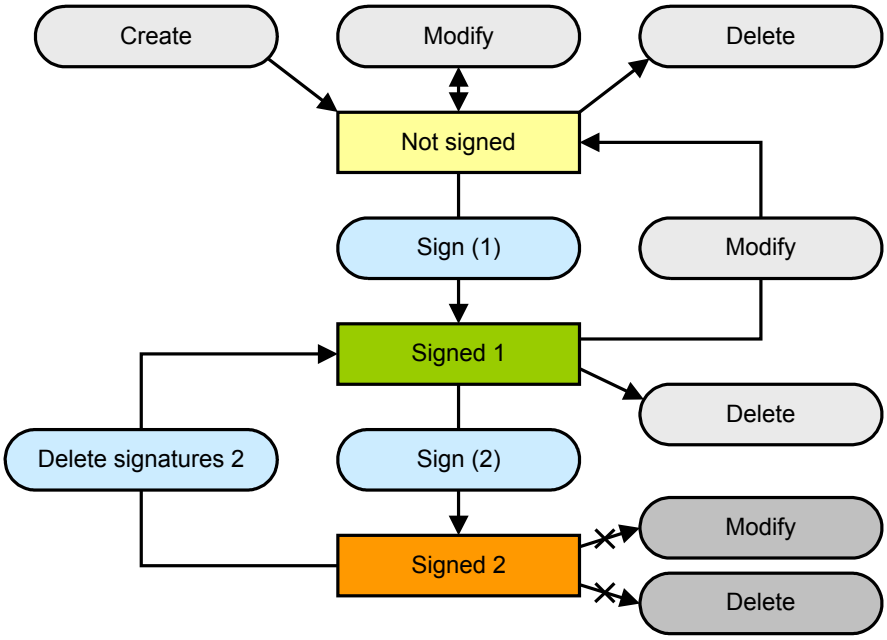
- **Signing at Level 2**
  Level 2 can only be signed if signatures already exist at Level 1.
- **Different users**
  The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
  Each signature must be accompanied by a reason selected from predefined default reasons. Additionally, a further comment can be entered.
- **Saved data**
  For each signature, signature date, user name, full name, reason and comments are saved.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when creating a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Signing methods**
  Methods can only be signed individually.
- **Signature options**
  The options for electronic signatures are set in the **Signatures** tab in the **Security settings** dialog window.

2.3.2 Procedure for electronic signatures

Program parts: **Database / Method**

Methods and determinations exhibit one of the following three states in relation to signatures (see flow diagram):

- **Not signed**
  Methods and determinations which are not signed can be deleted and changed, a new version being created at each change.
- **Signed (1)**
  When signing methods and determinations at Level 1, no new versions are generated. If methods and determinations signed at Level 1 are changed, a new version is generated, which no longer contains any signatures. Methods and determinations signed at Level 1 can be deleted.
- **Signed (2)**
  When signing methods and determinations at Level 2, no new versions are generated. Methods and determinations signed at Level 2 can neither be changed nor deleted. However, it is possible to delete the signatures (2), whereby the signatures (1) are retained.



2.3.3 Signature Level 1

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Signature 1... ▶ Signature Level 1**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Signature 1... ▶ Signature Level 1**

In the window **Signature Level 1**, methods or determinations can be signed at level 1.

NOTICE

Methods or determinations which have been signed at level 1 can be modified and deleted. If the modified method or determination is saved as a new version then all existing signatures will be deleted automatically, i.e. the method or determination must be signed again.

Info

Display of information for signing and deleting signatures. The following messages are possible:

Selection	**Signature possible | Signature 1 not possible (signature 2 exists) | Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)
The selected method or determination can no longer be signed at level 1 as it has already been signed at level 2.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 1**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 1 if the user belongs to a user group with the corresponding authorization.

2.3.4 Signature Level 2

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Signature 2... ▶ Signature Level 2**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Signature 2... ▶ Signature Level 2**

In the window **Signature Level 2**, methods or determinations can be signed at level 2.

NOTICE

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be modified nor deleted. In order to be able to edit such methods or determinations again, the signatures on level 2 must first be deleted.

Info

Information for signing and deleting signatures is displayed in this box. The following messages are possible:

Selection	**Signature possible** | **Signature 2 not possible (signature 1 missing)** | **Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)
The selected method or determination cannot be signed at level 2 as it has not yet been signed at level 1.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization.

2.3.5 Delete signatures level 2

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

In the window **Delete Signatures Level 2**, all signatures on level 2 for the selected method or determination can be deleted.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Delete]

Delete signatures 2.

NOTICE

Signatures 2 can only be deleted if the user belongs to a user group with the corresponding authorization.

2.4 Formula editor

Dialog window: **Formula editor**

The formula editor serves as a support when entering formulas for result calculation. It has an automatic **syntax check**, which is activated when the formula is applied. The general rules of priority apply for the calculation operations.

The **Formula editor** dialog window contains the following elements:

- **Input field**
  Entry of the calculation formula *(see chapter 2.4.1, page 24)*.
- **Buttons**
  Buttons for the quick entry of operators, parentheses and brackets *(see chapter 2.4.1, page 24)*.
- **Variables**
  Selection of the variables available for the calculation formula *(see chapter 2.4.3, page 27)*.
- **Operators/functions**
  Selection of the operators and functions available for the calculation formula *(see chapter 2.4.4.1, page 50)*.
- **Description**
  Description of the selected variables, operators or functions.

2.4.1 Input field

Dialog window: **Formula editor**

The calculation formula is entered in the input field of the formula editor. The following options are available for the entry:

Entry via keyboard

- **Numbers**
  Numbers as well as mathematical functions can be entered directly via the keyboard.
- **Text**
  Text must be enclosed in quotation marks **"** (e.g. **"my text"**).
- **Variables**
  Variables must be entered with an apostrophe **'** at the beginning and at the end (e.g. **'MV.my variable'**).
- **Time**
  Time indications must always be made with the aid of the **Time( )** function.

Entry using the buttons

Mathematical operators and parentheses or brackets can simply be inserted in the formula using the corresponding buttons. A space is automatically inserted before and after the character.

+	*Addition*	=	*Equal to*	AND	*Logical AND*
–	*Subtraction*	>	*Greater than*	OR	*Logical OR*
×	*Multiplication*	<	*Less than*	( )	Round parentheses
/	*Division*	<>	*Not equal to*	{ }	Curly brackets e.g. for endpoint definition (example **'DETpH 1.EP{1}.VOL'**)
^	*Potentiation*	<=	*Less than or equal to*		*Molar mass calculator*
		>=	*Greater than or equal to*		Undo last action
					Redo last action

Entry via selection

The element selected in the **Variables** or **Operators** fields can be added to the formula with a double-click or with **[Insert]**.

2.4.2 Calculation algorithms

Dialog window: **Formula editor**

Numerical format

The standard IEEE 754 (1985) for binary floating-point arithmetic is implemented in "double precision" (64 bit) in the software.

Rounding-off process

Measured values and results are rounded off symmetrically (commercial rounding). I.e., **1, 2, 3, 4** are always rounded down whereas **5, 6, 7, 8, 9** are always rounded up.

Examples

2.33 yields **2.3**

2.35 yields **2.4**

2.47 yields **2.5**

–2.38 yields **–2.4**

–2.45 yields **–2.5**

Statistics

The mean value as well as the absolute and relative standard deviation of results *R* are calculated using the following formulas:

Mean value

$$\bar{x}_k = \frac{1}{n} \cdot \sum_{i=1}^{n} R_{k,i}$$

Absolute standard deviation

$$Sabs_k = +\sqrt{\frac{\sum_{i=1}^{n} \left(R_{k,i} - \bar{x}_k\right)^2}{n-1}}$$

Relative standard deviation (in %)

$$Srel_k = 100 \cdot \frac{Sabs_k}{\bar{x}_k}$$

The calculation of the mean value and the standard deviation requires a multitude of calculation operations, which are carried out with full accuracy. The input data (results) and the output data (mean value, standard deviation), however, are then rounded off to the accuracy specified by the user.

It is not the number of decimal places which is decisive for the accuracy of the calculations, but rather the number of significant digits of the decimal numbers displayed. As a result of the binary 64-bit numerical format implemented on the basis of the IEEE 754 standard, the resulting decimal numbers have 15 reliable significant decimal places.

You can influence the number of significant digits by selecting the unit and the number of decimal places. As the result unit to be set sometimes contains the prefix "milli" as well as the actual physical unit, the number of significant places changes accordingly by three places during such a conversion.

Example

The displayed result of **1,234.56789158763 mg/L** has 15 reliable digits. It should be rounded off to three decimal places according to the above rounding-off process:

1,234.568 mg/L (7 significant places, 3 of them decimal places)

The unit "**g/L**" means that the same result **1.23456789158763 g/L** is also rounded off to three decimal places:

1.235 g/L (4 significant places, 3 of them decimal places)

The number of significant digits has now been reduced by three to four digits by omitting the prefix "milli".

NOTICE

The above losses with respect to accuracy caused by rounding off in the range of the maximum reliable places are only theoretically relevant. Most of the time they are lower by several orders of magnitude than, for example, the uncertainties resulting from sample size.

2.4.3 Variables

2.4.3.1 Variables - Overview

Dialog window: **Formula editor**

Variables are automatically generated by the program during or at the end of the determination. You can use the formula editor to access these and either use the values for further calculations or output them in reports as a result.

Variable types

The following types of variables are differentiated:

Name	Syntax	Description
Method variables	**'MV.Variable name.Variable identification'**	Method variables are variables defined in the **START** command.
Command variables	**'Command name.Variable name'**	Command variables are variables which are generated by the individual commands in the method run. The command variables are displayed in the order determined by the commands executed in the method run.
Result variables	**'RS.Result name.Variable identification'**	Result variables are special command variables which are generated by **CALC** and which are available under a designation of their own.
Determination variables	**'DV.Variable identification'**	Determination variables are general variables and cannot be assigned to individual commands.

Name	Syntax	Description
System variables	**'SV.Variable identification'**	System variables are general variables which are adopted in the determination at the start of the determination.
Common variables	**'CV.Variable name.Variable identification'**	Common variables are client-specific variables, which are adopted from the table of the **Configuration** program part at the start of the determination and assigned to the determination.
Global variables	**'GV.Variable name.Variable identification'**	Common variables apply to all clients and are adopted from the table of the **Configuration** program part at the start of the determination and assigned to the determination.

Entering variables

Variables must always be entered and ended with an apostrophe **'** (e.g. **'MV.myVariable'**).

NOTICE

When using variables, always observe their data type (**Number**, **Text** or **Date/Time**).

2.4.3.2 Method variables

Dialog window: **Formula editor ► Variables**

Method variables are method-specific and are defined in the **START** command of the method. There the data type (**Text**, **Number**, **Date/Time**) of the variables is defined. Either sample data variables (**Sample size**, **Unit**, **Sample position**, **ID1 - ID16**) or fixed values can be assigned to these variables. The **Variables** field of the formula editor lists all the **Method variables** that are available for the current method.

Syntax

'MV.Variable name.Variable identification'

Examples: **'MV.TestDate'**, **'MV.RemainingTime.VAL'**, **'MV.TestValue.OVF'**

Method variables can be selected directly in the formula editor under **Variables ► Method variables** so as to avoid syntax errors.

Method variables

Variable name	Description	Data type
.VAL	Value of the method variable (optional, i.e. **'MV.Factor?** = **MV.Factor.VAL'**) (**Text**, **Number** or **Date/Time**)	Text, Number or Date/Time
.OVF	Exceeding limits for method variable (**Number**: **1 = limit exceeded**, **0 = limit not exceeded**)	Number
In the following lines you will find the method variables (sample data) present in the default settings which appear in the **Workplace** and which can be edited and deleted in the **START** command of the corresponding method.		
Sample size.VAL	Value of 'Sample size'	Number
Sample size.OVF	Exceeding limit for 'sample size'	Number
Unit.VAL	Value of 'Unit'	Text
Unit.OVF	Exceeding limit for 'unit'	Number
Sample position.VAL	Value of 'Sample position'	Number
Sample position.OVF	Exceeding limit for 'sample position'	Number
ID1 (- 3).VAL	Value of 'ID1 - 3'	Text
ID1 (- 3).OVF	Exceeding limit for 'ID - 3'	Number

2.4.3.3 Method variables of the next sample data line

Dialog window: **Formula editor ► Variables**

Method variables are method-specific and are defined in the **START** command of the method. There the data type (**Text**, **Number**, **Date/Time**) of the variables is defined. Either sample data variables (**Sample size**, **Unit**, **Sample position**, **ID1 - ID16**) or fixed values can be assigned to these variables. The **Variables** field of the formula editor lists all the **Method variables** that are available for the current method.

Syntax

'MV.NEXT.Variable name.Variable identification'

These variables contain the sample data of the *next line of the sample table* of a determination series. These variables are distinguished in the

syntax from the sample data variables of the current sample data line by means of the word **NEXT**. The data type (**Text**, **Number** or **Date/Time**) depends on the variable.

Method variables can be selected directly in the formula editor under **Variables ► Method variables ► NEXT** so as to avoid syntax errors.

Method variables

Variable name	Description	Data type
.VAL	Value of the method variable (optional, i.e. **'MV.NEXT.Factor'** = **MV.NEXT.Factor.VAL'**) (**Text**, **Number** or **Date/time**)	Text, Number or Date/Time
.OVF	Exceeding limits for method variable (**Number**: **1 = limit exceeded**, **0 = limit not exceeded**)	Number
In the following lines you will find the method variables (sample data) present in the default settings which appear in the **Workplace** and which can be edited and deleted in the **START** command of the corresponding method.		
Sample size.VAL	Value of 'Sample size'	Number
Sample size.OVF	Exceeding limit for 'sample size'	Number
Unit.VAL	Value of 'Unit'	Text
Unit.OVF	Exceeding limit for 'unit'	Number
Sample position.VAL	Value of 'Sample position'	Number
Sample position.OVF	Exceeding limit for 'sample position'	Number
ID1 (- 3).VAL	Value of 'ID1 - 3'	Text
ID1 (- 3).OVF	Exceeding limit for 'ID - 3'	Number

NOTICE

For method variables of the next sample data line, the following rules apply:

- If in a determination a method variable of the next sample data line is used, the data type of this variable has to be identical to the one of the current sample data line. If this is not the case, then the value **invalid** will be assigned to the variable.
- Method variables of the next sample data line are always read out of the sample table at the beginning of the determination.
- In the case of a single determination or if the current determination is the last determination of a series, all of the method variables of the next sample data line contain the value **invalid**.

2.4.3.4 Command variables

Dialog window: **Formula editor ► Variables**

The command variables are method-specific and depend on which commands are used in the method. Included among the command variables are also solution and sensor variables, which are applied automatically from the corresponding tables in the **Configuration** for the instrument-dependent commands when the determination is started and which are assigned to the individual commands. The **Variables** field of the formula editor lists all **Command variables** that are available for the current method.

Syntax

'Command name.Variable identification'

Examples: **'DET U 3.SME'**, **'Track 6.BSY'**, **'Liquid Handling 4.CONC'**

Command variables can be selected directly in the formula editor under **Variables ► Command variables** in order to avoid syntax errors.

Command variables

Unless marked otherwise, all of the variables listed here in alphabetical order are of the **Number** type.

NOTICE

In the case of variables with index **{x}**, the desired number **1 - 9** must be entered for **x** (e.g. **.EP{3}.ERC** for the third endpoint).

If no index is specified, then the last index will be used automatically (e.g. **.EP.ERC** for the last endpoint).

Identification	Description	Commands
.BLV	Blank value for the sensor used for the command (only for ISE sensor) and/or blank value calculated from the calibration (for CAL LOOP Conc)	DET U, MET U, SET U, STAT U, MEAS U, MEAS Conc, CAL LOOP Conc, DOS U
.BP{x}.CNT	Intensity for the break point x (1 - 9) in counts	MEAS Opt
.BP{x}.DME	Measured value differential for the break point x (1 - 9)	MET
.BP{x}.ERC	ERC or first derivative for the break point x (1 - 9)	DET
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TIM	Time for the break point x (1 - 9) in s	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TRN	Transmission for the break point x (1 - 9) in %	MEAS Opt
.BP{x}.VOL	Volume for the break point x (1 - 9) in mL	DET, MET
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started	All except START and END
.C0	Coefficient c0 of the calibration curve	CAL Spec, CAL LOOP Opt
.C1	Coefficient c1 of the calibration curve	CAL Spec, CAL LOOP Opt
.C2	Coefficient c2 of the calibration curve	CAL Spec, CAL LOOP Opt
.C3	Coefficient c3 of the calibration curve	CAL Spec, CAL LOOP Opt

Identification	Description	Commands
.CAL	Status of the calibration: **1 = calibrated normally**, **0 = canceled**, because reference wavelength was not found.	CAL Spec
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**	SET, KFT, KFC, BRC
.CLC	Cell constant of the sensor used in the command (with conductivity sensors)	MET Cond, MEAS Cond, CAL Cond
.COD	Coefficient of determination (R^2), which is calculated on the basis of the calibration function and of the confidence interval.	CAL LOOP Opt, STDADD
.COK	Command status; **1 = Condition requirement fulfilled**, **0** = **Condition requirement not fulfilled**	SET, KFT, KFC, BRC
.CONC	Concentration of the solution used for the command	DET, MET, SET, KFT, STAT, ADD, DOS, LQH, STDADD
.CP{#}.MEA	Measured wavelength of the calibration point in nm. If no measured peak can be assigned, then **not found** will be entered.	CAL Spec
.CP{#}.REF	Reference wavelength of the calibration point in nm.	CAL Spec
.CYL	Cylinder volume of the exchange or dosing unit used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH, PREP, EMPTY

Identification	Description	Commands
.DBL	Total duration for the processing of the command in s	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS, CAL Cond, CAL MEAS, CAL Spec, STDADD, DOS, ELT MEAS
.DEF	Default value which is defined in the configuration for an IO port	ANALOG OUT, DIGITAL OUT
.DRI	Current and/or last drift for drift correction in µL/min	SET, KFT, KFC, BRC
.DSC	Time for processing all start conditions in s	DET, MET, SET, KFT, STAT
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)	SET, KFT, KFC, BRC
.EGF	Last measured gas flow rate (measured value following processing of the command) in mL/min	MEAS T/Flow
.EME	End measured value (measured value after processing of the command) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, STDADD, DOS, ELT MEAS
.ENP	Electrode zero point for the sensor used for the command (dimensionless for pH sensor or in mV for the ISE sensor) and/or electrode zero point calculated from the calibration (for STDADD and CAL LOOP)	DET pH, DET U, MET pH, MET U, SET pH, SET U, STAT, MEAS pH, MEAS U, MEAS T, MEAS Conc, STDADD, CAL LOOP, DOS, ELT LOOP
.EP{x}.CHA	Charge for endpoint x (1 - 9) in mA·s	KFC, BRC

Identification	Description	Commands
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)	MET
.EP.DVT	Drift for the endpoint x (1 - 9) in µg/min	KFC, BRC
.EP{x}.ERC	ERC for the endpoint x (1 - 9)	DET
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**	DET, MET, SET, KFT
.EP.QTY	Measured value for the endpoint in µg	KFC, BRC
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C	DET, MET, SET, KFT, KFC, BRC
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached	DET, MET, SET, KFT, KFC, BRC
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL	DET, MET, SET, KFT
.EPP	Position after finishing the command. **0 = invalid position**.	PORT
.ETE	End temperature (temperature following processing of the command) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL Cond, CAL MEAS, STDADD, DOS, ELT MEAS

Identification	Description	Commands
.ETR	Result of the electrode test. Electrode quality: 0 = No data available 1 = Short circuit 2 = Excessive start drift 3 = Wrong buffer 4 = Problems with the diaphragm 5 = Reference system defective 6 = No buffer values for the temperature or excessive deviation of the temperature between buffers 7 = Partial short circuit 8 = Glass defective 9 = Poor electrode 10 = Usable electrode 11 = Good electrode 12 = Excellent electrode	ELT LOOP
.EVT	End volume (total dosed volume at the end of the command) in mL	DET, MET, SET, KFT, STAT, DOS
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**	All except START and END
.FP{x}.CNT	Intensity for the fixed endpoint x (1 - 9) in counts	MEAS Opt
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9)	MET
.FP{x}.DVT	Drift for the fixed endpoint x (1 - 9) in µg/min	KFC, BRC
.FP{x}.ERC	ERC for the fixed endpoint x (1 - 9)	DET

Identification	Description	Commands
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV	DET, MET, SET, KFT, STAT
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value	KFC, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.QTY	Measured value for the fixed endpoint x (1 - 9) in µg	KFC, BRC
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.TRN	Transmission for the fixed endpoint x (1 - 9) in %	MEAS Opt
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL	DET, MET, SET, KFT, STAT
.GMA	Maximum gas flow rate in mL/min	MEAS T/Flow
.GMI	Minimum gas flow rate in mL/min	MEAS T/Flow
.GMN	Average gas flow rate in mL/min	MEAS T/Flow
.GP.VOL	Volume for Gran endpoint in mL	DET, MET
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value	DET, MET
.GP.TEM	Temperature for Gran endpoint in °C	DET, MET
.GP.TIM	Time for Gran endpoint in s	DET, MET
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)	DET, MET

Identification	Description	Commands
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C	DET, MET
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached	DET, MET
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL	DET, MET
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min	MEAS T/Flow
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, STDADD, DOS, ELT MEAS
.ITE	Initial temperature (temperature before start conditions are processed) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS, ELT MEAS
.IVE	Value of the input at the end of the command.	CONTROL
.IVS	Value of the input at the start of the command.	CONTROL
.LCO	Loop counter = current number of completed runs, both of *Repeat loops* and of *While loops*	LOOP, CAL LOOP, ELT LOOP
.LP.CAx	Calculated value x (1 - 3) for the last measuring point on the measuring point list	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec, Opt), DOS

Identification	Description	Commands
.LP.CHA	Charge for the last measuring point of the measuring point list in mA s	KFC, BRC
.LP.CNT	Intensity of the last measuring point of the measuring point list in counts	MEAS Opt, MEAS Opt Conc, CAL MEAS Opt
.LP.DME	Measured value differential for the last measuring point on the measuring point list	MET
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC, BRC)	SET, KFT, KFC, BRC, STAT, DOS
.LP.ERC	ERC for the last measuring point in the measuring point list	DET
.LP.EXx	External value x (1 - 3) for the last measuring point on the measuring point list	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec, Opt), DOS
.LP.GFL	Gas flow value for the last measuring point on the measuring point list in mL/min	MEAS T/Flow
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA	KFC, BRC
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, DOS, ELT MEAS
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg	KFC, BRC

Identification	Description	Commands
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, DOS, ELT MEAS
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, DOS, ELT MEAS
.LP.TRN	Transmission of the last measuring point of the measuring point list in %	MEAS Opt, MEAS Opt Conc, CAL MEAS Opt
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list in V; in case of measurements with 756, 831: **0 = not defined**, **1 = <14 V**, **2 = 14 - 28 V**, **3 = >28 V**	KFC, BRC
.LP.VOL	Volume for the last measuring point in the measuring point list in mL	DET, MET, SET, KFT, STAT, DOS
.LPO	Current absolute lift position in mm (entry when ending the command)	LIFT
.LST	Start time of the loop command (**Date/Time**)	LOOP, CAL LOOP, ELT LOOP
.MA.CNT	Intensity for maximum measured value in counts	MEAS Opt
.MA.MEA	Maximum measured value in the unit of the measured value	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)

Identification	Description	Commands
.MA.TEM	Temperature for the maximum measured value in °C	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MA.TIM	Time in s until the maximum measured value is reached	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MA.TRN	Transmission for maximum measured value in %	MEAS Opt
.MA.VOL	Volume at maximum measured value in mL	DET, MET, SET, KFT, STAT
.MI.CNT	Intensity for minimum measured value in counts	MEAS Opt
.MI.MEA	Minimum measured value in the unit of the measured value	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MI.TEM	Temperature at minimum measured value in °C	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MI.TIM	Time for the minimum measured value in s	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MI.TRN	Transmission for minimum measured value in %	MEAS Opt
.MI.VOL	Volume at minimum measured value in mL	DET, MET, SET, KFT, STAT
.MN.MEA	Average of the measured value in the unit of the measured value	MEAS T/Flow
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range	STAT, DOS

Identification	Description	Commands
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min	STAT, DOS
.MR.MRT	Mean dosing rate for the whole range in mL/min.	STAT, DOS
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL Cond, CAL MEAS, STDADD, DOS, ELT MEAS
.NMP	Number of measuring points in measuring point list	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL Cond, CAL MEAS, DOS, ELT MEAS
.OVE	Value of the output at the end of the command. Direct controller/2-point controller: **1 = active**, **0 = inactive** PID/PWM: -100 to 100% (value of the analog output or the pulse frequency)	CONTROL
.OVS	Value of the output at the start of the command. Direct controller/2-point controller command status: **1 = active**, **0 = inactive** PID/PWM: -100 to 100% (value of the analog output or the pulse frequency)	CONTROL
.PK{x}.ABS	Absorbance of the peak x (1 - 9) in mAU	MEAS Spec

Identification	Description	Commands
.PK{x}.TRN	Transmission of the peak x (1 - 9) in %	MEAS Spec
.PK{x}.CNT	Intensity of the peak x (1 - 9) in counts	MEAS Spec
.PK{x}.CNR	Intensity of the peak x (1 - 9) in the reference spectrum in counts	MEAS Spec
.PK{x}.CND	Intensity of the peak x (1 - 9) in the dark spectrum in counts	MEAS Spec
.PK{x}.WVL	Wavelength of the peak x (1 - 9) in nm	MEAS Spec
.PK{x}.SAT	Detector with peak x (1 - 9) saturated: **1 = saturated**;**0 = not saturated**	MEAS Spec
.RAN	Current absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when exiting the command)	MOVE
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window x (1 - 9)	STAT
.RE{x}.DRS	Standard deviation for mean dosing rate in window x (1 - 9) in mL/min	STAT
.RE{x}.DRT	Mean dosing rate in window x (1 - 9) in mL/min	STAT
.RE{x}.RWL	Lower limit of the evaluation window x (1 - 9) in s	STAT
.RE{x}.RWH	Upper limit of the evaluation window x (1 - 9) in s	STAT
.RES	Calculated result of the standard addition in the selected unit	STDADD
.RPO	Current rack position (entry when exiting the command); **0** means **'not defined'**	MOVE
.RTE	Reference temperature in °C	MET Cond, MEAS Cond, CAL Cond

Identification	Description	Commands
.SAN	Current absolute swing angle of the robotic arm in ° (entry upon exiting the command)	MOVE, SWING
.SLO	Electrode slope of the sensor used for the command (in % for pH sensor or mV for ISE sensor) or electrode slope calculated from the calibration (for STDADD and CAL LOOP)	DET pH, DET U, MET pH, MET U, SET pH, SET U, STAT, MEAS pH, MEAS U, MEAS T, MEAS Conc, STDADD, CAL LOOP, DOS, ELT LOOP
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC, STAT
.SPO	Current external position (entry when ending the command); **0** means **invalid position**	SWING
.STC {x}	Concentration of the standard x (1 - 50) used for the command	CAL LOOP Opt
.STE	Start temperature (temperature after processing the start conditions) in °C	DET, MET, SET, KFT, KFC, BRC, STAT
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**	DET, MET, SET, KFT, STAT, MEAS, CAL Cond, CAL MEAS, CAL Spec, STDADD, DOS, ELT MEAS
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL	DET, MET, SET, KFT, STAT
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL	DET, MET

Identification	Description	Commands
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL	DET, MET
.SVT	Total start volume (volume that was added according to all three start conditions) in mL	DET, MET, SET, KFT, STAT
.TC.TC	Temperature coefficient of the conductivity in %/°C	MET Cond, MEAS Cond, CAL Cond
.TC.C0	Coefficient of the Chebyshev polynomial of the conductivity of the zero order	MET Cond, MEAS Cond, MEAS TC Cond
.TC.C1	Coefficient of the Chebyshev polynomial of conductivity of the first order	MET Cond, MEAS Cond, MEAS TC Cond
.TC.C2	Coefficient of the Chebyshev polynomial of conductivity of the second order	MET Cond, MEAS Cond, MEAS TC Cond
.TC.C3	Coefficient of the Chebyshev polynomial of conductivity of the third order	MET Cond, MEAS Cond, MEAS TC Cond
.TC.C4	Coefficient of the Chebyshev polynomial of conductivity of the fourth order	MET Cond, MEAS Cond, MEAS TC Cond
.TC.MIN	Minimum temperature coefficient of the conductivity in %/°C	MET Cond, MEAS Cond, MEAS TC Cond
.TC.MAX	Maximum temperature coefficient of the conductivity in %/°C	MET Cond, MEAS Cond, MEAS TC Cond
.TC.TSTART	Start temperature in °C	MET Cond, MEAS Cond, MEAS TC Cond
.TC.TSTOP	Stop temperature in °C	MET Cond, MEAS Cond, MEAS TC Cond

Identification	Description	Commands
.TITER	Titer value of the solution used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH
.TMF	Transmission factor (dimensionless)	MEAS TMF
.TOL	Tolerance within which a measured peak can be assigned to a calibration wavelength.	CAL Spec
.TOU	Timeout status: **1 = Max. waiting time expired**; **0 = Max. waiting time not expired**	RECEIVE, TRANSFER, SCAN
.UNI	Mapping unit which is defined in the configuration for an IO port (**Text**)	ANALOG IN, ANALOG OUT
.VAL	Value of the command variables (optional, i.e. **Command name.Port name'** = **Command name.Port name.VAL'**) (**Number**). The value returned is the value after the ending of the command.	ANALOG IN, ANALOG OUT, DIGITAL IN, DIGITAL OUT
.VAR	Variance of the calculated result of the command in the selected unit	CAL LOOP pH, CAL LOOP Conc, ELT LOOP, STDADD
.VOL	Dosed volume	STDADD, ADD, DOS, LQH
.WVL	Wavelength of the Optrode in nm	DET U, MET U, MEAS U

2.4.3.5 Result variables

Dialog window: **Formula editor ► Variables**

Result variables are method-specific and are defined in the **CALC** command of the method. The **Variables** field of the formula editor lists all **Result variables** that are available for the current method.

Syntax

'RS.Result name.Variable identification'

Examples: **'RS.RS01.VAL' (='RS.RS01')**, **'RS.testTime.UNI'**

Method variables can be selected directly in the formula editor under **Variables ▶ Results** so as to avoid syntax errors.

Results

Identification	Description	Data type
.VAL	Result value, optional, i.e. **'RS.RS01'** = **'RS.RS01.VAL'**	Number
.ASD	Absolute standard deviation for the result	Number
.MAX	Maximum value of the result	Number
.MIN	Minimum value of the result	Number
.MNV	Mean value of the result	Number
.NSR	Statistics actual counter for the result	Number
.NST	Statistics setpoint counter for the result	Number
.OVF	Limit value violation for result; **1 = limit exceeded**, **0 = limit not exceeded**	Number
.RSD	Relative standard deviation for the result	Number
.STS	Statistics status for the result; **1 = Statistics on**, **0 = Statistics off**	Number
.UNI	Result unit	Text
.SLO	Slope for the linear regression (result vs. sample size)	Text
.ITC	Axis intercept for the linear regression (result vs. sample size)	Text
.COR	Correlation coefficient R for the linear regression (result vs. sample size)	Text

2.4.3.6 Determination variables

Dialog window: **Formula Editor ▶ Variables**

Determination variables are general variables that are generated in the method run. They are not assigned to individual commands. The **Variables** field of the Formula editor lists the **determination variables** which are available for the current method, sorted according to name.

Syntax

'DV.Variable name'

Examples: **'DV.DUR'**, **'DV.STT'**

You can select the determination variables directly in the formula editor under **Variables/Determination variables** in order to avoid syntax errors.

Available determination variables

Variable name	Description	Data type
DUR	Duration of the determination in s	Number
STT	Time point at which the determination was started	Date/ Time

2.4.3.7 System variables

Dialog window: **Formula Editor ► Variables**

System variables are general variables which are adopted in the determination at the start of the determination. They are assigned neither to individual commands nor to determinations. The **Variables** field of the Formula editor lists all **System variables** which are available for the current method.

Syntax

'SV.Variable name'

Examples: **'SV.SIN'**, **'SV.SLI'**

You can select the system variables directly in the formula editor under **Variables/System variables** in order to avoid syntax errors.

Available system variables

Variable name	Description	Data type
ACC	Autostart actual counter	Number
ACE	Autostart setpoint counter	Number
DID	Determination ID	Text
FUN	Full name of the logged-in user	Text
REM	Remarks	Text
RUN	Sample number	Number
SEN	Indication whether the end of the sample table has been reached; **1 = yes**, **0 = no**	Number

Variable name	Description	Data type
SIN	Indication whether the determination has been started as a single determination or within a series; **1 = single determination**, **0 = series determination**	Number
SLI	Sample table actual line (**number**)	Number
STA	Indication whether the statistics is activated; **1 = yes**, **0 = no**	Number
STC	Start counter	Number
USN	Short name of the logged-in user	Text
ORG	Method run: **1 = original determination**, **0 = reprocessing**	Number
STO	Indication whether the determination has been stopped (manual stop, stop via SEND command, emergency stop) or terminated normally ; **1 = stopped**, **0 = terminated normally**	Number

2.4.3.8 Common variables

Dialog window: **Formula Editor ▶ Variables**

Common variables are global variables, which are adopted from the corresponding table of the program part **Configuration**, where the common variables can be defined, at the start of the determination and assigned to the determination. The **Variables** field of the Formula editor lists all **Common Variables** which are available for the current method, sorted according to name.

Syntax

'CV.Variable name.Variable name'

Examples: **'CV.TestDate'**, **'CV.TestTime.VAL'**, **'CV.AverageTemp.UNI'**

You can select the common variables directly in the formula editor under **Variables/Common Variables** in order to avoid syntax errors.

Available Common Variables

Variable name	Description	Data type
VAL	Value of the Common Variable (facultative, i.e. **'CV.Test.VAL'** = **'CV.Test'**)	Text, number or date/ time
UNI	Unit of the Common Variable	Text

2.4.3.9 Global variables

Dialog window: **Formula Editor ► Variables**

Global variables are client-embracing variables, which are adopted from the corresponding table of the program part **Configuration**, where the global variables can be defined, at the start of the determination and assigned to the determination. The field **Variables** of the formula editor lists all **Global variables** which are available for the current method, sorted according to name.

Syntax

'GV.Variable name.Variable name'

Examples: **'GV.TestDate'**, **'GV.TestTime.VAL'**, **'GV.AverageTemp.UNI'**

You can select the global variables directly in the formula editor under **Variables/Global variables** in order to avoid syntax errors.

Available global variables

Variable name	Description	Data type
VAL	Value of the global variable (facultative, i.e. **'GV.Test.VAL'** = **'GV.Test'**)	Text, number or date/ time
UNI	Unit of the global variable.	Text

2.4.4 Operators/functions

2.4.4.1 Operators/functions - Overview

Dialog window: **Formula editor ► Operators/functions**

Overview of the operators and functions

Operators	Functions
Arithmetic: ▪ *Addition* (+) ▪ *Subtraction* (-) ▪ *Multiplication* (*) ▪ *Division* (/) ▪ *Potentiation* (^)	**Arithmetic:** ▪ *Exponential function* (Exp) ▪ *Natural logarithm* (Ln) ▪ *Common logarithm* (Log) ▪ *Square root* (Sqrt) ▪ *Absolute value* (Abs) ▪ *Fraction* (Frac) ▪ *Integer* (Int) ▪ *Round integer* (Round) ▪ *Sign* (Sign) ▪ *Quantiles of the Student's t-distribution* (Tinv)

Operators	Functions
Logic: ▪ *AND* ▪ *OR*	**Date/Time:** ▪ *Time()* ▪ *Time(Date)* ▪ *Time(Date+Time)*
Comparison: ▪ *Equal to* (=) ▪ *Greater than* (>) ▪ *Greater than or equal to* (>=) ▪ *Less than* (<) ▪ *Less than or equal to* (<=) ▪ *Not equal to* (<>)	**Type conversion:** ▪ *NumberToText* ▪ *NumberToTime* ▪ *TextToNumber* ▪ *TextToTime* ▪ *TimeToNumber* ▪ *TimeToText*
	Text: ▪ *TextPosition* ▪ *SubText* ▪ *Trim*
	Miscellaneous: ▪ *Error* ▪ *Case*

Priority rules of the operators

The operators are evaluated in the order in which they are listed in the table below. In order to attain the required order, it may be necessary to place operands in parentheses.

	Operators
Arithmetic	^
	*, /
	+, -
Comparison	<, <=, >, >=
Logic	AND, OR

2.4.4.2 Arithmetical operators

2.4.4.2.1 Addition

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 + Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**.

Examples

Operand1	Operand2	Result	Example	Remark
both operands of the same type:				
Number	Number	Number	**1.2 + 3 = 4.2**	-
Text	Text	Text	**"Metrohm" + "AG" = "Metrohm AG"**	If the maximum permissible length (65 536 characters) of the character string is exceeded by addition of the operands, the surplus characters will be removed from the second operand.
Time	Time	Number	**Time(1998;04;06) + Time(1964;02;03) = 59300.875** (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	**1.2 + "Metrohm" = "1.2Metrohm"**	-
Text	Number	Text	**"Metrohm" + 1.2 = "Metrohm1.2"**	-
Number	Time	Number	**2.0 + Time(1999;11;7) = 36472.96** (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	**Time(1999;10;7) + 2.0 = 36441.92** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" + Time(1999;10;7) = "Metrohm1999-10-07 00:00:00 UTC+2"**	Before the operation, the operand of the type **Date/Time** is converted to **Text**.
Time	Text	Text	**Time(1999;01;7) + "Metrohm" = "1999-01-07 00:00:00 UTC +1Metrohm"**	The same rules apply here as for the previous operation.

2.4.4.2.2 Subtraction

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 - Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**.

Examples

Operand1	Operand2	Result	Example	Remark
both operands of the same type:				

Operand1	Operand2	Result	Example	Remark
Number	Number	Number	**1.2 - 3 = -1.8**	-
Text	Text	Text	**"Metrohm" - "AG" = invalid**	This operation is not allowed.
Time	Time	Number	**Time(1998;01;06) - Time(1964;12;03) = 12'087.00** (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	**1.2 - "Metrohm" = invalid**	This operation is not allowed.
Text	Number	Text	**"Metrohm" - 1.2 = not valid**	This operation is not allowed.
Number	Time	Number	**2.0 - Time(1999;10;7) = -36'437.917** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	**Time(1999;10;7) - 2.5 = 36'437.917** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" - Time(1999;10;7) = invalid**	This operation is not allowed.
Time	Text	Text	**Time(1999;10;7) - "Metrohm" = invalid**	This operation is not allowed.

2.4.4.2.3 Multiplication

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 * Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**.

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**1.2 * 3 = 3.6**	-
Text	Text	Text	**"Metrohm" * "AG" = invalid**	This operation is not allowed.
Time	Time	Number	**Time(1998;05;06) * Time(1902;02;03) = 27'478'004.545** (for UTC+1 or +2 for summer time)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	**2 * "Metrohm" = "MetrohmMetrohm"**	-

Operand1	Operand2	Result	Example	Remark
Text	Number	Text	**"Metrohm" * 2 = "MetrohmMetrohm"**	-
Number	Time	Number	**2.0 * Time(1999;10;7) = 72'879.833** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	**Time(1999;10;7) * 2.0 = 72'879.833** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" * Time(1999;10;7) = invalid**	This operation is not allowed.
Time	Text	Text	**Time(1999;10;7) * "Metrohm" = invalid**	This operation is not allowed.

2.4.4.2.4 Division

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 / Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**.

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**1.2 / 3 = 0.4**	Operand2 must not be zero!
Text	Text	Text	**"Metrohm" / "AG" = invalid**	This operation is not allowed.
Time	Time	Number	**Time(1998;04;06) / Time(1964;02;03) = 1.533** (for UTC+1 or +2 for summer time)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	**1.2 / "Metrohm" = invalid**	This operation is not allowed.
Text	Number	Text	**"Metrohm" / 1.2 = invalid**	This operation is not allowed.
Number	Time	Number	**10'000 / Time(1999;10;7) = 274** (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	**Time(1999;02;17) / 10'000 = 3.621** (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time

Operand1	Operand2	Result	Example	Remark
Text	Time	Text	**"Metrohm" / Time(1999;10;7) = invalid**	This operation is not allowed.
Time	Text	Text	**Time(1999;10;7) / "Metrohm" = invalid**	This operation is not allowed.

2.4.4.2.5 Potentiation

Dialog window: **Formula editor ▶ Operators/Functions**

Syntax

Operand1 ^ Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**.

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**1.2 ^ 3 = 1.728**	Complex results (which comprise +b*i*, i.e. a real and an imaginary component) are displayed as an error.
Text	Text	Text	**"Metrohm" ^ "AG" = invalid**	This operation is not allowed.
Time	Time	Number	**Time(1900;01;05) ^ Time(1900;01;02) = 196.371** (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	**1.2 ^ "Metrohm" = invalid**	This operation is not allowed.
Text	Number	Text	**"Metrohm" ^ 1.2 = invalid**	This operation is not allowed.
Number	Time	Number	**1.2 ^ Time(1900;02;03) = 586.198** (for UTC+1)	-
Time	Number	Number	**Time(1999;10;7) ^ 2.5 = 253479847878.04** (for UTC+2)	-
Text	Time	Text	**"Metrohm" ^ Time(1999;10;7) = invalid**	This operation is not allowed.
Time	Text	Text	**Time(1999;10;7) ^ "Metrohm" = invalid**	This operation is not allowed.

2.4.4.3 Logical operators

2.4.4.3.1 AND

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 AND Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false). The following cases are possible:

Operand1	Operand2	Result
1	1	1
0	1	0
1	0	0
0	0	0

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 AND 4 ➔ 1** **4 AND 0 ➔ 0**	Numbers greater than 0 are interpreted as **1** (true).
Text	Text	Number	**"Metrohm" AND "AG" ➔ 1** **"" AND "AG" ➔ 0**	An empty character string (**""**) is interpreted as **0** (false), everything else as **1** (true). The first operation therefore corresponds to **1 AND 1 ➔ 1.**
Time	Time	Number	**Time(1999;10;07) AND Time(1999;10;07) ➔ 1**	**Time()**: see *Time(Date)*
Operands of a different type:				
Number	Text	Number	**1.2 AND "1.2" ➔ 1** **0 AND "1" ➔ 1** **0 AND "0" ➔ 1** **0 AND "" ➔ 0**	Before the operation, the operand of the type **Number** is converted to the type **Text**, as a conversion from **Text** to **Number** is not advisable. During the second operation, the 0 is therefore converted to **"0"**, which corresponds to the logical value **1** (true), as every character string that is not empty is interpreted as 1.
Text	Number	Number	**"Metrohm" AND 1.2 ➔ 1**	The same rules apply here as for the previous operation.

Oper-and1	Oper-and2	Result	Example	Remark
Number	Time	Number	**2.0 AND Time(1999;10;7) ➔ 1** **0 AND Time(1999;10;07) ➔ 0**	Before the operation, the operand of the type **Date/Time** is converted to **Number** and all data from December 30, 1899 are interpreted as **1** (true).
Time	Number	Number	**Time(1999;10;7) AND 2.5 ➔ 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" AND Time(1999;10;7) ➔ 1** **"" AND Time(1999;10;07) ➔ 0**	Before execution of the operation, the operand of the type **Date/Time** is converted to the type **Text** and every character string that is not empty is interpreted as **1** (true).
Time	Text	Number	**Time(1999;10;7) AND "Metrohm" ➔ 1**	The same rules apply here as for the previous operation.

2.4.4.3.2 OR

Dialog window: **Formula editor ▶ Operators/Functions**

Syntax

Operand1 OR Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false). The following cases are possible:

Operand1	Operand2	Result
1	**1**	**1**
0	**1**	**1**
1	**0**	**1**
0	**0**	**0**

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 OR 4 ➔ 1** **4 OR 0 ➔ 1**	Numbers greater than 1 are automatically interpreted as 1 (true)
Text	Text	Number	**"Metrohm" OR "AG" ➔ 1** **"" OR "Metrohm" ➔ 1** **"" OR "" ➔ 0**	An empty character string ("") is interpreted as 0 (false), everything else as 1 (true). The first operation therefore corresponds to 1 OR 1 ➔ 1
Time	Time	Number	**Time(1999;10;07) OR Time(1964;02;03) ➔ 1**	**Time()**: see *Time(Date)*

Operand1	Operand2	Result	Example	Remark
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Number	**1.2 OR "1.2" ➔ 1** **0 OR "" ➔ 1**	Before the operation, the operand of the type **Number** is converted to the type **Text**, as a conversion from **Text** to **Number** is not advisable. During the second operation, the 0 is therefore converted to "0", which corresponds to the logical value 1 (true), as every character string that is not empty is interpreted as 1.
Text	Number	Number	**"Metrohm" OR 1.2 ➔ 1**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 OR Time(1999;10;7) ➔ 1** **0 OR Time(1964;02;03) ➔ 1**	Before the operation, the operand of the type **Date/Time** is converted to **Number** and all data from December 30, 1899 are interpreted as 1 (true).
Time	Number	Number	**Time(1999;10;7) OR 2.5 ➔ 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" OR Time(1999;10;7) ➔ 1**	Before execution of the operation, the operand of the type **Date/Time** is converted to the type **Text** and every character string that is not empty is interpreted as 1 (true).
Time	Text	Number	**Time(1999;10;7) OR "Metrohm" ➔ 1**	The same rules apply here as for the previous operation.

2.4.4.4 Relational operators

2.4.4.4.1 Equal to

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 = Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				

Oper-and1	Oper-and2	Result	Example	Remark
Number	Number	Number	**5 = 5 ➔ 1** **4 = 5 ➔ 0**	-
Text	Text	Number	**"Metrohm" = "AG" ➔ 0** **"aG" = "AG" ➔ 0**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) = Time(1964;02;03) ➔ 0**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**1.2 = "1.2" ➔ 11.2 = "Metrohm" ➔ 0**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" = 1.2 ➔ 0**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 = Time(1999;10;07) ➔ 0**	Before the operation, the operand of the type **Date/Time** is converted to **Number**. During execution of the operation, the exact value is always used after this conversion, even if maximum 5 places after the comma can be displayed *(see chapter 2.4.4.7.5, page 75)*.
Time	Number	Number	**Time(1999;10;7) = 2.0 ➔ 0**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" = Time(1999;10;07) ➔ 0**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999-10-07 00:00:00 UTC +2"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;07) = "Metrohm" ➔ 0**	The same rules apply here as for the previous operation.

2.4.4.4.2 Greater than

Dialog window: **Formula editor ▶ Operators/Functions**

Syntax

Operand1 > Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 > 4 ➔ 1** **4 > 5 ➔ 0**	-
Text	Text	Number	**"Metrohm" > "AG" ➔ 1** **"Aarau" > "Zug" ➔ 0**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) > Time(1964;02;03) ➔ 1**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**1.2 > "Metrohm" ➔ 01.23 > "1.2" ➔ 1**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" > 1.2 ➔ 1**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 > Time(1999;10;07) ➔ 0**	Before the comparison, the operand is converted from the type **Date/Time** to a **Number**.
Time	Number	Number	**Time(1999;10;07) > 2.0 ➔ 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" > Time(1999;10;07) ➔ 1**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999-10-07 00:00:00 UTC +2"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;7) > "Metrohm" ➔ 0**	The same rules apply here as for the previous operation.

2.4.4.4.3 Greater than or equal to

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 >= Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 >= 4 ➔ 1** **4 >= 5 ➔ 0**	-
Text	Text	Number	**"Metrohm" >= "AG" ➔ 1**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) >= Time(1964;02;03) ➔ 1**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**1.2 >= "1.2" ➔ 11.2 >= "Metrohm" ➔ 0**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" >= 1.2 ➔ 1**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 >= Time(1999;10;07) ➔ 0**	Before the comparison, the operand is converted from the type **Date/Time** to a **Number**.
Time	Number	Number	**Time(1999;10;07) >= 2.0 ➔ 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" >= Time(1999;10;07) ➔ 1**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999-10-07 00:00:00 UTC +2"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;7) >= "Metrohm" ➔ 0**	The same rules apply here as for the previous operation.

2.4.4.4.4 Less than

Dialog window: **Formula editor ▶ Operators/Functions**

Syntax

Operand1 < Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 < 4 ➔ 0** **4 < 5 ➔ 1**	-
Text	Text	Number	**"Metrohm" < "AG" ➔ 0**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) < Time(1964;02;03) ➔ 0**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**1.2 < "Metrohm" ➔ 11.2 < "1" ➔ 0**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" < 1.2 ➔ 0**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 < Time(1999;10;07) ➔ 1**	Before the comparison, the operand is converted from the type **Date/Time** to a **Number**.
Time	Number	Number	**Time(1999;10;07) < 2.0 ➔ 0**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" < Time(1999;10;07) ➔ 0**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999-10-07 00:00:00 UTC +2"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;7) < "Metrohm" ➔ 1**	The same rules apply here as for the previous operation.

2.4.4.4.5 Less than or equal to

Dialog window: **Formula editor ► Operators/Functions**

Syntax

Operand1 <= Operand2

The operands can be entered either directly or as variables and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 <= 4 ➔ 0** **4 <= 5 ➔ 1**	-
Text	Text	Number	**"Metrohm" <= "AG" ➔ 0**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) <= Time(1964;02;03) ➔ 0**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**2 <= "1.2" ➔ 01.2 <= "Metrohm" ➔ 1**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" <= 1.2 ➔ 0**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 <= Time(1999;10;07) ➔ 1**	Before the comparison, the operand is converted from the type **Date/Time** to a **Number**.
Time	Number	Number	**Time(1999;10;07) <= 2.0 ➔ 0**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" <= Time(1999;10;07) ➔ 0**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999.10.07"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;7) <= "Metrohm" ➔ 1**	The same rules apply here as for the previous operation.

2.4.4.4.6 Not equal to

Dialog window: **Formula editor ▶ Operators/Functions**

Syntax

Operand1 <> Operand2

The operands can be entered either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. The result type is always a number (**1** = true, **0** = false).

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	**5 <> 4 ➔ 1** **5 <> 5 ➔ 0**	-
Text	Text	Number	**"Metrohm" <> "AG" ➔ 1**	When making a comparison between two texts the **ASCII value** of the character sequence is compared *(see chapter 2.4.4.10, page 82)*. **Attention:** Uppercase and lowercase letters have different values!
Time	Time	Number	**Time(1998;04;06) <> Time(1964;02;03) ➔ 1**	*(see chapter 2.4.4.6.2, page 70)*
Operands of a different type:				
Number	Text	Number	**1.2 <> "1.2" ➔ 01.2 <> "Metrohm" ➔ 1**	Before the relational operation, the **Number** is converted to **Text**, afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Text	Number	Number	**"Metrohm" <> 1.2 ➔ 1**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 <> Time(1999;10;07) ➔ 1**	Before the comparison, the operand is converted from the type **Date/Time** to a **Number**.
Time	Number	Number	**Time(1999;10;07) <> 2.5 ➔ 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" <> Time(1999;10;07) ➔ 1**	Before the operation, the operand is converted from the type **Date/Time** to **Text** (here thus: **"1999-10-07 00:00:00 UTC +2"**), afterwards the texts are compared according to **ASCII value** *(see chapter 2.4.4.10, page 82)*.
Time	Text	Number	**Time(1999;10;7) <> "Metrohm" ➔ 1**	The same rules apply here as for the previous operation.

2.4.4.5 Arithmetical functions

2.4.4.5.1 Exponential function

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Exp(number)

Calculates e ^ number. Other notation for $y = e^{(number)}$, whereby e is the Euler number (e = 2.71828…).

Parameters

Number Exponent

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Exp(1.5) = 4.48169

Exp('CV.AverageTemp') = Power of the exponent (common variable **CV.AverageTemp**) for base e

2.4.4.5.2 Natural logarithm

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Ln(number)

Gives the logarithm of the entered number for base e. Alternative notation for y = loge(number), whereby $_e$ is the Euler number (e = 2.71828…).

Parameters

Number > 0

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Ln(3) = 1.09861

Ln('CV.AverageTemp') = Natural logarithm of the value of the common variable **CV.AverageTemp** for base e

2.4.4.5.3 Common logarithm

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Log(number)

Gives the logarithm of the entered number for base 10. Alternative notation for y = $\log_{10}$(number).

Parameters

Number > 0

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the

expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Log(10) = 1

Log('CV.AverageTemp') = Common logarithm of the value of the common variable **CV.AverageTemp**

2.4.4.5.4 Square root

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Sqrt(number)

Gives the square root of the entered number. Alternative notation for y = $\sqrt{}$ **number** or y = $^{2}\sqrt{}$ **number**.

Parameters

Number ≥ 0

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Sqrt(33) = 5.745

Sqrt('CV.AverageTemp') = Square root of the value of the common variable **CV.AverageTemp**

2.4.4.5.5 Absolute value

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Abs(number)

Gives the absolute value of the entered number, i.e. the value of the number irrespective of its sign.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Abs(-55.3) = 55.3

Abs('CV.AverageTemp') = Value of the common variables **CV.Average-Temp** without signs

2.4.4.5.6 Fraction

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Frac(number)

Gives the fraction of the entered number.

NOTICE

In the results properties, the number **Decimal places** of the result must always be given, as otherwise the fraction cannot be displayed.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Frac(-55.325) =0.325

Frac('CV.AverageTemp') = Value of the common variable **CV.Average-Temp** without sign

2.4.4.5.7 Integer

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Int(number)

Gives the integer of the entered number.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Int(-55.325) = -55

Int('CV.AverageTemp') = Integer of the value of the common variable **CV.AverageTemp**

2.4.4.5.8 Rounding integer

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Round(number)

Gives the rounded value of the entered number as a whole number.

NOTICE

If the first decimal place is 5 or greater, the number is rounded up to the next whole number (commercial rounding).

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Round(-55.5259) = -56

Round('CV.AverageTemp') = Rounded value of the common variable **CV.AverageTemp**

2.4.4.5.9 Sign

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Sign(number)

Gives the sign of the entered number: **1** for a positive number, **-1** for a negative number.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

Examples

Sign(-55.3) = -1

Sign(26.115) = 1

Sign('CV.AverageTemp') = Sign of the value of the common variable **CV.AverageTemp**

2.4.4.5.10 Quantiles of the Student's t-distribution

Dialog window: **Formula editor ► Operators/Functions**

Syntax

t_s **= Tinv(Probability; Degrees of freedom)**

Calculates the quantiles of the Student's t-distribution for two-sided intervals.

The result describes the half interval length as a multiple of the standard deviation of a sampling totality with given **degrees of freedom** within which, with the indicated **probability**, the mean value of the distribution lies, when the interval is centered on the mean value of the sampling totality.

Parameters

Probability

Type number, value range: 0 ... 1. Direct entry as number or as formula providing a number. If the type of value is non-permitted, then the result will become **invalid**. This is to indicate the probability with which the unknown mean value of the t-distributed result is expected to lie within the two-sided interval.

Degrees of freedom

Type number, value range: 1 ... n. Direct entry as number or as formula providing a number. If the type of value is non-permitted, then the result will become **invalid**. The number of independent samplings for calculating the standard deviation, reduced by the number of adjusted parameters for the model to which the standard deviation refers, must be specified as degrees of freedom (Degrees of freedom = Number of samplings − Number of parameters).

Examples

Tinv(0.95; 9) = 2.26 : With a 10-fold determination (e.g. of a titer) half the interval length corresponds to 2.26 times the standard deviation.

Calculation of the confidence interval for a mean value of sampling: A variance-homogenous sampling with a range n for a normally distributed quantity with an expected value μ has the mean value x_m, the standard deviation s and the freedom degrees $v = n - 1$. Half the interval length $t_s \cdot s/\sqrt{n}$ then indicates how high the absolute difference between the mean value x_m and the expected value μ maximally is within the given probability. The **confidence interval** is the full interval length, centered to the mean value: $\mu = x_m \pm t_s \cdot s/\sqrt{n}$.

Titer determination: 0.991, 1.021, 0.995, 1.003, 1.007, 0.993, 0.998, 1.015, 1.003, 0.985

Mean value = 1.001

Standard deviation = 0.0111

Student's t-quantiles for a probability of 95% = 2.26

Confidence interval of the titer = 1.001 ± 0.008

2.4.4.6 Date/time functions

2.4.4.6.1 Time()

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Time()

Gives the current date and the current time.

Parameters

none

Return value

Current date and current time in the format **yyyy-mm-dd hh:mm:ss UTC ±xx**

NOTICE

UTC = Universal Time , from which the times in the various time zones of the earth are derived. CET (Central European Time) is equal to UTC plus 1 hour, in the summer time UTC plus 2 hours.

2.4.4.6.2 Time(Date)

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Time(year; month; day)

Gives the entered figures in the format **Date/Time**.

Parameters

year	**00…99** or **1000…9999**
month	**1…12**
day	**1…31**

A parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the

expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

NOTICE

Only the integral part is used for all parameters.

A variable of the type **Date/Time** cannot be transferred as a parameter here.

Both for the automatic and explicit conversion of a **Time** to the type **Number**, the number of days are counted since **December 30, 1899** at **01 hours**.

Attention: December 30, 1899 01 hour = 0.00000 days, this number is **rounded** off to 5 decimal places, but a relational operation for example is carried out with the exact value!

Return value

Date/Time in the format **yyyy-mm-dd hh:mm:ss UTC ±xx**

NOTICE

UTC = Universal Time , from which the times in the various time zones of the earth are derived. CET (Central European Time) is equal to UTC plus 1 hour, in the summer time UTC plus 2 hours.

Examples

Time(2004;02;02) = 2004-02-02 00:00:00 UTC +1 (dependent on the system time)

Time('CV.Test year';'CV.Test month';'CV.Test day') = Date comprised of the common variables

2.4.4.6.3 Time(Date + Time)

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Time(year; month; day; hour; minute; second)

Gives the entered numbers in the format **Date/Time**.

Parameters

year	**00…99** or **1000…9999**
month	**1…12**
day	**1…31**

hour	**0…23**
minute	**0…59**
second	**0…59**

A parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this is not possible, the result of this operation is given as **invalid**.

NOTICE

Only the integral part is used for all parameters.

A variable of the type **Date/Time** cannot be transferred as a parameter here.

Both for the automatic and explicit conversion of a **Time** to the type **Number**, the number of days are counted since **December 30, 1899** at **01 hours**.

Attention: December 30, 1899 01 hour = 0.00000 days, this number is **rounded** off to 5 decimal places, but a relational operation for example is carried out with the exact value!

Return value

Date/Time in the format **yyyy-mm-dd hh:mm:ss UTC ±xx**

NOTICE

UTC = Universal Time , from which the times in the various time zones of the earth are derived. CET (Central European Time) is equal to UTC plus 1 hour, in the summer time UTC plus 2 hours.

Examples

Time(2004;06;02;10;30;25) = 2004-06-02 10:30:25 UTC +2 (dependent on the system time)

Time('CV.TestYear';'CV.TestMonth';'CV.TestDay';'CV.TestHour';'CV.TestMin';'CV.TestSek') = Date comprised of the common variables

2.4.4.7 Type Conversion functions

2.4.4.7.1 NumberToText

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = NumberToText(number)

Returns the entered number as **Text**.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**.

Examples

NumberToText(-55.3) = **-55.3**

NumberToText('CV.AverageTemp') = Vale of the common variable (AverageTemp) as **Text**

2.4.4.7.2 NumberToTime

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = NumberToTime(number)

Returns the entered number as **Date/Time**, whereby the number is interpreted as the number of days since December 30, 1899 at 01 hours.

Parameters

Number

The parameter can be indicated either directly as a number or as a variable of the type **Number**.

Examples

NumberToTime(35545.526) = **1997-05-25 14:37:26 UTC+2** (dependent on the system time)

NumberToTime(35780.55) = **1997-12-16 14:12:00 UTC+1** (dependent on the system time)

NumberToTime('CV.TestDate') = Value of the common variable (TestDate) as **Date/Time**

2.4.4.7.3 TextToNumber

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = TextToNumber(Text)

Returns the entered text as a **number**.

Parameters

Text

The parameter may only contain **numerical characters** or variables of the type **Text**, as otherwise a type conversion is not possible. The result of this conversion or the calculation would then be **invalid**. In addition, text must be marked by **inverted commas**.

Examples

TextToNumber("-55.3") = **-55.3**

TextToNumber('CV.AverageTemp') = Value of the variables (Average-Temp) as **Number**

TextToNumber('MV.ID1') = entered text of **ID 1** as **Number**

2.4.4.7.4 TextToTime

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = TextToTime(Text;Format)

Returns the entered text as a **Date/Time**.

Parameters

Text

The parameter may only contain **numerical characters** or variables of the type **Text**, as otherwise a type conversion is not possible (Result = **invalid**). As **separator** between Year, Month etc. you can use the following characters: slash (**/**), full stop (**.**), minus (**-**), semi-colon (**;**), colon (**:**), space and comma. You can determine the **order** of the individual data yourself, but must indicate this in the **Format** parameter.

Format

Indicates in which format or order the text has been entered. This parameter must be marked by **inverted commas** and can comprise the following code characters:

Characters	Significance
y	Year

Characters	Significance
M	Month
d	Day
H	Hour 0…23
h	Hour AM/PM
m	Minute
s	Second
a	AM/PM marking

NOTICE

If you indicate the time in the format **AM/PM**, it is necessary in addition to the formatting character **h** to use the AM/PM marking **a** (see first example below).

Examples

TextToTime("2004-12-3 5:22:01 PM";"yMdhmsa") = **2004-12-03 17:22:01 UTC+1** (dependent on the system time)

TextToTime("12-15-01 2001:3:5";"HmsyMd") = **2001-03-05 12:15:01 UTC+1** (dependent on the system time)

TextToTime('CV.TestDate';'CV.TestFormat') = Values of the common variables in the time format indicated

TextToTime('MV.ID1';'CV.TestFormat') = entered text of ID1 in the time format indicated

2.4.4.7.5 TimeToNumber

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = TimeToNumber(Time)

Returns the entered time as a **Number**.

NOTICE

Both for the automatic and explicit conversion of a **Time** to the type **Number**, the number of days are counted since **December 30, 1899 at 01 hours**.

Attention: December 30, 1899 01 hours = 0.00000 days, this number is **rounded** off to 5 decimal places, but a relational operation for example is carried out with the exact value.

Parameters

Time

This parameter can be indicated either in the form of a time function or as a variable of the type **Time**.

Examples

TimeToNumber(Time()) = current date and current time represented as **Number** (in days since December 1899)

TimeToNumber(Time(1999;12;31;23;59;59)) = 36525.95832

TimeToNumber(Time('TestYear';'TestMonth';'TestDay')) = Value of the common variables as number of days as a **Number**

2.4.4.7.6 TimeToText

Dialogfenster: **Formula editor ► Operators/Functions**

Syntax

y = TimeToText(Time)

Returns the time entered as **Text**.

y = TimeToText(Time;Format)

Gives the time entered as **Text** in the required format.

Parameters

Time

This parameter can be indicated either in the form of a time function or as a variable of the type **Date/Time**.

Format

Indicates in which format or order the time is to be output as text. This parameter can comprise the following code characters and must be marked by **inverted commas**:

Characters	Significance	Example
y	two-digit year number	**03**
yyyy	four-digit year number	**1999**
M	one or two-digit month number	**4, 12**
MM	two-digit month number	**04, 12**
MMM	Month name short form	**Jul, Aug**
MMMM	Month name	**July, August**
d	one or two-digit day number	**2, 25**
dd	two-digit day number	**02, 25**
h	one-digit or two-digit hour number (1…12 AM/PM)	**5, 11**
hh	two-digit hour number (1…12 AM/PM)	**05, 11**
H	one-digit or two-digit hour number (0…23)	**8, 17**
HH	two-digit hour number (0…23)	**08, 17**
m	one or two-digit minute number	**2, 25**
mm	two-digit minute number	**02, 25**
s	one or two-digit second number	**3, 55**
ss	two-digit second number	**03, 55**
E	Weekday short form	**Mon, Tue, Wed**
EEEE	Weekday	**Monday, Tuesday**
D	one, two or three-digit number of the day in the year	**2, 35, 142**
DD	two or three-digit number of the day in the year	**02, 35, 142**
DDD	three-digit number of the day in the year	**002, 035, 142**
F	one-digit number of the weekday in the month, e.g. the **2**nd Monday in May	**2**
w	one or two-digit number of the week in the year	**5, 25**
ww	two-digit number of the week in the year	**05, 25**
W	one-digit number of the week in the month	**3**
a	Format AM/PM	**AM, PM**

Characters	Significance	Example
'	Inverted commas used for entering any text	
''	Entry of '	'

NOTICE

If you wish to indicate the time in the format **AM/PM**, it is necessary in addition to the formatting character **h** to use the AM/PM marking **a** (see last example below).

Examples

TimeToText(Time()) = current date and current time (system) as **Text**

TimeToText(Time(2004;05;04)) = **2004-05-04 00:00:00 UTC+2** (dependent on the system time)

TimeToText('CV.TestTime') = Value of the common variable (type **Time**) as **Text**

TimeToText(Time(2000;12;31);"EEEE', 'dd'.'MMMM' 'yyyy") = Sunday, December 31, 2000

TimeToText(Time(1997;05;22);"M'/'d'/'yyyy', 'ha") = 5/22/1997, 12PM

2.4.4.8 Text functions

2.4.4.8.1 TextPosition

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = TextPosition(Text ; sample text)

Gives the **Index** which indicates at which point the **sample text** appears for the first time in the **Text**. The numbering of the index begins at **1**!

Parameters

Text

The parameter can be indicated either directly or as a variable of the type **Text**, **Number** or **Date/Time**.

Sample text

The parameter can be indicated either directly or as a variable of the type **Text**, **Number** or **Date/Time**. If the types of the two parameters do not coincide, the type is converted from **Sample text** to the type **Text**. If the **Sample text** is not included in the **Text**, the status **invalid** is given.

NOTICE

Entries of the type **Number** are always provided with a decimal place.

Example: **TexPosition("12345";3)** = **invalid**, as the 3 is converted to 3.0 before the operation in 3.0 and this is not included in the text.

Examples

TextPosition("Citric acid";"acid") = 9, the word "**acid**" occurs in the text from index number 9 onwards

TextPosition("Citric acid";"Acid") = **invalid**, the word "**Acid**" (capitalized) does not occur in the text

TextPosition("Citirc acid";"salt") = **invalid**, the word "**salt**" does not occur in the text

TextPosition(Time(2004;05;05);"5") = **7**

TextPosition(3362.14;"6") = **3**

TextPosition('MV.ID2';"Carbonate") = Index in which the word part "**Carbonate**" begins for the first time in the ID2

2.4.4.8.2 SubText

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = SubText(Text ; Position ; Length)

Gives that part of the text from **Text** which begins at the index **Position** and which has the length **Length**.

Parameters

Text

The parameter can be indicated either directly as text or as a variable of the type **Text**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If this type conversion is not possible, the result of this operation is given as **invalid**.

Position

The numbering of the **Position** begins at **1**. The parameter can be indicated either **directly as a number** or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. If a type conversion is not possible or the position does not exist, the result of this operation is given as **invalid**.

Length

The parameter can be indicated either directly as a number or as a variable of the type **Number**. If the parameter does not correspond to the expected type, it will automatically be converted to this. It a type conversion is not possible or the length indicated here is greater than the length of the subtext, **invalid** is given

Examples

SubText("Citric acid";9;5) = **acid**

SubText("Citric acid";9;6) = **invalid**, only five characters exist from position 9 onwards

SubText('MV.ID2';1;3) = the first three chracters of the identification 2

2.4.4.8.3 Trim

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Trim(Text)

Gives the **Text** without spaces before and after.

y = Trim(Text ; sample text)

Gives the **Text** without **Sample text**.

Parameters

Text

The parameter can be indicated either directly or as a variable of the type **Text**, **Number** or **Date/Time**.

Sample text

The parameter can be indicated either directly or as a variable of the type **Text**, **Number** or **Date/Time**. If the types of the two parameters do not coincide, the type is converted from **Sample text** to the type **Text**.

NOTICE

Entries of the type **Number** are always provided with a decimal place.

Example: **Trim("12345";3)** = **12345**, as the 3 is converted to 3.0 before the operation and this is not included in the text.

Examples

Trim(" Citric acid ") = **"Citric acid"**

Trim("Citric acid";"acid") = **Lemons**

Trim("Citric acid";"salt") = **Citric acid**

2.4.4.9 Miscellaneous functions

2.4.4.9.1 Case

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Case(Condition ; value_true ; value_false)

y = Case(Condition ; value_true ; value_false ; value_error)

Gives **value_true** if the condition is true. Otherwise **value_false** is given. If an error occurs in the condition (result **invalid**), **value_error** is given.

Parameters

Condition Number

Any variable (type **Number**) can be entered here, or a relational or logic operation can be performed whose operators can be transferred either directly or as a variable. These can be of the type **Text**, **Number** or **Date/Time**.

Value_true

If **condition <> 0**, this parameter is saved as a result of the function. This parameter can be transferred either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. Entire operations can also be transferred here.

Value_false

If **condition = 0**, this parameter is saved as a result of the function. This parameter can be transferred either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. Entire operations can also be transferred here.

Value_error

If **condition = invalid**, this parameter is saved as a result of the function. This parameter can be transferred either directly or as a variable and can be of the type **Text**, **Number** or **Date/Time**. Entire operations can also be transferred here.

Examples

Case('MV.ID1' = "";"ID1 empty";"ID1 not empty") = if no entry has been made for ID1 in the run window, the text **ID1 empty**, otherwise **ID1 not empty**will be saved in the result.

Case('DET pH 1.EP{1}.VOL';'DET pH 1.EP{1}.VOL';0;0) = If an endpoint has been found in the titration **DET pH 1**, for which the volume is not 0 (**value_true**), this will be saved as a result. If the EP1 is exactly 0, **0** will be given. If no endpoint has been found, **0** will also be saved as a result for this function.

Case('RS.IntermediateRes' > 5.5;"Intermediate result too high";'RS.IntermediateRes' * 26.5;"Error occurred") = If the result "**IntermediateRes**" is greater than 5.5, the text "**Intermediate result too high**" will be written into the result, otherwise the intermediate result will be multiplied by 26.5. If an error occurs during the comparison (**'RS.IntermediateRes' > 5.5**), "**Error occurred**" will be saved as a result of this operation.

2.4.4.9.2 Error

Dialog window: **Formula editor ► Operators/Functions**

Syntax

y = Error(value)

Gives **+1** if the **value is invalid** (error) or **0** if the **valie is valid**. This function can be used e.g. to check variables for their existence or validity.

Parameters

Value

The variable to be tested.

Examples

Error('RS.IntermediateRes') = 0: the intermediate result was able to be calculated.

Error('RS.ZwischenRes') = 1: the intermediate result is invalid.

Error('DET pH 6.EP{1}.MEA') = 0: the variable for the measured value exists at endpoint 1,

Error('DET pH 6.EP{1}.MEA') = 1: no variable for the measured value or no EP exists.

2.4.4.10 ASCII table

Dialog window: **Formula editor**

To generate the ASCII code, press and hold the [ALT] key and enter the three-digit code for the required symbol using the numeric keypad.

Only printable characters are listed in the table below:

ASCII value (dec)	Character	ASCII value (dec)	Character	ASCII value (dec)	Character
32	Space	64	At sign (@)	96	Grave accent (`)
33	Exclamation mark (!)	65	A	97	a
34	Quotation mark (")	66	B	98	b

ASCII value (dec)	Character	ASCII value (dec)	Character	ASCII value (dec)	Character
35	Hash mark (#)	67	C	99	c
36	Dollar ($)	68	D	100	d
37	Percent (%)	69	E	101	e
38	Ampersand (&)	70	F	102	f
39	Apostrophe (')	71	G	103	g
40	Opening parentheses (()	72	H	104	h
41	Closing parentheses ())	73	I	105	i
42	Multiplication sign (*)	74	J	106	j
43	Addition sign (+)	75	K	107	k
44	Comma (,)	76	L	108	l
45	Minus sign (-)	77	M	109	m
46	Period (.)	78	N	110	n
47	Slash mark (/)	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	Colon (:)	90	Z	122	z
59	Semicolon (;)	91	Square bracket ([)	123	Curly bracket ({)
60	Less than (<)	92	Backslash (\)	124	Vertical stroke (¦)
61	Equals (=)	93	Square bracket (])	125	Curly bracket (})
62	Greater than (>)	94	Circumflex (^)	126	Tilde (~)

ASCII value (dec)	Character	ASCII value (dec)	Character	ASCII value (dec)	Character
63	Question mark (?)	95	Underscore (_)		

2.4.5 Molar mass calculator

Dialog window: **Molar mass calculator**

The dialog window **molar mass calculator** is used for the simple entry of molar masses into the formula editor and is opened with the button .

Mode of operation

The molecular formula of any chemical compound can be entered in the **Molecular formula** field, after which pressing **[OK]** will cause the molar mass of the compound to be calculated and entered directly into the formula editor.

The molecular formula can be entered either directly or by clicking on the symbols of the periodic system.

Examples

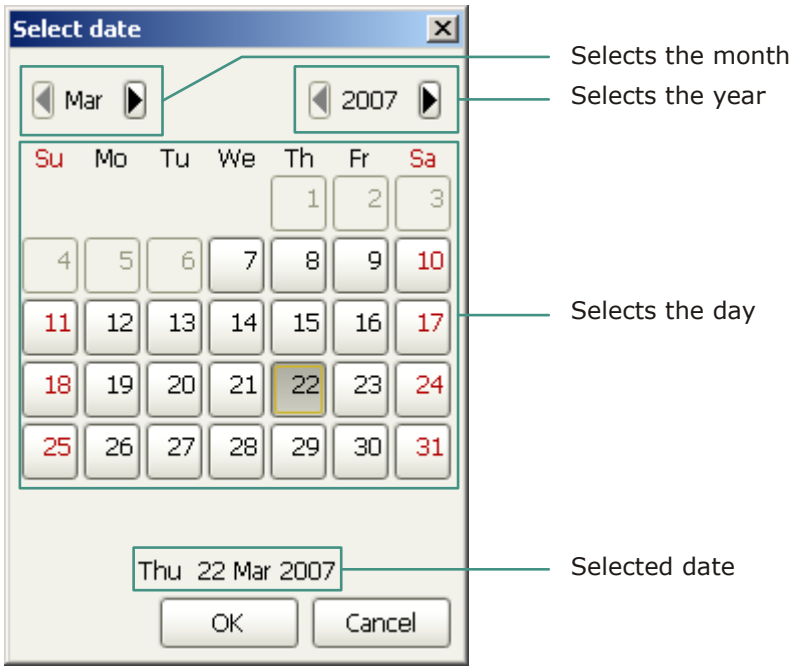
Molecular formula	Molar mass
H2SO4	**98.0734**
Ca(OH)2	**74.09268**
AlCl3*6H2O	**238.43174**

2.5 Editing

2.5.1 Select date

Dialog window: **Select date**

The dialog window **Select date** serves for entering a date in a field and is opened with the button .



2.5.2 Text editor

Dialog window: **Text editor**

The text editor serves for entering formatted text in text fields and is opened with the button T.

The toolbar of the text editor includes the following functions:

Cut selected text and copy it to the clipboard.

Copy selected text to the clipboard.

Insert text from the clipboard.

Open editor for entering a hyperlink *(see chapter 2.5.3, page 86)*.

Open formula editor for entering calculation formulas *(see chapter 2.4, page 24)*.

NOTICE

In order for results of formulas of the type **Date** to be output correctly, for text windows they must be converted to **Text** using the function **TimeToText** *(see chapter 2.4.4.7.6, page 76)*.

Font size in pt.

Select font color.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

2.5.3 Hyperlink

Dialog window: **Hyperlink**

The dialog window **Hyperlink** serves for entering a hyperlink in a field and is opened with the button .

Displayed text

Designation of the hyperlink that is displayed.

Link target

Address of the link target to which the hyperlink refers (Web site, E-mail address, file,...).

The button opens a selection dialog for linking a file as a link target.

2.6 E-mail

2.6.1 Send E-mail

Dialog window: **[E-mail...] ▶ Send e-mail**

E-mail template

Selection of the template for sending E-mails.

Subject

Subject to describe the message.

Message

Text of the message, which is output at the address defined under **[E-mail...]**. Clicking on the symbol opens the dialog window of the text editor *(see chapter 2.5.2, page 85)*.

3 Workplace

3.1 Workplace - General

3.1.1 Workplace - Definition

Program part: **Workplace**

In **tiamo**, **Workplace** is defined as the program part in which up to 4 workplaces can be opened next to one another for the simultaneous, independent running of determinations.

3.1.2 Workplace - Desktop

Program part: **Workplace**

Workplace symbol

Clicking on the workplace symbol in the vertical bar on the left opens the program part **Workplace** while, at the same time, the workplace symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of workplaces currently opened *(see chapter 3.2.3.1, page 97)*.

Elements

The desktop of the program part **Workplace** comprises the following elements:

- Workplace-specific menu bar.
- Workplace-specific toolbar.
- Main window in which up to 5 subwindows can be displayed.

3.1.3 Workplace - Menu bar

3.1.3.1 Workplace - Main menu

Program part: **Workplace**

The menu bar in the program part **Workplace** contains the following main menu items:

- *File*
  Create, edit, close workplaces; save methods; open manual control.
- *View*
  Change layout, load views, save views, edit properties of subwindows.

- *Tools*
  Manual control, run test, sample tables, sample assignment tables, text templates.
- *Help*
  Open help, show program info.

3.1.3.2 Workplace - Menu File

Program part: **Workplace**

File	
Workplace ►	
New...	Open new workplace *(see chapter 3.2.1, page 96)*.
Properties...	Edit properties of the selected workplace *(see chapter 3.2.2, page 97)*.
Close	Close the selected workplace *(see chapter 3.2.4, page 98)*.
Method ►	
Save	Save the method with the modified live parameters *(see chapter 3.7.3, page 173)*.
Save as...	Save the method with the modified live parameters under a new name *(see chapter 3.7.3, page 173)*.
Logout...	Logout user *(see chapter 2.2.3, page 17)*.
Exit	Exit the program.

3.1.3.3 Workplace - Menu View

Program part: **Workplace**

View	
Change layout...	Change the layout of the loaded workplace view *(see chapter 3.1.7.2, page 94)*.
Load view...	Load a saved workplace view *(see chapter 3.1.7.3, page 95)*.
Save view...	Save the current workplace view *(see chapter 3.1.7.4, page 95)*.
Split vertically	Split the workplace window vertically and display two workplaces side by side *(see chapter 3.2.3.3, page 98)*.

Split horizontally	Split the workplace window horizontally and display two workplaces below each other *(see chapter 3.2.3.4, page 98)*.
Unsplit	Unsplit the workplace window *(see chapter 3.2.3.2, page 98)*.
Properties ▶	
Properties Run window	Set the properties for the tab **Single determination** or **Determination series** in the subwindow **Run**.
Properties Live display 1	Set the properties for the subwindow **Live display 1** *(see chapter 3.8.5, page 176)*.
Properties Live display 2	Set the properties for the subwindow **Live display 2** *(see chapter 3.8.5, page 176)*.
Toolbar	Switch the toolbar display on/off.

3.1.3.4 Workplace - Menu Tools

Program part: **Workplace**

Tools	
Run test	Carry out the run test for determination(s) *(see chapter 3.6.2, page 123)*.
Sample table ▶	
New...	Open a new and empty sample table *(see chapter 3.3.1.1, page 98)*.
Open...	Open a saved sample table *(see chapter 3.3.1.2, page 99)*.
Manager...	Manage saved sample tables *(see chapter 3.3.3.1, page 117)*.
Sample assignment table...	Define sample identifications which a certain method can be assigned to *(see chapter 3.4.1, page 119)*.
Text templates...	Create text templates for sample identification *(see chapter 3.5.1, page 121)*.

3.1.3.5 Menu Help

Program parts: **Workplace / Database / Method / Configuration**

tiamo Help	Open tiamo Help.
About	Display information about the program and the installation.

3.1.4 Workplace - Toolbar

Program part: **Workplace**

Sample table/New...	Open a new and empty sample table *(see chapter 3.3.1.1, page 98)*.
Sample table/Open...	Open a saved sample table *(see chapter 3.3.1.2, page 99)*.
Sample table/ Manager...	Manage saved sample tables *(see chapter 3.3.3.1, page 117)*.
Change layout	Change the layout of the loaded workplace view *(see chapter 3.1.7.2, page 94)*.
Load view	Loads a saved workplace view *(see chapter 3.1.7.3, page 95)*.
Save view	Save the current workplace view *(see chapter 3.1.7.4, page 95)*.
Run test	Carry out the run test for determination(s) *(see chapter 3.6.2, page 123)*.
Split vertically	Split the workplace window vertically and display two workplaces side by side *(see chapter 3.2.3.3, page 98)*.
Split horizontally	Split the workplace window horizontally and display two workplaces below each other *(see chapter 3.2.3.4, page 98)*.
Unsplit	Unsplit the workplace window *(see chapter 3.2.3.2, page 98)*.
Logout	Logout user *(see chapter 2.2.3, page 17)*.
tiamo Help	Open tiamo Help.

3.1.5 Workplace - Subwindows

Program part: **Workplace**

Selection

The following subwindows can be displayed in the main window:

- *Run*
  Window for controlling sequences and entering sample data. This subwindow is permanently on display.
- *Method*
  Display of the currently loaded method.
- *Live display 1*
  Display of live curves, measured values and messages for the running determination.

- *Live display 2*
  Display of live curves, measured values and messages for the running determination.
- *Report*
  Display of reports of recorded determinations.

Presentation

The subwindows can be enlarged or made smaller to suit by dragging the separating bar between the windows.

By clicking on the button ❑ above at the right, the subwindows can be maximized so that only one subwindow is displayed in the main window. The original view of all subwindows is restored when the ❑ button is clicked in the maximized subwindow again.

3.1.6 Workplace - Functions

Program part: **Workplace**

The following functions can be carried out in the **Workplace** program part:

Views

- *Define the workplace view layout*
- *Load workplace view*
- *Save workplace view*
- *Rename workplace view*
- *Delete workplace view*

Workplaces

- *Create workplace*
- *Edit workplace*
- *Select workplace*
- *Close workplace*

Sample tables

- *Create sample table*
- *Open sample table*
- *Edit sample table*
- *Edit sample data*
- *Save sample table*
- *Print sample table*
- *Define sample table properties*
- *Manage sample tables*

Single determination

- *Start/stop single determination*
- *Interrupt/resume single determination*
- *Enter sample data*

- *Modify sample data live*
- *Define properties*

Determination series

- *Start/stop series*
- *Interrupt/resume determination*
- *Interrupt/resume series*
- *Load sample table*
- *Edit sample table*
- *Enter sample data*
- *Modify sample data live*
- *Define properties*

Subwindow Method

- *Zoom*
- *Modify parameters live*
- *Cancel commands*

Subwindow Report

- *Select a report*

Tools

- *Perform run test*
- *Edit sample assignment table*
- *Define text templates*

3.1.7 Views

3.1.7.1 Views - General

Program parts: **Workplace / Database / Configuration**

Definition

The term **View** defines the contents and design of the main window in the program parts **Workplace**, **Database** and **Configuration**. The following elements belong to a view:

- Number, arrangement, sequence and size of the subwindows.
- Representation within the individual subwindows, i.e. column sequence, column width, sorting and filter.

Functions

The following functions are possible for views:

- *Change layout*
  Define the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.

- *Load view*
  Load a saved view.
- *Rename view*
  Rename a saved view.
- *Delete view*
  Delete a saved view.

Automatic save

If the corresponding option is activated in the program part **Configuration** under **Tools ► Options...** on the tab **Save** under **Save on closing**, then the current view will be saved automatically when the program is closed.

Automatic load

The standard procedure is that the view saved when the program is terminated will be loaded automatically the next time that the program is opened. As an alternative a standard view can be defined for each user group that is loaded automatically the first time that the program part is opened.

The standard procedure is that the view with the following subwindow is opened with the very first program start:

- **Workplace**
  Run, **Method**, **Live display 1**, **Report**
- **Database**
  Determination overview, **Curves 1**, **Information**, **Results**
- **Configuration**
  Devices, **Titrants / Solutions**, **Sensors**, **Common Variables**

Export/Import

Views can also be exported and imported. In this way these views can be exchanged between different client / server systems.

3.1.7.2 Change layout

Dialog window: **Workplace / Database / Configuration ► View ► Change layout... ► Change layout**

The symbol or the menu item **View ► Change layout...** opens the dialog window **Change layout**.

Select layout

Selection of a graphical symbol for the number, arrangement and sequence of the subwindows.

Selection	**'Selection of the possible combinations'**

Available subwindows

Displaying the subwindows that are still available for displaying the view.

Selection	**'Selection of the subwindows'**

Displayed subwindows

Displaying the subwindows that are shown in the view.

Selection	**'Subwindows'**

Add the selected subwindow to the view.

Remove the selected subwindow from the view.

Move the selected subwindow upward (modifies sequence).

Move the selected subwindow downward (modifies sequence).

3.1.7.3 Loading a view

Dialog window: **Workplace / Database / Configuration ► View ► Load view... ► Load view**

The symbol or the menu item **View ► Load view...** opens the dialog window **Load view**.

Name

Name of the view to be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

3.1.7.4 Saving a view

Dialog window: **Workplace / Database / Configuration ► View ► Save view... ► Save view**

The symbol or the menu item **View ► Save view...** opens the dialog window **Save view**.

Name

Name under which the view is to be saved.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

Save the view under the given name. The saved views are globally valid and available for client/server systems.

3.1.7.5 Renaming a view

Dialog window: **Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view ▶ [Rename] ▶ Rename view**

To be able to rename a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Rename]** must be pressed down. Afterwards, the window **Rename view** opens.

Rename view '%1' to

Entry of a new name for the view.

Entry	**50 characters**

3.1.7.6 Deleting a view

Function: **Workplace / Database / Configuration ▶ View ▶ Load/save view… ▶ [Delete]**

To delete a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Delete]** must be pressed down. The delete procedure must then be confirmed.

3.2 Workplaces

3.2.1 Create new workplace

Dialog window: **Workplace ▶ File ▶ Workplace ▶ New… ▶ New workplace**

The properties of the new workplace can be defined in this dialog window.

Name

Entry of a name for the new workplace or selection from the list of the 10 names most recently used.

Entry	**50 characters**

Color

Selection of the color for the title bar of the subwindow and the status symbol for the new workplace in the status bar.

Selection	**green** | **blue** | **ochre** | **brown**
Default value	**green**

3.2.2 Edit workplace

Dialog window: **Workplace ► File ► Workplace ► Properties... ► Workplace properties**

The properties of the selected workplace can be defined in this dialog window.

Name

Entry of a name for the selected workplace or selection from the list of the 10 names most recently used.

Entry	**50 characters**

Color

Selection of the color for the title bar of the subwindow and the status symbol for the selected workplace in the status bar

Selection	**green** | **blue** | **ochre** | **brown**
Default value	**green**

3.2.3 Displaying workplaces

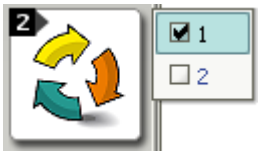
3.2.3.1 Selecting workplace

Program part: **Workplace**

The number of the currently opened workplaces is displayed in the left upper corner of the workplace symbol. If 2 or more workplaces are opened, then these two workplaces, which can be displayed next to one another or one above the other, can be selected with the aid of the workplace symbol.

One workplace is opened and is displayed in the main window.

Two workplaces are opened. Normally only one workplace is displayed in the main window but the option exists of displaying two workplaces at once, either next to one another or one below the other.



A menu with the currently opened workplaces is displayed by clicking with either the left or right mouse button on the workplace symbol. The workplaces displayed in the main window are marked with a checkmark. Clicking on the desired workplace will cause it to be displayed in the main window in place of the previously selected one.

3.2.3.2 Displaying single workplaces

Menu item: **Workplace ► View ► Unsplit**

In the default settings, the most recently opened workplace is displayed alone in the main window. If the display of two windows is enabled, then the symbol or the menu item **View ► Unsplit** can be used to switch back to the display of just one single workplace.

3.2.3.3 Displaying workplaces next to one another

Menu item: **Workplace ► View ► Split vertically**

With the symbol or the menu item **View ► Split vertically** two workplaces are displayed next to one another in the main window.

3.2.3.4 Displaying workplaces one below the other

Menu item: **Menu item ► Workplace ► Split horizontally**

With the symbol or the menu item **View ► Split horizontally** two workplaces can be displayed one below the other in the main window.

3.2.4 Close workplace

Menu item: **Workplace ► File ► Workplace ► Close**

With this menu item the selected workplace is closed.

3.3 Sample tables

3.3.1 Editing the sample table

3.3.1.1 Creating new sample table

Dialog window: **Workplace ► Tools ► Sample table ► New… ► Sample table 'New sample table'**

With the symbol or the menu item **Tools ► Sample table ► New…** a new sample table is opened that can then be edited.

3.3.1.2 Opening sample tables

Dialog window: **Workplace ▶ Tools ▶ Sample table ▶ Open… ▶ Open sample table**

With the symbol or the menu item **Tools ▶ Sample table ▶ Open…** a globally available sample table can be opened.

List of sample tables

The list of sample tables contains information about all the saved sample tables. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the **Comment** tab as a comment concerning the sample table *(see chapter 3.3.2.6, page 116)*.

Opening the sample table

Name

Name of the sample table that is to be opened. If a sample table from the table is selected, the name will be entered automatically in this field. It can, however, also be entered manually.

Entry	**50 characters**

[Open]

Open selected sample table.

3.3.1.3 Editing sample table

Dialog window: **Workplace ▶ Tools ▶ Sample table ▶ Open... ▶ [Open] ▶ Sample table 'Name'**

A newly created sample table or one that has been opened can be edited and saved in this dialog window.

Toolbar

Save sample table	Save the sample table.
Output of PDF file	Output the sample table as a PDF file.
Reset sample table	Reset lines that have been processed, i.e. they can be edited again.
Duplicate	Duplicate selected line(s). The new lines are inserted underneath the selected range.
Increment	Increment the selected lines automatically.
Filling	Fill the selected lines automatically.
Test sample table	Check whether or not all sample data in the sample table is correct.

Sample data table

This table contains the sample data lines that have already been saved in the sample table and a line for entering new data that contains a star instead of a line number. The table cannot be edited or sorted directly.

For the meaning of the columns, see *Editing sample data*.

Window menus

[Edit] contains the following menu items:

Edit line	Edit the selected line.
Insert new line	Insert a new empty line above the line selected.
Cut lines	Cut the selected lines and transfer them to the clipboard.
Copy lines	Copy the selected lines to the clipboard.
Paste lines	Paste lines from the clipboard above the selected line.

Delete lines	Delete the selected lines.
Increment	Using the cursor, which takes on the form ✚, the range which is to be automatically incremented can be selected from a column in the table. The number standing at the end of the expression will thereby be automatically increased by 1 in the selected cells of a column, starting from the first selected cell. This works with pure numbers as well as with character strings ending with a number (e.g. **ABC10** → **ABC11** → **ABC12**…).
Filling	Fill the selected lines automatically.
Duplicate	Duplicate selected line(s). The new lines are inserted underneath the selected range.
Mark lines	Mark the selected lines with a red background for the line number. Before the start of such a line the corresponding actions defined under **Properties** on the **Process** tab *(see chapter 3.3.2.4, page 113)* will be triggered.
Unmark lines	Remove the line marking for the selected lines.
Set lines inexecutable	Set the selected lines to "inexecutable", i.e. these lines will not be executed in the run. Such lines are crossed through with a red line.
Set lines executable	Set the selected lines to "executable", i.e. they will be executed in the run.

[Sample table] contains the following menu items:

Save	Save the current sample table under the same name.
Save as...	Save the current sample table under a new name.
Print (PDF)...	Output the sample table as a PDF file.
Properties...	Edits properties of the selected sample table.
Import data...	Import a sample table from a file with the format ***.csv**.

Moving lines with Drag&Drop

The lines selected in the sample table can be moved into the working sample table via Drag&Drop.

Copying lines with Drag&Drop

The lines selected in the sample table can be copied into the working sample table with Drag&Drop by pressing the **Ctrl key**.

3.3.1.4 Editing sample data

Dialog window: **Workplace ► Tools ► Sample table ► Open... ► [Open] ► [Edit] ► Edit line ► Edit line - Sample table 'Name'**

Method

Entry or selection of the method from the current method group with which the determination is to be carried out. By typing in the first characters, the method selection is continuously restricted and allows fast selecting of the method required.

Entry	**50 characters**
Selection	**Method selection**

Open the dialog window **Open method** for the extended method selection. If a method is selected in this window from a method group other than the current one, then this group will henceforth be the current method group for the quick selection of methods in the **Method** field. This button is active only if more than one method group is present.

NOTICE

If a method is changed and saved in the method editor or during reprocessing, then the latest method version will be loaded when a new determination is started.

NOTICE

The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method *(see chapter 5.6.2.2.5, page 442)*.

Sample position

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this to be achieved, the **Sample position** option must be set under **Target** for the **Move** parameter.

Input range	**1 to 999** (Increment: **1**)
Default value	**'empty'**

ID1...ID16

Sample identifications ID1…ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of

the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**
Selection	**Selection of text templates**

Sample size

Sample size (initial weight). Only numbers, decimal points, **+**, –, **E** and **e** can be entered in this field. The checking for limit values does not take place until the start of determination.

NOTICE

If a value is entered or imported into this field, then in addition the time of the data entry and the data source are stored **manually**, while the **'Name of the scale'**, the **'Name of the barcode reader'** or the **'Name of the import file'**) are stored automatically at the same time, placed in the determination and identified in the **Information** sub-window as **Data entry** and **Data source**.

NOTICE

If a negative value is entered in this field (e. g. during data import from a scale in the event of reweighing), then this will be also be calculated as a negative in the formula editor.

Entry	**Number with a maximum of 10 digits**
Default value	**1.0**

Unit

Sample size unit (initial weight). There are no restrictions on the text to be entered in this field.

Entry	**16 characters**
Selection	**g** | **mg** | **µg** | **mL** | **µL** | **pieces**
Default value	**g**

Navigation

Display of the currently selected line in the sample table with the following functions:

Jump to the first line in the sample table.

Jump to the previous line in the sample table.

Option of entering the desired line number to which the program jumps when the **[Enter]** is actuated.

Jump to the next line in the sample table. If the end of the table has been reached, then a new line will be inserted automatically and the program will jump to it.

The same function can also be triggered by pressing the **[Enter]** key.

Jump to the last line in the sample table.

Jump to a new, empty line.

Display application note

on | off (Default value: **off**)

If this check box is activated, then the application note defined in the method will be displayed during the editing of the sample data.

Functions

[Apply]

Apply the sample data entered in the respective line of the sample table. If the end of the table has been reached, then a new line will be generated automatically. The same function can also be triggered by pressing the **[Enter]** key. The next line will, however, also be highlighted automatically when **[Enter]** is used.

[Close]

Closes the input window. The current sample data will not be applied in the sample table (this needs to be triggered beforehand with **[Apply]**).

3.3.1.5 Duplicate sample data

Dialog window: **Workplace ► Sample table / Determination series ► [Edit] ► Duplicate ► Duplicate**

Number

Request as to how often the selected lines are to be duplicated. The new lines are inserted underneath the selected range.

Input range	**1 to 999**
Default value	**1**

3.3.1.6 Importing sample data

Dialog window: **Workplace ► Sample table / Determination series ► [Sample table] ► Import data… ► Select files to import**

Select a ***.csv** file in this dialog window with the sample data to be imported.

File name

Input or selection of the file that is to be imported.

Selection	**File name**

File type

Selection of the import format for the import of data from a file (only ***.csv** is possible).

Selection	***.csv** | ***.csv (Unicode)**
Default value	***.csv**

[Open]

The sample data from the selected file is inserted at the end of the sample table.

NOTICE

No matter the number of data fields defined on the **Display** tab, the import file must always contain for each line the entirety of the sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit;ID9;ID10;ID11;ID12;ID13;ID14;ID15;ID16;**.

3.3.1.7 Sample table test

Dialog window: **Workplace ► Sample table / Determination series ► [Sample table] ► Sample table test... ► Sample table test -Sample table name**

The menu item **[Sample table] ► Sample table test...** or the symbol is used to perform the sample table test. At the same time, the dialog window **Sample table test - 'Sample table name'** in which the information concerning the test is displayed opens.

NOTICE

The **Sample table test** is only used to check whether or not all sample data is correct (in contrast to the **Run test** *(see chapter 3.6.2, page 123)*, which also checks the required hardware).

Line

Displays the line number of the currently tested sample data line.

Status displays

One of the following status displays appears underneath the line number:

Selection	**Sample table test running… | Sample table test stopped manually | Sample table test finished without errors | Sample table test finished with errors**

Sample table test running…
This display appears during the test run. A progress bar also appears; the test can be interrupted thereby by means of the [x] next to the bar.

Sample table test stopped manually
This display appears if the sample table test was canceled manually by the user.

Sample table test finished without errors
This display appears at the end of a sample table test that has been completed without errors.

Sample table test finished with errors
This display appears if an error has occurred during the sample table test. The errors that occured are listed in the **Test report** field.

Test report

Display of errors that occurred during the sample table test, together with line numbers.

3.3.1.8 Save sample table

Dialog window: **Workplace ▶ Sample table / Determination series ▶ [Sample table] ▶ Save as… ▶ Save sample table**

A name for the working sample table to be saved can be entered or selected in this dialog window.

List of sample tables

The list of sample tables contains information about all the saved sample tables.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table *(see chapter 3.3.2.6, page 116)*.

Saving sample table

Name

Name under which the sample table is to be saved.

NOTICE

The name of the sample table must be unique throughout the entire client/server system.

Entry	**50 characters**

[Save]

Save the sample table under the desired name.

3.3.1.9 Print sample table (PDF)

Dialog window: **Workplace ▶ Sample table / Determination series ▶ [Sample table] ▶ Print (PDF)… ▶ Print sample table (PDF)**

The output format for the PDF output can be selected in this dialog window.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output in portrait format.

Landscape
Output in landscape format.

3.3.2 Sample table - Properties

3.3.2.1 Properties - Overview

Dialog window: **Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'**

The properties for a sample table are set on the following tabs:

- *Properties - Display*
  Definition of the columns that are to be displayed in the sample table.
- *Properties - Edit*
  Options for editing the sample table in the dialog windows **Sample table** and **Edit line**.
- *Properties - Process*
  Options for processing the working sample table on the tab **Determination series**.
- *Properties - Data import*
  Activating/deactivating the import of external data for sample table fields.
- *Properties - Comment*
  Entry of a comment on the sample table.

3.3.2.2 Properties - Display

Dialog window:Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window:Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Definition of the controls and columns that are to be displayed in the sample table.

Controls

NOTICE

This parameter group is visible only if the dialog window above the tab **Determination series** is open.

[Pause]/[Cont]

on | off (Default value: **on**)

Enable/disable the display of the buttons **[Pause]** or **[Cont]**.

[Hold]/[Cont]

on | off (Default value: **on**)

Enable/disable the display of the buttons **[Hold]** or **[Cont]**.

Determination parameters

NOTICE

This parameter group is visible only if the dialog window above the tab **Determination series** is open.

Sample number

on | off (Default value: **on**)

Enable/disable the display of the field **Sample number**.

User

on | off (Default value: **on**)

Enable/disable the display of the field **User**.

Remarks

on | off (Default value: **on**)

Enable/disable the display of the field **Remarks**.

Statistics

on | off (Default value: **on**)

Enable/disable the display of the statistics fields.

Sample data

NOTICE

The names defined here will be used **only** for the column headings in the sample table.

The names defined in the **START** command under **Method variables** will always be used when editing a sample line and for the determination data.

Sample position

on | off (Default value: **on**)

Enable/disable the display of the column **Sample position** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Sample position**

ID1 … ID3

on | off (Default value: **on**)

Enable/disable the display of the column **ID1 … ID3** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**ID1…3**

ID4 … ID16

on | off (Default value: **off**)

Enable/disable the display of the column **ID4 … ID16** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**ID4…16**

Sample size

on | off (Default value: **on**)

Enable/disable the display of the column **Sample size** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Sample size**

Unit

on | off (Default value: **on**)

Enable/disable the display of the column **Sample size unit** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Unit**

3.3.2.3 Properties - Edit

Dialog window: Workplace ► Tools ► Sample table ► New… ► [Sample table] ► Properties… ► Properties - Sample table 'Name'

Dialog window: Workplace ► Run ► Determination series ► Properties Run window ► Properties - Determination series

Options for the editing of the sample table.

Apply data with

on | off (Default value: **off**)

Selection of the data field which must be filled in connection with automatic data import via balance, barcode reader or file in order to apply the data for the line in the sample data storage and to switch onward to the next line. If the relevant column is empty, then additional imported data will be written into the same line. This means that it is possible, for example, to fill a line first with sample identifications per barcode reader and then later to apply the sample size from a balance for the same line.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16** | **Sample size** | **Unit** | **Sample position**
Default value	**Sample size**

Lock editing in working sample table

on | off (Default value: **off**)

If this option is activated, then it is not possible to edit lines in the sample table that is loaded in the working sample table.

Copy automatically into next line

Method

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

ID1 … ID3

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

ID4 … ID16

on | off (Default value: **off**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Sample size

on | off (Default value: **off**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Unit

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Sample position + 1

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be incremented by **+1** when a new sample data line is created.

3.3.2.4 Properties - Process

Dialog window: Workplace ▶ Tools ▶ Sample table ▶ New… ▶ Sample table 'Name' ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Options for processing the working sample table in the Workplace window in the tab **Determination series**.

Delete processed lines

on | off (Default value: **off**)

If this option is activated, then lines in the working sample table which have already been processed completely will be deleted automatically.

Method selection by assignment ID

on | off (Default value: **off**)

If this option is activated, then the selected sample identification will be used for the method selection in the working sample table. This identification received the designation **Assignment ID**, which can then no longer be changed; if this ID matches one of the Assignment IDs from the sample assignment table *(see chapter 3.4.1, page 119)*, then the respective method from this table will be entered in the field **Method**.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16**
Default value	**ID1**

Request assignment ID

on | off (Default value: **off**)

If this option is activated, the **Assignment ID** will be queried immediately after the start of the determination.

Actions for marked sample table lines

Selection	**Pause series ([Pause]) and show message** | **Stop series ([Stop])**
Default value	**Pause series ([Pause]) and show message**

Pause series ([Pause]) and show message
If this option is selected, then the series is interrupted before the start of the marked line (equivalent to [Pause]). At the same time a message will appear which also contains the text defined in the message box.

Stop series ([Stop])
If this option is selected, then the series is stopped before the start of the marked line (equivalent to [Stop]).

Start the text editor with which the message can be entered and edited.

3.3.2.5 Properties - Data import

Dialog window: Workplace ► Tools ► Sample table ► New… ► [Sample table] ► Properties… ► Properties - Sample table 'Name'

Dialog window: Workplace ► Run ► Determination series ► Properties Run window ► Properties - Determination series

Activating/deactivating the import of external data for sample table fields.

NOTICE

The successful completion of the data import is indicated during the run by an acoustic signal (beep).

Import from a balance

on | off (Default value: **off**)

If this option is activated, then external data from the selected balance will be imported into the opened sample table. Data can be imported into the fields **ID1…ID4**, **Sample size** and **Unit**.

NOTICE

In order to be able to import sample identifications from the balance, data export must be set accordingly at the balance (Use designations **ID1**, **ID2**, **ID3**, **ID4**).

Balance

Selection of the balance from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the balance is imported into the open sample table for which this balance is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the balance is only imported into the open sample table if this is actively selected (i.e. when the window has the focus).

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data is imported during a determination only if the **Data input** dialog of a **REQUEST** command is opened.

Import from a barcode reader

on | off (Default value: **off**)

If this option is activated, then external data from the selected barcode reading device will be imported into the opened sample table. The device properties of the barcode reader will define the field into which the data is imported *(see chapter 7.15.4, page 1583)*.

Barcode reader

Selection of the barcode reader from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the barcode reader is imported into the open sample table for which this barcode reader is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the barcode reader is only imported into the open sample table if this is actively selected (i.e. when the window has the focus).

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data is imported during a determination only if the **Data input** dialog of a **REQUEST** command is opened.

Import from a file

on | off (Default value: **off**)

If this option is activated, then external data from a file (e.g. via LIMS) will be imported into a sample table. When this is the case, a check is made to determine whether the specified import file is available when the sample table is opened, when the sample table is loaded into the working sample table and also periodically (every 10 s) when the sample table is open (although not when the dialog window **Edit line** is open). If the import file is available, then the data from this file is automatically inserted at the end of the sample table. The import file is deleted after each import.

NOTICE

No matter the number of data fields defined on the **Display** tab, the import file must always contain for each line the entirety of the sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Unit;ID9;ID10;ID11;ID12;ID13;ID14;ID15;ID16;**.

Import file

File that is to be imported. With the file can be selected in the dialog window **Select files for import**.

Entry	**File name**

Import format

Selection of the import format for the import of data from a file.

Selection	***.csv** | ***.csv (Unicode)**
Default value	***.csv**

***.csv**
Format for the import of CSV files with Western European ASCII character sets.

***.csv (Unicode)**
Format for the import of CSV files with Unicode character sets.

3.3.2.6 Properties - Comment

Dialog window: Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Entry of a comment on the sample table.

Comment on sample table

Entry of a comment on the sample table. This comment will be displayed in the column of the same name in the dialog windows **Open sample table** and **Sample table manager**.

Entry	**1,000 characters**

3.3.3 Sample table manager

3.3.3.1 Sample table manager

Dialog window: **Workplace ► Tools ► Sample table ► Manager… ► Sample table manager**

With the symbol or the menu item **Tools ► Sample table ► Manager…**, the saved sample tables can be managed.

List of sample tables

The list of sample tables contains information about all the saved sample tables. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing order.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table *(see chapter 3.3.2.6, page 116)*.

Window menus

The menu **[Edit]** below the list of sample tables contains the following menu items:

Rename…	Renames the selected sample table *(see chapter 3.3.3.2, page 118)*.

Copy	Copies the selected sample table(s) *(see chapter 3.3.3.3, page 118)*.
Delete…	Deletes the selected sample table(s) *(see chapter 3.3.3.4, page 118)*.
Export…	Exporting selected sample table(s) in the file format ***.mstab** *(see chapter 3.3.3.5, page 118)*.
Import…	Importing sample table(s) from ***.mstab** file(s) *(see chapter 3.3.3.6, page 119)*.

3.3.3.2 Renaming sample table

Dialog window: **Workplace ► Tools ► Sample table ► Manager… ► [Edit] ► Rename… ► Rename sample table**

The selected sample table can be renamed in this dialog window.

Rename sample table 'Name' to

Entry of the new name for the sample table.

NOTICE

The name of the sample table must be unique throughout the entire client/server system.

Entry	**50 characters**

3.3.3.3 Copying sample table

Menu item: **Workplace ► Tools ► Sample table ► Manager… ► [Edit] ► Copy**

The selected sample tables are copied under the name **Copy of 'Name'** with the menu item **[Edit] ► Copy** in the dialog window **Sample table manager**.

3.3.3.4 Deleting sample table

Menu item: **Workplace ► Tools ► Sample table ► Manager… ► [Edit] ► Delete…**

The selected sample tables are deleted with the menu item **[Edit] ► Delete…** in the dialog window **Sample table manager**.

3.3.3.5 Exporting sample table

Dialog window: **Workplace ► Tools ► Sample table ► Manager… ► [Edit] ► Export… ► Select directory for export**

With the menu item **[Edit] ► Export…**, the dialog window **Select directory for export** is opened in which the directory for export needs to be selected. The selected sample table is exported into a file with the name **'Name'.mstab**.

3.3.3.6 Importing sample table

Dialog window: **Workplace ▶ Tools ▶ Sample table ▶ Manager… ▶ [Edit] ▶ Import ▶ Select files for import**

The dialog window **Select files for import**, in which the sample table (file format ***.mstab**) to be imported needs to be selected, is opened by means of the menu item **[Edit] ▶ Import…**.

3.3.3.7 Renaming imported sample tables

Rename imported sample table 'Name' to

Entry of the new name for the sample table.

NOTICE

The name of the sample table must be unique throughout the entire client/server system.

Entry	**50 characters**

3.4 Sample assignment table

3.4.1 Sample assignment table

Dialog window: **Workplace ▶ Tools ▶ Sample assignment table… ▶ Sample assignment table**

The **Sample assignment table** causes the samples to be processed automatically with the **correct method**. A particular method will be assigned thereby to a sample identification (**Assignment ID**). In order to make sure this functions as intended, the option **Method selection by assignment ID** must be enabled in the properties of the **Individual determination** or **Determination series** on the tab **Process** and one of the sample identifications needs to have been selected as Assignment ID. The respective method will be loaded automatically as soon as an **Assignment ID** has been recognized during the processing of the sample data. The **Method** is then no longer available for editing and will be displayed in gray.

NOTICE

The sample assignment table is valid for all opened workplaces and is saved per client.

The overview table shows all the defined assignment IDS and cannot itself be edited directly. With a click on the column title **Assignment ID** or

Method, the table can be sorted according to the selected column in either increasing or decreasing sequence.

Assignment ID

Identification on the basis of which the method is assigned.

Method

Method which is loaded for the Assignment ID.

[New]

Add new sample assignment.

[Properties]

Edit selected sample assignment.

[Delete]

Delete selected sample assignment.

3.4.2 Sample assignment

Dialog window: **Workplace ► Tools ► Sample assignment table... ► [New] / [Properties] ► Sample assignment**

Assignment ID

Entry of an identification on the basis of which the method is assigned or selection of a defined text template. The assignment ID can contain any number of alphanumerical characters or wildcards (*****). No assignment ID can occur more than once, although several different assignment IDs can be assigned the same method.

Entry	**50 characters**
Selection	**Selection of text templates**

NOTICE

The character ***** itself must be generated with ******. It stands for an arbitrary number of characters. No identical sample may be entered when the samples are entered. If a string of characters fits several samples, then the first suitable sample in the table will be used.

Method

Selection of the method in the current method group. If one remains in this field with the cursor, then the name of the current method group will appear as Tooltip **Group: 'Group name'**, in the event that other groups are on hand besides the main group.

Selection	**Method selection**

Open the dialog window **Open method** for the extended method selection. If a method is selected in this window from a method group other than the current one, then this group will henceforth be the current method group for the quick selection of methods in the **Method** field.

This button is active only if more than one method group is present.

3.4.3 Enter assignment ID

Dialog window: **Workplace ► Sample assignment**

Assignment ID

Request for the assignment ID on the basis of which the method will be assigned or selection of a definite text template.

Entry	**50 characters**
Selection	**Selection of text templates**

3.5 Text templates

3.5.1 List of text templates

Dialog window: **Workplace ► Tools ► Text templates... ► Text templates**

Text templates can be defined for the fields **Remark** and **ID1…ID16** which can be applied for inclusion in these fields on the tab **Single determination**, in the **Sample table** and in the **Working sample table**. The text templates are saved per client.

Text templates for

selection of the field for which the text templates are to be defined.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16** | **Remarks**
Default value	**ID1**

List of the text templates

All defined text templates for the selected field are displayed in the list of the text templates. The table cannot be edited. With a click on the column title **Text** the table can be sorted according in either increasing or decreasing sequence.

Text

Shows the text templates defined for the selected field.

[New]

Add new text template *(see chapter 3.5.2, page 122)*.

[Properties]

Edit selected text template *(see chapter 3.5.2, page 122)*.

[Delete]

Delete the selected text template.

3.5.2 Edit text template

Dialog window: **Workplace ▶ Tools ▶ Text templates... ▶ Text templates ▶ [New] / [Properties] ▶ Text templates**

The text templates can be edited in the dialog window **Text templates**.

Text

Text template entry.

Entry	**100 characters**

3.6 Run subwindow

3.6.1 Run - General

Subwindow: **Workplace**

Run subwindow

The **Run** subwindow contains the controls for controlling method runs and for administering sample data. It is always displayed in the **Workplace** program part, i.e., it cannot be removed from the workplace view. The subwindow can be enlarged and reduced as required; it can also be maximized.

Tabs

The **Run** subwindow consists of the following three tabs:

- *Single determination*
  Control of single determinations.
- *Determination series*
  Control of determination series.

NOTICE

If a run has been started on the **Single determination** tab (**Status** = **BUSY**), then the **Determination series** tab is no longer accessible (disabled). The same holds true for the **Single determination** tab in the event that a run has started on the **Determination series** tab.

3.6.2 Run test

Menu item: **Workplace ▶ Tools ▶ Run test**

NOTICE

In contrast to the **Sample table test**, which is only used to check whether or not all sample data is correct, the **Run test** also checks the required hardware.

Single determination

The menu item **Tools ▶ Run test** or the symbol is used to perform the start test for the selected method. The precondition for this is that the workplace is in **READY** status.

For the Run test, the dialog window **Run test - 'Workplace name' - Single determination** opens, in which information concerning the test is displayed.

Method

Displays the method for the single determination.

Determination series

The menu items **Tools ▶ Run test** or **[Sample table] ▶ Run test…** or the symbol are used to perform the Start test. The precondition for this is that the workplace is in **READY** status. The Start test is however performed only for the number of lines defined under **Autostart**.

For the Run test, the dialog window **Run test - 'Workplace name' - Determination series** opens, in which information concerning the test is displayed.

Line

Displays the line number of the currently tested sample data line for the determination series.

Status displays

One of the following status displays appears underneath the line number:

Selection	**Run test running… | Run test error | Run test finished without errors**

Run test running…
This display appears during the test run. A progress bar also appears; the test can be interrupted thereby by means of the [x] next to the bar.

Run test error
This display appears if an error has occurred during the run test. During a determination series, the user can determine, on the basis of the line number displayed, the line to which the the error message belongs that appeared at the time of the error and that is currently displayed in the usual message window.

Run test finished without errors
This display appears at the end of a run test that has been completed without errors.

3.6.3 Single determination

3.6.3.1 Single determination - Overview

Tab: **Workplace ► Run ► Single determination**

Parameters and sample data for single determinations can be edited and run functions can be triggered on the **Single determination** tab. It contains the following elements and functions:

- *Single determination - Controls*
  Buttons for starting, stopping, interrupting and resuming determinations.
- *Single determination - Status display*
  Shows the current status of the workplace.
- *Single determination - Determination parameters*
  Entry of general parameters for the determination.
- *Single determination - Sample data*
  Entry of method and sample identification for the next determination.
- *Properties - Overview*
  Definition of the properties for the **Single determination** tab.

3.6.3.2 Single determination - Controls

Tab: **Workplace ► Run ► Single determination**

The following controls are located on the **Single determination** tab:

Start single determination (shortcut: **Ctrl G**)

The button is present in the status **READY** (no determination started), **COND READY** (conditioning condition fulfilled) and **COND BUSY** (conditioning is running). If the start can be triggered, it is green, otherwise light gray. Conditioning will be started first for methods that have conditioning.

Stop single determination (shortcut: **Ctrl S**)

The button is present in the status **BUSY** (determination is running), **COND READY** (conditioning condition fulfilled) and **COND BUSY** (conditioning is running), i.e. when conditioning has been started.

Interrupt run

The button is enabled (dark gray) in the status **BUSY** (determination is running), **COND READY** (conditioning condition fulfilled) and **COND BUSY** (conditioning is running). The button is disabled (light gray) in all other cases. When **[Hold]** is pressed, it will be replaced in the display by **[Cont]**.

Continue run

The button is present only in the status **HOLD** (determination interrupted) and **COND HOLD** (conditioning interrupted). Pressing **[Cont]** will cause this button to be replaced again in the display by **[Hold]**.

3.6.3.3 Single determination - Status display

Tab: **Workplace ► Run ► Single determination**

The current status of the workplace is displayed on the **Single determination** tab:

Status

Selection	**READY** | **BUSY** | **HOLD** | **COND BUSY** | **COND READY** | **COND HOLD** | **ERROR**

READY
Ready for starting a determination or for conditioning.

BUSY
Determination is running.

HOLD
Determination is interrupted.

COND BUSY
Conditioning is running (is displayed only when no determination is running).

COND READY
Conditioning condition is fulfilled (is displayed only when no determination is running).

COND HOLD
Conditioning is interrupted (is displayed only when no determination is running).

ERROR
Error.

3.6.3.4 Single determination - Determination parameters

Subwindow: **Workplace ► Run ► Single determination**

User

If the option **Enforce login with user name** is activated in the security settings, then the short name of the currently logged in user will be displayed in this field. This field is then not available for editing. If work is done without registering, then a user name can be entered in this field (only in the status **READY**).

Entry	**50 characters**

Sample number

The sample number is set to **0** for all workplaces at the time of each program start. Each time a determination is started, it is incremented by **+1**. It can only be edited by the user in the status **READY**.

Input range	**0 to 99,999**
Default value	**0**

Remark

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries *(see chapter 3.5.1, page 121)*.

NOTICE

The field **Remarks** can also be modified live while determinations are running. The context-sensitive menu item **Modify remarks** is used to open the dialog window **Live modifications** *(see chapter 3.6.3.6, page 130)*.

Entry	**100 characters**

Autostart

Shows the number of automatic, internal starts of single determinations. This field is only displayed if the option **Autorepeat determination** is activated on the **Process** tab *(see chapter 3.6.3.11.4, page 138)*. With every triggering of **[Start]** the counter is reset to **0**.

Statistics

on | off (Default value: **on**)

This field is displayed only when a method has been loaded with a **START** command in which the option **Statistics** has been activated. The statistics defined in the method can be activated and deactivated manually here (only in the status **READY** and **COND BUSY**).

The first field after **Statistics** shows the number of determinations already carried out for the statistics (actual counter). This field cannot be edited, but when it is in the status **READY**, it can be set to **0** with the context-sensitive **Delete statistics** menu item, and the already calculated statistics data is deleted at the same time.

The second field after **Statistics** shows the number of determinations to be carried out for the statistics (setpoint counter). By default, it contains the value **Number of single determinations** defined in the **START** command. This field cannot be edited except in the status **READY** and **COND BUSY**.

NOTICE

When a new statistics series is started, the setpoint counter will be reset to the value defined in the **START** command.

3.6.3.5 Single determination - Sample data

Tab: **Workplace ► Run ► Single determination**

Method

Entry or selection of the method from the current method group with which the determination is to be carried out. By typing in the first characters, the method selection is continuously restricted and allows fast selecting of the method required.

Entry	**50 characters**
Selection	**Method selection**

Open the dialog window **Open method** for the extended method selection. If a method is selected in this window from a method group other than the current one, then this group will henceforth be the current method group for the quick selection of methods in the **Method** field. This button is active only if more than one method group is present.

NOTICE

If a method is changed and saved in the method editor or during reprocessing, then the latest method version will be loaded when a new determination is started.

NOTICE

The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method *(see chapter 5.6.2.2.5, page 442)*.

Sample position

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this to be achieved, the **Sample position** option must be set under **Target** for the **Move** parameter.

Input range	**1 to 999** (Increment: **1**)
Default value	**'empty'**

ID1…ID16

Sample identifications ID1…ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**
Selection	**Selection of text templates**

Sample size

Sample size (initial weight). Only numbers, decimal points, **+**, –, **E** and **e** can be entered in this field. The checking for limit values does not take place until the start of determination.

NOTICE

If a value is entered or imported into this field, then in addition the time of the data entry and the data source are stored **manually**, while the **'Name of the scale'**, the **'Name of the barcode reader'** or the **'Name of the import file'**) are stored automatically at the same time, placed in the determination and identified in the **Information** sub-window as **Data entry** and **Data source**.

NOTICE

If a negative value is entered in this field (e. g. during data import from a scale in the event of reweighing), then this will be also be calculated as a negative in the formula editor.

Entry	**Number with a maximum of 10 digits**
Default value	**1.0**

Unit

Sample size unit (initial weight). There are no restrictions on the text to be entered in this field.

Entry	**16 characters**
Selection	**g** | **mg** | **µg** | **mL** | **µL** | **pieces**
Default value	**g**

NOTICE

Sample position, **ID1 - ID16**, **Sample size** and **Sample size unit** can be changed live for a running determination *(see chapter 3.6.3.7, page 130)*. Generally, no formula input is possible in these fields.

NOTICE

The name of the method variables assigned in the **START** command is displayed automatically for the sample data variables **ID1 - ID16**, **Sample size**, **Sample size unit**, **Sample position**.

3.6.3.6 Modify remark

Dialog window: **Workplace ▶ Run ▶ Single determination ▶ Modify remark ▶ Live modifications**

The dialog window **Live modifications**, in which the remarks can be modified in a determination while it is running, opens with the context-sensitive menu **Modify remark**.

Remarks

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**

3.6.3.7 Live modification

Dialog window: **Workplace ▶ Run ▶ Single determination ▶ Live modifications ▶ Live modifications**

Certain sample data can be modified live in this dialog window while a determination is running.

Sample position

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this to be achieved, the **Sample position** option must be set under **Target** for the **Move** parameter.

Input range	**1 to 999** (Increment: **1**)
Default value	**'empty'**

ID1…ID16

Sample identifications ID1…ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**
Selection	**Selection of text templates**

Sample size

Sample size (initial weight). Only numbers, decimal points, **+**, –, **E** and **e** can be entered in this field. The checking for limit values does not take place until the start of determination.

NOTICE

If a value is entered or imported into this field, then in addition the time of the data entry and the data source are stored **manually**, while the **'Name of the scale'**, the **'Name of the barcode reader'** or the **'Name of the import file'**) are stored automatically at the same time, placed in the determination and identified in the **Information** sub-window as **Data entry** and **Data source**.

NOTICE

If a negative value is entered in this field (e. g. during data import from a scale in the event of reweighing), then this will be also be calculated as a negative in the formula editor.

Entry	**Number with a maximum of 10 digits**
Default value	**1.0**

Unit

Sample size unit (initial weight). There are no restrictions on the text to be entered in this field.

Entry	**16 characters**
Selection	**g** | **mg** | **µg** | **mL** | **µL** | **pieces**
Default value	**g**

NOTICE

Generally speaking, no formula input is possible in these fields.

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then a reason and a comment on the modification must be entered before saving *(see chapter 6.2.2.4, page 1320)*.

3.6.3.8 Single determination - Determination run

Tab: **Workplace ► Run ► Single determination**

A determination that is started on the tab **Single determination** in the subwindow **Run** runs through as follows:

1 - Loading the sample data

The sample data entered for the determination is loaded.

2 - Method selection

The following actions are triggered with method selection:

- **Method selection without Assignment ID**
  The method selected in the field **Method** is loaded.
- **Method selection by assignment ID**
  If the option **Method selection by assignment ID** is enabled in the properties of the single determination on the tab **Process** *(see chapter 3.6.3.11.4, page 138)*, then the method defined in the sample assignment table will be loaded *(see chapter 3.4, page 119)*.

3 - Start test

The following checks and actions are triggered with start test:

- **Authorization for carrying out the method?**
  Check whether the registered user is authorized to carry out the method required *(see chapter 5.4.2.3, page 425)*.
- **Method executable?**
  Check whether the required method is executable. For methods which are not executable, a prompt appears to perform the method check and to modify the method accordingly *(see chapter 5.2.5, page 409)*.
- **Check device (modules) and rack**
  Check whether the instruments (and/or instrument types), device modules (e.g. measuring input, tower, etc.) and racks required in the instrument-specific commands are present and available and/or assigned. If the instrument in a command is not yet assigned, then the **device assignment** dialog window will open for the assignment of the instrument.
- **Check solutions**
  Check whether the solutions required in the instrument-specific commands are present and available.
- **Check sensors**
  Check whether the sensors required in the instrument-specific commands are present and available.

NOTICE

When it is in **READY** status, the start test can also be triggered manually with the menu item **Tools ► Run test**.

4 - Conditioning (only for methods with conditioning)

Conditioning is started in the case of methods which contain commands with switched-on conditioning. The requirement for this is that the **Automatic conditioning** option is switched on in the **START** command. Con-

ditioning is not yet part of determination and causes no counters to be incremented (**Sample number**, **Statistics**).

- **Conditioning condition not fulfilled**
  After conditioning starts, the status switches to **COND BUSY**. The determination can be started in this status with **[Start]**, even though the conditioning requirement is not fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the **error track** nor the **exit track** will be run through.
- **Conditioning condition fulfilled**
  If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. The determination can be started in this status with **[Start]**. Conditioning can however also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the conditioning requirement will continue to be monitored on a continuous basis.

5 - Method start

The following checks and actions are triggered with method start:

- **Check sample data**
  Check whether the sample data entered corresponds to the defined method variables and is valid.
- **Assign determination ID**
  A unique determination ID is assigned for the determination.
- **Reserve devices (modules)**
  The devices and/or their function units used by the device-dependent commands in the method are reserved for the duration of the determination, i.e. they can neither be used in other workplaces nor can they be operated manually.
- **Increasing sample number**
  The **sample number** is increased by **+1**.
- **Increasing statistics counter**
  If Statistics is switched on, both in the **START** command and on the **Single determination** tab, then the statistics counter will be increased by **+1**. If a new method has been loaded or if the statistics counter corresponds to the setpoint counter, then the current statistics data is deleted beforehand and the statistics counter is set to **0**.

6 - Main procedure

The following actions can be carried out during processing of the method loaded:

- **Processing the main track**
  The status switches to **BUSY** after the start of the main track. The main track commands and those of the other tracks it calls up are processed in sequence. If tracks which are not free are called up by the main track, then a waiting period will be observed until these tracks can be started.
- **Interrupt and continue run**
  A determination that is running can be interrupted at any time with **[Hold]** and resumed with **[Cont]**. All active tracks are interrupted and resumed together when this is done.
- **Cancel run**
  A determination that is running can be canceled at any time with **[Stop]**. The exit track (if present) is run afterwards and the determination is stopped.
- **Stop by error**
  If an error occurs while a determination is running that causes the determination to be interrupted, then the error track will be run (if present) and the determination will be ended.
- **Processing exit track**
  If the main track and all of the tracks that it has called up are finished, then the exit track (if present) will be run and the determination finished. The status switches to **READY** after the end of the main track.

7 - Conditioning (only for methods with conditioning)

Conditioning is started with the loaded method in the case of methods which contain commands with switched-on conditioning. The requirement for this is that the **Automatic conditioning** option is switched on in the **START** command. The conditioning starts immediately after the end of the track which contains the command with conditions.

- **Conditioning condition not fulfilled**
  After conditioning starts, the status switches to **COND BUSY**. A new determination can be started in this status with **[Start]**, even though the conditioning requirement is not fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the error track nor the exit track will be run through.
- **Conditioning condition fulfilled**
  If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. A new determination can be started in this status with **[Start]**. Conditioning can however also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the conditioning requirement will continue to be monitored on a continuous basis.

3.6.3.9 Device assignment

Dialog window: Workplace ▶ Run ▶ Single determination ▶ Device assignment

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Device assignment

If the option **not defined** is selected in the field **Device name** in a device-dependent command, then a prompt appears in the run asking with which device this command should be executed.

Command type

Shows the type of command that the device should be assigned to.

Command name

Shows the name of the command that the device should be assigned to.

Device type

Shows the type of device that should be assigned to the command.

Device name

Selection of a device of the required device type from those available in the device table.

Selection	**'Device name'**

3.6.3.10 Sensor assignment

Dialog window: Workplace ▶ Run ▶ Single determination ▶ Sensor assignment

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Sensor assignment

If the option **not defined** is selected in the field **Sensor name** in a device-dependent command, then a prompt appears in the run asking with which sensor this command should be executed.

Command type

Shows the type of command that the sensor should be assigned to.

Command name

Shows the name of the command that the sensor should be assigned to.

Sensor name

Selection of a sensor of the required sensor type from those available in the sensor table.

Selection	**'Sensor name'**

Wavelength

If an Optrode is selected as sensor, then the wavelength also needs to be specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

3.6.3.11 Single determination - Properties

3.6.3.11.1 Properties - Overview

Dialog window: **Workplace ▶ Run ▶ Single determination ▶ Properties Run window ▶ Properties - Single determination**

The properties for the tab **Single determination** are set on the following tabs:

- *Display*
  Definition of the columns that are to be displayed on the tab **Single determination**.
- *Edit*
  Definition of sample data which are copied automatically into the next determination.
- *Process*
  Options for the processing of single determinations.
- *Data import*
  Enabling/disabling the import of external data for fields on tab **Single determination**.

3.6.3.11.2 Properties - Display

Dialog window: **Workplace ▶ Run ▶ Single determination ▶ Properties Run window ▶ Properties - Single determination**

Definition of the controls and columns that are to be displayed on the tab **Single determination**..

Controls

[Hold]/[Cont]

on | off (Default value: **on**)

Enable/disable the display of the buttons **[Hold]** or **[Cont]**.

Determination parameters

Sample number

on | off (Default value: **on**)

Enable/disable the display of the field **Sample number**.

User

on | off (Default value: **on**)

Enable/disable the display of the field **User**.

Remarks

on | off (Default value: **on**)

Enable/disable the display of the field **Remarks**.

Statistics

on | off (Default value: **on**)

Enable/disable the display of the statistics fields.

Arrangement ID1...16

NOTICE

The fields **Sample size** and **Sample size unit** are always displayed next to one another in a line.

Selection	**1 Column** | **2 columns**
Default value	**1 Column**

1 Column
If this option is selected, then the sample identifications **ID1...ID16** are shown in single columns.

2 columns
If this option is selected, then the sample identifications **ID1...ID16** are shown in double columns.

3.6.3.11.3 Properties - Edit

Dialog window: **Workplace ► Run ► Single determination ► Properties Run window ► Properties - Single determination**

Definition of the sample data which is to be applied automatically for the next **single determination**.

Copy automatically into the next determination

Sample size

on | off (Default value: **on**)

Sample size unit

on | off (Default value: **on**)

Sample position

on | off (Default value: **on**)

ID1...ID16

on | off (Default value: **on**)

3.6.3.11.4 Properties - Process

Tab: **Workplace ► Run ► Single determination ► Properties Run window ► Properties - Single determination ► Process**

Options for the processing of single determinations.

Method selection by assignment ID

on | off (Default value: **off**)

If this option is enabled, then the selected sample identification will be used for the method selection. This identification receives the designation **Assignment ID**, which can then no longer be changed; if this ID matches one of the Assignment IDs from the sample assignment table *(see chapter 3.4.1, page 119)*, then the respective method from this table will be entered in the field **Method**.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16**
Default value	**ID1**

Request assignment ID

on | off (Default value: **off**)

If this option is enabled, the **Assignment ID** will be queried immediately after the start of the determination.

Autorepeat determination

on | off (Default value: **off**)

If this option is enabled, then the next determination will be started with the same method automatically after the completion of a determination. The determination must be canceled with **[Stop]** in order to cancel the automatic repetition.

3.6.3.11.5 Properties - Data import

Tab: **Workplace ► Run ► Single determination ► Properties Run window ► Properties - Single determination ► Data import**

Enabling/disabling the import of external data for fields on tab **Single determination**.

NOTICE

The successful conclusion of the data import during the run will be signaled by an acoustic signal (beep).

Import from balance

on | off (Default value: **off**)

If this option is enabled, then external data from the selected balance will be imported into the fields on the tab **Single determination**. Data can be imported into the fields **ID1…ID4**, **Sample size** and **Unit**.

NOTICE

In order to be able to import sample identifications from the balance, data export must be set accordingly at the balance (Use designations **ID1**, **ID2**, **ID3**, **ID4**).

Balance

Selection of the balance from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the balance is imported into all of the **Single determination** tabs of the open workplaces for which this balance is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the balance is imported only into the **Single determination** tab of the workplace that is actively selected.

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

Import from barcode reader

on | off (Default value: **off**)

If this option is enabled, then external data from the selected barcode reader will be imported into the fields on the tab **Single determination**. The device properties of the barcode reader will define the field into which the data is imported *(see chapter 7.15.4, page 1583)*.

Barcode reader

Selection of the barcode reader from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the barcode reader is imported into all of the **Single determination** tabs of the open workplaces for which this barcode reader is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the barcode reader is imported only into the **Single determination** tab of the workplace that is actively selected.

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

3.6.3.12 Modification comment for sample data

Dialog window: Workplace ► Run ► Single determination ► Live modifications ► Live modifications ► Modification comments sample data

Dialog window: Workplace ► Sequence ► Determination series ► [Edit] ► Edit line ► Edit line - Working sample table - Workplace 'Name' ► Modification comment sample data

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then this window must be opened before saving. A reason and a comment on the modification must be entered here *(see chapter 6.2.2.4, page 1320)*.

Reason

Selection from the standard reasons for the category **Modifications of sample data** *(see chapter 6.2.2.6, page 1322)* that are defined in the security settings.

Selection	**Selection from default reasons**

Comment

Entry of remarks about the modifications to the sample data.

Entry	**1,000 characters**

3.6.4 Determination series

3.6.4.1 Determination series - Overview

Tab: **Workplace ► Run ► Determination series**

Parameters and sample data for determination series can be edited and run functions can be triggered on the **Determination series** tab in the **Run** subwindow. It contains the following elements and functions:

- *Controls*
  Buttons for starting, stopping, interrupting and resuming determinations and series.
- *Status display*
  Shows the current status of the workplace.
- *Sample data*
  Entry of sample data for the next determinations.
- *Properties*
  Definition of the properties for the **Determination series** tab.

3.6.4.2 Determination series - Controls

Tab: **Workplace ► Run ► Determination series**

The following controls are located on the **Determination series** tab:

Start series (shortcut: **Ctrl G**)

Start of the first determination of a sample series. The button is present in the status **READY** (no determination started). If the start can be triggered, it is green, otherwise light gray. For methods that have conditioning, conditioning will start first, followed automatically by the determination (status **COND READY**).

Stop series (shortcut: **Ctrl S**)

Immediate stop of the running determination (or the conditioning) of a sample series. This button is present in the status **BUSY** (determination is running), **COND READY** (conditioning condition fulfilled) and **COND BUSY** (conditioning is running), i.e. when conditioning has been started.

Interrupt run

Interrupts the ongoing determination of a sample series. The button is enabled (dark gray) in the status **BUSY** (determination is running), **COND READY** (conditioning condition fulfilled) and **COND BUSY** (conditioning is running). The button is disabled (light gray) in all other cases. When **[Hold]** is pressed, it will be replaced in the display by **[Cont]**.

Continue run

Continues the ongoing determination of a sample series. The button is present only in the status **HOLD** (determination interrupted) and **COND HOLD** (conditioning interrupted). Pressing **[Cont]** will cause this button to be replaced again in the display by **[Hold]**.

Interrupt series

With this button, the ongoing determination of a sample series will still be completed, but no new determination will be started. The button is present in the status **BUSY** (determination is running). The button is disabled (light gray) in all other cases. When **[Pause]** is pressed, this button will be replaced in the display by **[Cont]**.

Continue series

Starts the next determination of the interrupted sample series. The button is only present in the status **HOLD** (series interrupted). Pressing **[Cont]** will cause this button to be replaced again in the display by **[Pause]**.

3.6.4.3 Determination series - Status display

Tab: **Workplace ► Run ► Determination series**

The current status of the workplace is displayed on the **Determination series** tab:

Status

Selection	**READY** | **BUSY** | **HOLD** | **PAUSE** | **COND BUSY** | **COND READY** | **COND HOLD** | **ERROR**

READY
Ready for starting a determination or for conditioning.

BUSY
Determination is running.

HOLD
Determination is interrupted.

PAUSE
Series is interrupted.

COND BUSY
Conditioning is running (is displayed only when no determination is running).

COND READY
Conditioning condition is fulfilled (is displayed only when no determination is running).

COND HOLD
Conditioning is interrupted (is displayed only when no determination is running).

ERROR
Error.

3.6.4.4 Determination series - Determination parameters

Tab: **Workplace ► Run ► Determination series**

User

If the option **Enforce login with user name** is activated in the security settings, then the short name of the currently logged-in user will be displayed in this field *(see chapter 6.2.2.2, page 1315)*. This field is then not available for editing. If work is done without registering, then a user name can be entered in this field (only in the status **READY**).

Entry	**50 characters**

Sample number

The sample number is set to **0** for all workplaces at the time of each program start. Each time a determination is started, it is incremented by **+1**. It can only be edited by the user in the status **READY**.

Input range	**0 to 99,999**
Default value	**0**

Remark

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries *(see chapter 3.5.1, page 121)*.

NOTICE

The field **Remarks** can also be modified live while determinations are running. The context-sensitive menu item **Modify remarks** is used to open the dialog window **Live modifications** *(see chapter 3.6.3.6, page 130)*.

Entry	**100 characters**

Autostart

Number of automatic, internal starts of determinations within a sample series.

The first field after **Autostart** shows the number of determinations already carried out (actual counter). This field cannot be edited, but it can be reset to **0** in the status **READY** or **PAUSE** through the use of the context-sensitive **Reset autostart counter** menu item.

The second field after **Autostart** shows the total number of determinations per series to be carried out (setpoint counter). By default, it contains the entry **Sample table**, which refers to the number of lines of the working sample table. This field cannot be edited except when it is in the status **READY**.

NOTICE

The second field after **Autostart** can also be modified live for a series that is currently running. The **Live modifications** window opens with the context-sensitive **Modify autostart counter** menu item.

Input range	**1 to 999**
Default value	**Sample table**

Statistics

on | off (Default value: **on**)

This field is displayed only when a method has been loaded with a **START** command in which the option **Statistics** has been activated. The statistics defined in the method can be activated and deactivated manually here (only in the status **READY**).

The first field after **Statistics** shows the number of determinations already carried out for the statistics (actual counter). This field cannot be edited, but when it is in the status **READY** and **COND BUSY**, it can be set to **0** with the context-sensitive **Delete statistics** menu item, and the already calculated statistics data is deleted at the same time.

The second field after **Statistics** shows the number of determinations to be carried out for the statistics (setpoint counter). By default, it contains the value **Number of single determinations** defined in the **START** command. This field cannot be edited except in the status **READY** and **COND BUSY**.

NOTICE

When a new statistics series is started, the setpoint counter will be reset to the value defined in the **START** command.

3.6.4.5 Determination series - Sample data

Tab: **Workplace ► Run ► Determination series**

The current working sample table, which contains the sample data for determination series in tabular form, is displayed under **Sample data**. Each line corresponds to a single determination.

This table contains the sample data lines that have already been saved in the sample table and a line for entering new data that contains a star instead of a line number. The table cannot be edited or sorted directly.

For the meaning of the columns, *see Editing sample data*.

The lines in the working sample table can exhibit different **background colors**:

- **Light gray background**
  Processed line. Data in this line can no longer be modified. These lines only appear if the option **Delete processed lines** is disabled on the **Process** tab *(see chapter 3.3.2.4, page 113)*.
- **Dark gray background**
  Selected, already processed line.
- **Light orange background**
  Currently running line.
- **Dark orange background**
  Selected line currently running. If sample data is modified after the start of the determination (in the status **BUSY**), then this is considered a live modification.
- **White background**
  Lines that have not yet been processed. These lines can be edited.

- **Turquoise background**
  Selected line not yet processed.

Loaded

Shows the sample table whose data has been loaded into the working sample table. If no sample table has been loaded or if all lines have been deleted, then this field is empty. If data for a loaded sample table is modified retroactively or expanded to include new lines, then the term **(modified)** will be added to the display of the name.

Toolbar

Save sample table	Saves the sample table.
Output of PDF file	Outputs the sample table as a PDF file.
Reset sample table	Resets lines that have been processed, i.e., they can be edited again.
Duplicate	Duplicates the selected line(s). The new lines are inserted below the selected range.
Increment	Increments the selected cells automatically.
Fill	Fills the selected cells automatically.
Test sample table	Checks whether all sample data in the sample table is correct.

Window menus

[Edit] contains the following menu items:

Edit line	Edit the selected line.
Insert new line	Inserts a new, empty line above the selected line.
Cut lines	Cuts the selected lines and transfers them to the clipboard.
Copy lines	Copies the selected lines to the clipboard.
Insert lines	Pastes lines from the clipboard above the selected line.
Delete lines	Deletes the selected lines.

Increment	The range that is to be automatically incremented from a column in the table can be selected with the cursor, which takes on the form ✚. In this process, the number standing at the end of the expression will be automatically increased by 1 in the selected cells of a column, starting from the first selected cell. This works not only with pure numbers but also with text expressions ending with a number (e.g. **ABC10** → **ABC11** → **ABC12**…).
Fill	Fills the selected cells automatically.
Duplicate	Duplicates the selected line(s). The new lines are inserted below the selected range.
Mark lines	Marks the line number of the selected lines with a red background. Before the start of such a line, the corresponding actions defined under **Properties** on the **Process** *(see chapter 3.3.2.4, page 113)* tab will be triggered.
Unmark lines	Removes the line marking for the selected lines.
Set lines inexecutable	Sets the selected lines to "inexecutable", i.e., these lines will not be executed in the run. Such lines are struck through with a red line.
Set lines executable	Sets the selected lines to "executable", i.e., they will be executed in the run.

[Sample table] contains the following menu items:

New	Loads a new, empty sample table.
Load…	Loads the saved sample table into the working sample table.
Save	Saves the current sample table under the same name.
Save As…	Save the current sample table under a new name.
Sample table test…	Checks whether all sample data in the working sample table is correct.
Print (PDF)…	Outputs the working sample table as PDF file.
Properties…	Set the properties of the working sample table.
Import data…	Import a sample table from a file with the format ***.csv**.
Reset	Resets lines that have been processed, i.e., they can be edited again.

Moving lines with drag and drop

The lines selected in the working sample table can be moved to an opened sample table via drag and drop.

Copying lines with drag and drop

The lines selected in the working sample table can be copied to an opened sample table with drag and drop by pressing the **Ctrl key**.

3.6.4.6 Modify remark

Dialog window: **Workplace ► Run ► Single determination ► Modify remark ► Live modifications**

The dialog window **Live modifications**, in which the remarks can be modified in a determination while it is running, opens with the context-sensitive menu **Modify remark**.

Remarks

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**

3.6.4.7 Change autostart counter

With the context-sensitive menu item **Modify autostart counter**, the dialog window **Live modifications** opens, in which the autostart counter can be modified live during a running determination.

Autostart

Number of automatic, internal starts of determinations within a sample series.

The first non-editable field after **Autostart** shows the number of determinations already carried out (actual counter).

The second, editable field after **Autostart** shows the total number of determinations per series that are still to be carried out (setpoint counter).

Selection	**1 … 999** | **Sample table**
Default value	**Sample table**

3.6.4.8 Determination series - Determination run

Tab: **Workplace ► Run ► Determination series**

For a series of determinations that is started on the tab **Determination series** in the subwindow **Run**, each determination proceeds as follows:

1 - Loading the sample data

The sample data for the determination entered on the current line in the **Working sample table** is loaded.

2 - Method selection

The following actions are triggered with method selection:

- **Method selection without Assignment ID**
  The method selected in the column **Method** is loaded.
- **Method selection by assignment ID**
  If the option **Method selection by assignment ID** is enabled in the properties of the determination series on the tab **Process** *(see chapter 3.3.2.4, page 113)*, then the method defined in the sample assignment table will be loaded *(see chapter 3.4, page 119)*.

3 - Start test

The following checks and actions are triggered with start test:

- **Authorization for carrying out the method?**
  Check whether the registered user is authorized to carry out the method required *(see chapter 5.4.2.3, page 425)*.
- **Method executable?**
  Check whether the required method is executable. For methods which are not executable, a request appears to perform the method check and to modify the method accordingly *(see chapter 5.2.5, page 409)*.
- **Check device (modules) and rack**
  Check whether the devices (or device types), device modules (e.g. measuring input, tower etc.) and racks requested in the device-specific commands are present and available or assigned. If the device in a command is not yet assigned, the dialog window **Device assignment** opens for the assignment of the device.
- **Check solutions**
  Check whether the solutions requested in the device-specific commands are present and available.
- **Check sensors**
  Check whether the sensors requested in the device-specific commands are present and available.
- **Check sample data**
  Check whether the sample data entered corresponds to the method variables defined and whether it is valid.

NOTICE

When it is in the status **READY**, the start test can also be triggered manually with the symbol or the menu items **Tools ► Run test** or **[Sample table] ► Run test…**. In addition, the sample data test will also still be carried out afterwards.

4 - Preconditioning (only for methods with conditioning)

For methods containing commands with conditioning activated, the preconditioning is started for all these commands. The condition for this is, that the option **Automatic conditioning** is activated in the **START** com-

mand. The preconditioning is not part of the determination and increments no counter (**Sample number**, **Statistics**).

- **Condition requirement not fulfilled**
  The status switches to **COND BUSY** after the start of the preconditioning. In this status the conditioning can be interrupted with **[Hold]** and be continued with **[Cont]**. If an error occurs during conditioning neither the **Error track** nor the **Exit track** are run through.
- **Condition requirement fulfilled**
  If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. Afterwards, the method is started automatically.

5 - Method start

The following checks and actions are triggered with method start:

- **Assign determination ID**
  A unique determination ID is assigned for the determination.
- **Reserve devices (modules)**
  The devices and/or their function units used by the device-dependent commands of the method are reserved for the duration of the determination, i.e. they can neither be used in other workplaces nor can they be operated manually.
- **Increase sample number**
  The **Sample number** is increased by **+1**.
- **Increase statistics counter**
  If the statistics is activated in the **START** command as well as on the tab **Determination series** the statistics counter is increased by **+1**. If a new method has been loaded or if the statistics counter corresponds to the setpoint counter, the current statistics data is deleted before and the statistics counter is set to **0**.

6 - Main run

The following actions may be carried out during processing of the method loaded:

- **Process series start track**
  At the beginning of the first determination of a series the **Series start track** is started. If **[Stop]** is pressed during running this track, the **Exit track** is started, if an error occurs, the **Error track**.
- **Process the main track**
  After the start of the **Main track** the status switches to **BUSY**. The commands of the main track and of the tracks requested by the latter are processed in sequence. If tracks, which are not free, are requested by the main track, waiting takes place until these tracks can be started.

- **Stop run and continue**
  A running determination can be interrupted at any time with **[Hold]** and continued with **[Cont]**. Thereby, all active tracks are interrupted and continued jointly.
- **Stop series and continue**
  A running series can be interrupted at any time with **[Pause]**. Thereby, the ongoing determination of the sample series will still be carried out to completion, but no new determination will be started. The next determination of the interrupted sample series is started with **[Cont]**.
- **Cancel run**
  A determination that is running can be interrupted at any time with **[Stop]**. Afterwards the **Exit track** (if present) is run through and the determination is stopped.
- **Stop by error**
  If an error, which causes the determination to be interrupted, occurs, the **Error track** (if present) is run through and the determination is stopped.
- **Process exit track**
  if the main track and all tracks requested by the latter are ended, the **Exit track** (if present) is run through and the determination is stopped.
- **Process series end track**
  At the end of the last determination of a series, the **series end track** is started. If **[Stop]** is pressed during running this track, the determination is cancelled, if an error occurs, the **Error track**.

7 - Post-conditioning (only for methods with conditioning)

For methods containing commands with conditioning activated and for which the option **Automatic conditioning** is activated in the **START** command, the post-conditioning is automatically started for all these commands with the method loaded and this immediately after the end of the track containing the conditioning command. The status switches to **COND BUSY** after the start of the post-conditioning. In this status the conditioning can be cancelled with **[Stop]** or interrupted with **[Hold]** and continued with **[Cont]**. If an error occurs during conditioning, neither the error track nor the exit track are run through.

For methods containing commands with conditioning activated and for which the option **Automatic conditioning** is activated in the **START** command, the post-conditioning is automatically started for all these commands with the method loaded and this immediately after the end of the track containing the conditioning command.

- **Condition requirement not fulfilled**
  The status switches to **COND BUSY** after the start of the post-conditioning. In this status a new determination can be started with **[Start]** although the condition requirement is not fulfilled. The conditioning can aslo be cancelled with **[Stop]** or interrupted with **[Hold]** and continued with **[Cont]**. If an error occurs during conditioning, neither the **Error track** nor the **Exit track** are run through.
- **Condition requirement fulfilled**
  If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. A new determination can be started in this status with **[Start]**. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the condition requirement will continue to be monitored on a continuous basis.

3.6.4.9 Device assignment

Dialog window: Workplace ► Run ► Single determination ► Device assignment

Dialog window: Workplace ► Run ► Determination series ► Device assignment

If the option **not defined** is selected in the field **Device name** in a device-dependent command, then a prompt appears in the run asking with which device this command should be executed.

Command type

Shows the type of command that the device should be assigned to.

Command name

Shows the name of the command that the device should be assigned to.

Device type

Shows the type of device that should be assigned to the command.

Device name

Selection of a device of the required device type from those available in the device table.

Selection	**'Device name'**

3.6.4.10 Sensor assignment

Dialog window: Workplace ► Run ► Single determination ► Sensor assignment

Dialog window: Workplace ► Run ► Determination series ► Sensor assignment

If the option **not defined** is selected in the field **Sensor name** in a device-dependent command, then a prompt appears in the run asking with which sensor this command should be executed.

Command type

Shows the type of command that the sensor should be assigned to.

Command name

Shows the name of the command that the sensor should be assigned to.

Sensor name

Selection of a sensor of the required sensor type from those available in the sensor table.

Selection	**'Sensor name'**

Wavelength

If an Optrode is selected as sensor, then the wavelength also needs to be specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

3.6.4.11 Working sample table

3.6.4.11.1 Loading sample table

Menu item: **Workplace ► Run ► Determination series ► [Sample table] ► New**

A new, empty sample table is loaded as working sample table with the menu item **[Sample table] ► New** on the tab **Determination series**, i.e. all existing sample table rows will be deleted.

3.6.4.11.2 Loading sample table

Dialog window: **Workplace ► Run ► Determination series ► [Sample table] ► Load... ► Load sample table**

One of the globally available sample tables can be selected in this dialog window for loading as a working sample table.

List of sample tables

The list of sample tables contains information about all the saved sample tables. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the **Comment** tab as a comment concerning the sample table *(see chapter 3.3.2.6, page 116)*.

Load sample table

Name

Name of the sample table that is to be loaded. If a sample table from the table is selected, the name will be entered automatically in this field. It can, however, also be entered manually.

Entry	**50 characters**

[Load]

Load the data of the selected sample table into the working sample table. In addition, all properties of the sample table, with the exception of the settings for **Import from file** and **Import format** for the working sample table, are applied.

3.6.4.11.3 Edit sample data

Menu item: **Workplace ► Run ► Determination series ► [Edit] ► Edit line ► Edit line - Working sample table - Workplace 'Name'**

The fields in this dialog window exhibit the same background colors as the lines in the working sample table:

- **Light gray background**
  Line already processed, the data of which can no longer be modified.
- **Orange background**
  Line currently running. If sample data is not to be modified until after the start of the determination (in the status **BUSY**), then this is considered a live modification.
- **White background**
  A line that has not yet been processed and which can still be edited.

NOTICE

Generally speaking, no formula input is possible in the fields of this dialog window.

Method

Entry or selection of the method from the current method group with which the determination is to be carried out. By typing in the first characters, the method selection is continuously restricted and allows fast selecting of the method required.

Entry	**50 characters**
Selection	**Method selection**

Open the dialog window **Open method** for the extended method selection. If a method is selected in this window from a method group other than the current one, then this group will henceforth be the current method group for the quick selection of methods in the **Method** field. This button is active only if more than one method group is present.

NOTICE

If a method is changed and saved in the method editor or during reprocessing, then the latest method version will be loaded when a new determination is started.

NOTICE

The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method *(see chapter 5.6.2.2.5, page 442)*.

Sample position

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this to be achieved, the **Sample position** option must be set under **Target** for the **Move** parameter.

Input range	**1 to 999** (Increment: **1**)
Default value	**'empty'**

ID1…ID16

Sample identifications ID1…ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected *(see chapter 3.5.1, page 121)*.

Entry	**100 characters**
Selection	**Selection of text templates**

Sample size

Sample size (initial weight). Only numbers, decimal points, **+**, –, **E** and **e** can be entered in this field. The checking for limit values does not take place until the start of determination.

NOTICE

If a value is entered or imported into this field, then in addition the time of the data entry and the data source are stored **manually**, while the **'Name of the scale'**, the **'Name of the barcode reader'** or the **'Name of the import file'**) are stored automatically at the same time, placed in the determination and identified in the **Information** sub-window as **Data entry** and **Data source**.

NOTICE

If a negative value is entered in this field (e. g. during data import from a scale in the event of reweighing), then this will be also be calculated as a negative in the formula editor.

Entry	**Number with a maximum of 10 digits**
Default value	**1.0**

Unit

Sample size unit (initial weight). There are no restrictions on the text to be entered in this field.

Entry	**16 characters**
Selection	**g** | **mg** | **µg** | **mL** | **µL** | **pieces**
Default value	**g**

NOTICE

If data from the current sample data line is modified for the ongoing determination, then this is regarded as a live modification. If the option **Comment on modification of sample data (live)** is enabled in the security settings, then a reason and a comment on the modification must be entered before saving *(see chapter 6.2.2.4, page 1320)*.

Navigation

Display of the currently selected line in the working sample table with the following functions:

Jump to the first line in the working sample table.

Jump to the previous line in the working sample table.

Option of entering the desired line number to which the program jumps when the **[Enter]** is actuated.

Jump to the next line in the working sample table. If the end of the table has been reached, then a new line will be inserted automatically and the program will jump to it.

Jump to the last line in the working sample table.

Jump to a new, empty line.

Displaying application note

on | off (Default value: **off**)

If this check box is activated, then the application note defined in the method will be displayed during the editing of the sample data.

Functions

[Apply]

Apply the sample data entered in the respective line of the working sample table. If the end of the table has been reached, then a new line will be generated automatically. The same function can also be triggered by pressing the **[Enter]** key. The next line will, however, also be marked automatically when **[Enter]** is used.

[Close]

Closes the input window. The current sample data will not be applied in the working sample table (this needs to be triggered beforehand with **[Apply]**).

3.6.4.11.4 Duplicate sample data

Dialog window: **Workplace ► Sample table / Determination series ► [Edit] ► Duplicate ► Duplicate**

Number

Request as to how often the selected lines are to be duplicated. The new lines are inserted underneath the selected range.

Input range	**1 to 999**
Default value	**1**

3.6.4.11.5 Importing sample data

Dialog window: **Workplace ► Sample table / Determination series ► [Sample table] ► Import data… ► Select files to import**

Select a ***.csv** file in this dialog window with the sample data to be imported.

File name

Input or selection of the file that is to be imported.

Selection	**File name**

File type

Selection of the import format for the import of data from a file (only ***.csv** is possible).

Selection	***.csv** | ***.csv (Unicode)**
Default value	***.csv**

[Open]

The sample data from the selected file is inserted at the end of the sample table.

NOTICE

No matter the number of data fields defined on the **Display** tab, the import file must always contain for each line the entirety of the sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit;ID9;ID10;ID11;ID12;ID13;ID14;ID15;ID16;**.

3.6.4.11.6 Sample table test

Dialog window: **Workplace ► Sample table / Determination series ► [Sample table] ► Sample table test... ► Sample table test -Sample table name**

The menu item **[Sample table] ► Sample table test...** or the symbol is used to perform the sample table test. At the same time, the dialog window **Sample table test - 'Sample table name'** in which the information concerning the test is displayed opens.

NOTICE

The **Sample table test** is only used to check whether or not all sample data is correct (in contrast to the **Run test** *(see chapter 3.6.2, page 123)*, which also checks the required hardware).

Line

Displays the line number of the currently tested sample data line.

Status displays

One of the following status displays appears underneath the line number:

Selection	**Sample table test running... | Sample table test stopped manually | Sample table test finished without errors | Sample table test finished with errors**

Sample table test running...
This display appears during the test run. A progress bar also appears; the test can be interrupted thereby by means of the [x] next to the bar.

Sample table test stopped manually
This display appears if the sample table test was canceled manually by the user.

Sample table test finished without errors
This display appears at the end of a sample table test that has been completed without errors.

Sample table test finished with errors
This display appears if an error has occurred during the sample table test. The errors that occured are listed in the **Test report** field.

Test report

Display of errors that occurred during the sample table test, together with line numbers.

3.6.4.11.7 Save sample table

Dialog window: **Workplace ▶ Sample table / Determination series ▶ [Sample table] ▶ Save as... ▶ Save sample table**

A name for the working sample table to be saved can be entered or selected in this dialog window.

List of sample tables

The list of sample tables contains information about all the saved sample tables.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table *(see chapter 3.3.2.6, page 116)*.

Saving sample table

Name

Name under which the sample table is to be saved.

NOTICE

The name of the sample table must be unique throughout the entire client/server system.

Entry	**50 characters**

[Save]

Save the sample table under the desired name.

3.6.4.11.8 Run test

Menu item: **Workplace ► Tools ► Run test**

NOTICE

In contrast to the **Sample table test**, which is only used to check whether or not all sample data is correct, the **Run test** also checks the required hardware.

Single determination

The menu item **Tools ► Run test** or the symbol is used to perform the start test for the selected method. The precondition for this is that the workplace is in **READY** status.

For the Run test, the dialog window **Run test - 'Workplace name' - Single determination** opens, in which information concerning the test is displayed.

Method

Displays the method for the single determination.

Determination series

The menu items **Tools ► Run test** or **[Sample table] ► Run test...** or the symbol are used to perform the Start test. The precondition for this is that the workplace is in **READY** status. The Start test is however performed only for the number of lines defined under **Autostart**.

For the Run test, the dialog window **Run test - 'Workplace name' - Determination series** opens, in which information concerning the test is displayed.

Line

Displays the line number of the currently tested sample data line for the determination series.

Status displays

One of the following status displays appears underneath the line number:

Selection	**Run test running... | Run test error | Run test finished without errors**

Run test running…
This display appears during the test run. A progress bar also appears; the test can be interrupted thereby by means of the [x] next to the bar.

Run test error
This display appears if an error has occurred during the run test. During a determination series, the user can determine, on the basis of the line number displayed, the line to which the the error message belongs that appeared at the time of the error and that is currently displayed in the usual message window.

Run test finished without errors
This display appears at the end of a run test that has been completed without errors.

3.6.4.11.9 Print sample table (PDF)

Dialog window: **Workplace ▶ Sample table / Determination series ▶ [Sample table] ▶ Print (PDF)… ▶ Print sample table (PDF)**

The output format for the PDF output can be selected in this dialog window.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output in portrait format.

Landscape
Output in landscape format.

3.6.4.12 Determination series - Properties

3.6.4.12.1 Properties - Overview

Dialog window: Workplace ▶ Run ▶ Determination series ▶ [Sample table] ▶ Properties… ▶ Properties - Determination series

Dialog window: Workplace ▶ View ▶ Properties ▶ Properties Run window ▶ Properties - Determination series

The properties for the tab **Determination series** are set on the following tabs:

- *Display*
  Definition of the columns that are to be displayed in the working sample table.
- *Edit*
  Options for editing the working sample table on the tab **Determination series** and in the dialog window **Edit line**.

- *Process*
  Options for processing the working sample table on the tab **Determination series**.
- *Data import*
  Activating/deactivating the import of external data for working sample table fields.
- *Comment*
  Entry of a comment on the working sample table.

3.6.4.12.2 Properties - Display

Dialog window:Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window:Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Definition of the controls and columns that are to be displayed in the sample table.

Controls

NOTICE

This parameter group is visible only if the dialog window above the tab **Determination series** is open.

[Pause]/[Cont]

on | off (Default value: **on**)

Enable/disable the display of the buttons **[Pause]** or **[Cont]**.

[Hold]/[Cont]

on | off (Default value: **on**)

Enable/disable the display of the buttons **[Hold]** or **[Cont]**.

Determination parameters

NOTICE

This parameter group is visible only if the dialog window above the tab **Determination series** is open.

Sample number

on | off (Default value: **on**)

Enable/disable the display of the field **Sample number**.

User

on | off (Default value: **on**)

Enable/disable the display of the field **User**.

Remarks

on | off (Default value: **on**)

Enable/disable the display of the field **Remarks**.

Statistics

on | off (Default value: **on**)

Enable/disable the display of the statistics fields.

Sample data

NOTICE

The names defined here will be used **only** for the column headings in the sample table.

The names defined in the **START** command under **Method variables** will always be used when editing a sample line and for the determination data.

Sample position

on | off (Default value: **on**)

Enable/disable the display of the column **Sample position** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Sample position**

ID1 … ID3

on | off (Default value: **on**)

Enable/disable the display of the column **ID1 … ID3** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**ID1…3**

ID4 … ID16

on | off (Default value: **off**)

Enable/disable the display of the column **ID4 … ID16** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**ID4…16**

Sample size

on | off (Default value: **on**)

Enable/disable the display of the column **Sample size** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Sample size**

Unit

on | off (Default value: **on**)

Enable/disable the display of the column **Sample size unit** in the sample table. The option also exists of renaming the heading of this column in the working sample table.

Entry	**50 characters**
Default value	**Unit**

3.6.4.12.3 Properties - Edit

Dialog window: Workplace ► Tools ► Sample table ► New… ► [Sample table] ► Properties… ► Properties - Sample table 'Name'

Dialog window: Workplace ► Run ► Determination series ► Properties Run window ► Properties - Determination series

Options for the editing of the sample table.

Apply data with

on | off (Default value: **off**)

Selection of the data field which must be filled in connection with automatic data import via balance, barcode reader or file in order to apply the data for the line in the sample data storage and to switch onward to the

next line. If the relevant column is empty, then additional imported data will be written into the same line. This means that it is possible, for example, to fill a line first with sample identifications per barcode reader and then later to apply the sample size from a balance for the same line.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16** | **Sample size** | **Unit** | **Sample position**
Default value	**Sample size**

Lock editing in working sample table

on | off (Default value: **off**)

If this option is activated, then it is not possible to edit lines in the sample table that is loaded in the working sample table.

Copy automatically into next line

Method

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

ID1 … ID3

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

ID4 … ID16

on | off (Default value: **off**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Sample size

on | off (Default value: **off**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Unit

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be filled with the content of the previous line when a new sample data line is created.

Sample position + 1

on | off (Default value: **on**)

If this option is activated, then the content of this field will automatically be incremented by **+1** when a new sample data line is created.

3.6.4.12.4 Properties - Process

Dialog window: Workplace ► Tools ► Sample table ► New… ► Sample table 'Name' ► [Sample table] ► Properties… ► Properties - Sample table 'Name'

Dialog window: Workplace ► Run ► Determination series ► Properties Run window ► Properties - Determination series

Options for processing the working sample table in the Workplace window in the tab **Determination series**.

Delete processed lines

on | off (Default value: **off**)

If this option is activated, then lines in the working sample table which have already been processed completely will be deleted automatically.

Method selection by assignment ID

on | off (Default value: **off**)

If this option is activated, then the selected sample identification will be used for the method selection in the working sample table. This identification received the designation **Assignment ID**, which can then no longer be changed; if this ID matches one of the Assignment IDs from the sample assignment table *(see chapter 3.4.1, page 119)*, then the respective method from this table will be entered in the field **Method**.

Selection	**ID1** | **ID2** | **ID3** | **ID4** | **ID5** | **ID6** | **ID7** | **ID8** | **ID9** | **ID10** | **ID11** | **ID12** | **ID13** | **ID14** | **ID15** | **ID16**
Default value	**ID1**

Request assignment ID

on | off (Default value: **off**)

If this option is activated, the **Assignment ID** will be queried immediately after the start of the determination.

Actions for marked sample table lines

Selection	**Pause series ([Pause]) and show message | Stop series ([Stop])**
Default value	**Pause series ([Pause]) and show message**

Pause series ([Pause]) and show message
If this option is selected, then the series is interrupted before the start of the marked line (equivalent to [Pause]). At the same time a message will appear which also contains the text defined in the message box.

Stop series ([Stop])
If this option is selected, then the series is stopped before the start of the marked line (equivalent to [Stop]).

Start the text editor with which the message can be entered and edited.

3.6.4.12.5 Properties - Data import

Dialog window: Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Activating/deactivating the import of external data for sample table fields.

NOTICE

The successful completion of the data import is indicated during the run by an acoustic signal (beep).

Import from a balance

on | off (Default value: **off**)

If this option is activated, then external data from the selected balance will be imported into the opened sample table. Data can be imported into the fields **ID1…ID4**, **Sample size** and **Unit**.

NOTICE

In order to be able to import sample identifications from the balance, data export must be set accordingly at the balance (Use designations **ID1**, **ID2**, **ID3**, **ID4**).

Balance

Selection of the balance from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the balance is imported into the open sample table for which this balance is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the balance is only imported into the open sample table if this is actively selected (i.e. when the window has the focus).

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data is imported during a determination only if the **Data input** dialog of a **REQUEST** command is opened.

Import from a barcode reader

on | off (Default value: **off**)

If this option is activated, then external data from the selected barcode reading device will be imported into the opened sample table. The device properties of the barcode reader will define the field into which the data is imported *(see chapter 7.15.4, page 1583)*.

Barcode reader

Selection of the barcode reader from which data is to be imported.

Selection	**Device name**
Selection	**Always accept data** | **Accept data only for active window**
Default value	**Always accept data**

Always accept data
If this option is selected, then the data sent from the barcode reader is imported into the open sample table for which this barcode reader is defined as data source.

Accept data only for active window
If this option is selected, then the data sent from the barcode reader is only imported into the open sample table if this is actively selected (i.e. when the window has the focus).

Confirmation necessary to accept data during the determination.

on | off (Default value: **off**)

If this option is switched on, then data is imported during a determination only if the **Data input** dialog of a **REQUEST** command is opened.

Import from a file

on | off (Default value: **off**)

If this option is activated, then external data from a file (e.g. via LIMS) will be imported into a sample table. When this is the case, a check is made to determine whether the specified import file is available when the sample table is opened, when the sample table is loaded into the working sample table and also periodically (every 10 s) when the sample table is open (although not when the dialog window **Edit line** is open). If the import file is available, then the data from this file is automatically inserted at the end of the sample table. The import file is deleted after each import.

NOTICE

No matter the number of data fields defined on the **Display** tab, the import file must always contain for each line the entirety of the sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Unit;ID9;ID10;ID11;ID12;ID13;ID14;ID15;ID16;**.

Import file

File that is to be imported. With the file can be selected in the dialog window **Select files for import**.

Entry	**File name**

Import format

Selection of the import format for the import of data from a file.

Selection	***.csv** | ***.csv (Unicode)**
Default value	***.csv**

***.csv**
Format for the import of CSV files with Western European ASCII character sets.

***.csv (Unicode)**
Format for the import of CSV files with Unicode character sets.

3.6.4.12.6 Properties - Comment

Dialog window: Workplace ▶ Tools ▶ Sample table ▶ New… ▶ [Sample table] ▶ Properties… ▶ Properties - Sample table 'Name'

Dialog window: Workplace ▶ Run ▶ Determination series ▶ Properties Run window ▶ Properties - Determination series

Entry of a comment on the sample table.

Comment on sample table

Entry of a comment on the sample table. This comment will be displayed in the column of the same name in the dialog windows **Open sample table** and **Sample table manager**.

Entry	**1,000 characters**

3.6.4.13 Modification comment for sample data

Dialog window: Workplace ▶ Run ▶ Single determination ▶ Live modifications ▶ Live modifications ▶ Modification comments sample data

Dialog window: Workplace ▶ Sequence ▶ Determination series ▶ [Edit] ▶ Edit line ▶ Edit line - Working sample table - Workplace 'Name' ▶ Modification comment sample data

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then this window must be opened before saving. A reason and a comment on the modification must be entered here *(see chapter 6.2.2.4, page 1320)*.

Reason

Selection from the standard reasons for the category **Modifications of sample data** *(see chapter 6.2.2.6, page 1322)* that are defined in the security settings.

Selection	**Selection from default reasons**

Comment

Entry of remarks about the modifications to the sample data.

Entry	**1,000 characters**

3.7 Subwindow Method

3.7.1 Method window - General

Subwindow: **Workplace ► Method**

Subwindow Method

The **Method** subwindow displays the method with its tracks and commands that is loaded in the Run window on the **Single determination** or **Determination series** tab, whereby the display is identical with that in the method program part. The subwindow can be switched on in the **Workplace** program part during the definition of the Layout and thus made visible. It can be enlarged and reduced as required; it can also be maximized.

Presentation of the active tracks and commands

Active tracks (tracks with the status **BUSY**) are marked with a **light red** background and active commands (commands in the status **BUSY**) with a **red** frame. If automatic conditioning is switched on, then commands which are on conditioning will be marked with an **orange** frame.

3.7.2 Method window - Zoom

Context-sensitive menu item: **Zoom**

The default presentation of the method in the method window shows all of the tracks in their entirety. The following zoom levels for the display of the method can be selected with the context-sensitive menu item **Zoom**:

Selection	**200 %** Zoom in the view to 200%.
Selection	**150 %** Zoom in the view to 150%.
Selection	**100 %** Set view to 100%.
Selection	**75 %** Zoom out the view to 75%.
Selection	**50 %** Zoom out the view to 50%.
Selection	**25 %** Zoom out the view to 25%.
Selection	**Fit to width** Adjust to width of the window.

Selection	**Fit to height** Adjust to height of the window.

Selection	**Fit in window**
Default value	**Fit in window**
	Adjust to both height and width of the window.

3.7.3 Method window - Live modifications

Subwindow: **Workplace ► Method**

Double-clicking on a command in the method window or in the context-sensitive menu item **Properties** will open the properties window of the relevant command in which all of the parameters are shown, but in which only the specified live parameters can be edited. In addition, this parameters window contains the **[Apply]** button with which the modified live parameters can also be applied when the parameters window is open. Live parameters can be modified not only in the **BUSY** status but also in the **READY** status. If the option **Comment on modification of methods** is activated in the **Security settings**, then the dialog window **Modification comment for method** is displayed before the modified data is applied.

The modified parameters apply until either the method is changed, the user signs off or the program is closed. A message appears in such cases asking whether the method should be resaved. Responding with **[Yes]** causes a new method version to be created; responding with **[No]** retains the old method version.

If live parameters are modified, then these modifications will be documented not only in the determination but also in the audit trail. All parameters which were modified will be marked with an asterisk (*****) in the parameters report for the determination and saved at the end of the determination. If parameters of already processed commands are modified, then these changes will not in fact take effect until the next determination, although they will nevertheless be marked as "modified live" in the method report for the determination that has been executed. The markings disappear as soon as the method is saved in the regular way.

Methods with modified live parameters can also be resaved manually at any time in the **READY** status with**File, Method, Save** or**File, Method, Save under…**.

NOTICE

No live parameters can be edited with methods which have been signed at **Level 2** and thus locked.

Errors whose content is defined by a formula cannot be modified live.

If an active **SEQUENCE** command is canceled, then only the individual command in the sequence that is currently active will be canceled, and the next individual command will be started.

3.7.4 Method window - Cancel command

Subwindow: **Workplace ► Method**

If a workplace is in **BUSY** status, then the context-sensitive menu item **Cancel** can be used to stop the running of an active command immediately and to jump directly to the next command. This applies only to commands with live display. This cancellation is documented in the determination (under **Messages**) and in the **Audit Trail**. The data and variables which have already been generated by the command that was canceled will be saved.

3.8 Subwindow Live display

3.8.1 Live display - General

Subwindow: **Workplace ► Live display**

Subwindow Live display

In both of the subwindows **Live display 1** and **Live display 2**, live curves, measured values and messages on the method started in the run window on the tab **Single determination** or **Determination series** are displayed. The subwindows can be activated in the program part **Workplace** during the definition of the layout and thus made visible. They can be enlarged and reduced as required; they can also be maximized.

The display of curves and measured values in the live window can be defined per window and per command type in the **Properties**.

Tabs

The subwindows **Live display 1** and **Live display 2** are comprised of the following tabs:

- *Tracks*
  A tab is displayed for each track which is lettered with the name of the track.
- *Application note*
  Displaying the application message defined in the command **START**.

- *Messages*
  Displaying the messages generated during the determination.

3.8.2 Live display - Tracks

Subwindow: **Workplace ► Live display**

In the subwindow **Live display** the main track of the method loaded (**START** command) is always displayed, further tracks are only displayed if the live display is activated in the accompanying command **TRACK**. A tab is displayed for each track which is lettered with the name of the track.

On these tabs the live display elements (curve, measured value, message) defined in the **Properties** are displayed for the currently active command. The tabs have to be switched manually, i.e. there is no automatic switching when calling another track. This makes it possible to display two simultaneously active tracks next to another in two live windows.

At the start of the determination the content of the track tabs is deleted. Afterwards the messages, curves and measured value displays defined by the active commands will appear in the track tabs. The tab titles of the active tracks will be displayed in red. Additionally the command type and command name of the active command are displayed in the window title of the subwindow **Live display**.

If all tracks or single tracks are stopped with **[HOLD]** or a **SEND** command, then in these tracks **Track halted…** is displayed.

After finishing the track **Track finished** is displayed in each track except for the main track. After finishing the determination and depending on the determination run the following is displayed in the main track:

Selection	**Run: regular without remarks** | **Run: regular with remarks** | **Run: Stop** | **Run: Stop by error**

Run: regular without remarks
The determination has been finished automatically after it has been processed regularly and without any remarks.

Run: regular with remarks
The determination has been finished automatically after it has been processed regularly but with remarks *(see chapter 4.6.6, page 359)*.

Run: Stop
The determination or the conditioning has been stopped manually with **[Stop]**, by stop criterions or with a **SEND** command.

Run: Stop by error
The determination or the conditioning has been canceled automatically because of an error or has not even been started because of an error at the **Start test**.

Context menu

Cancel	Cancel the active command of the track.
Properties - Live display	Set properties of the live display *(see chapter 3.8.5, page 176)*.

3.8.3 Live display - Application note

Subwindow: **Workplace ▶ Live display**

On the tab **Application note**, the application note defined in the **START** command of the loaded method is displayed. This tab is opened by default in the subwindow **Live display** when loading the method.

3.8.4 Live display - Messages

Subwindow: **Workplace ▶ Live display**

On the tab **Messages** there is a scrollable message field which contains all messages concerning events occurring during the run of the current determination. Entries consist of messages that generate a database entry in the determination but which are not significant enough to result in the run being interrupted pending confirmation by the user.

Each message consists of **Date**, **Time** and **Message text**.

The message window is deleted when a run is started with **[START]**. In this way all messages of the last single determination or determination series can be viewed.

The label of the tab changes to **red** as soon as a new message has been entered. The label of the **Messages** tab changes to **black** again after having shown the messages and the tab is changed anew.

3.8.5 Live display - Properties

Subwindow: **Workplace ▶ Live display**

With the menu item **View, Properties, Properties Live display #** or the context-sensitive menu item **Properties Live display #** in the subwindow itself the dialog window **Properties Live display #** is opened.

Command type

Selection of the command type for which the properties in the live display are to be defined. The curve properties defined for each command type are saved per live display window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Opt** | **MEAS TMF** | **KFT** | **KFC / BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

Measured value display

on | off (Default value: **off**)

If this option is activated the measured values required are displayed in the subwindow **Live display**.

Measured value 1…3

Selection of the measured values for the measured value display. The measured quantities and the default value depend on the **Command type** selected.

DET

Selection	**Volume** | **Measured value** | **Time** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MET

Selection	**Volume** | **Measured value** | **Time** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

SET

Selection	**Time** | **Measured value** | **Volume** | **dV/dt** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MEAS

Selection	**Time** | **Measured value** | **dMW/dt** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MEAS T/Flow

Selection	**Time** | **Measured value** | **Flow** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MEAS TC Cond

Selection	**Temperature** | **Measured value** | **Time** | **dMW/dt** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MEAS Opt

Selection	**Time** | **Measured value** | **Intensity** | **Transmission** | **Saturated pixels** | **Temperature** | **dε/dt** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

MEAS TMF

Selection	**Time** | **Measured value** | **Transmission** | **Temperature** | **dMW/dt** | **off**
Default value	**off**

KFT

Selection	**Time** | **Measured value** | **Volume** | **dV/dt** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

KFC / BRC

Selection	**Time** | **Measured value** | **Quantity** | **Charge** | **Drift** | **Ugen** | **Igen** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

STAT

Selection	**Time** | **Measured value** | **Volume** | **dV/dt** | **Temperature** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

DOS

Selection	**off** | **Measured value** | **Time** | **Temperature** | **Volume** | **dV/dt** | **Calculated 1...3** | **External 1...3**
Default value	**off**

TET

Selection	**Volume** | **Measured value** | **Time** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

Curve display

on | off (Default value: **off**)

If this option is activated the curves required are displayed in the subwindow **Live display**.

x axis

Selection of the quantity shown on the x axis.

DET

Selection	**Volume** | **Measured value** | **Time** | **Temperature** | **ERC** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

MET

Selection	**Volume** | **Measured value** | **Time** | **Temperature** | **dMW** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

SET

Selection	**Time** | **Measured value** | **Temperature** | **Volume** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

KFT

Selection	**Time** | **Measured value** | **Temperature** | **Volume** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

KFC / BRC

Selection	**Time** | **Measured value** | **Quantity** | **Drift** | **Charge** | **dV/dt** | **Ugen** | **Igen** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

STAT

Selection	**Time** | **Measured value** | **Temperature** | **Volume** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

MEAS

Selection	**Time** | **Measured value** | **Temperature** | **dMW/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

MEAS T/Flow

Selection	**Time** | **Measured value** | **Flow** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

MEAS TC Cond

Selection	**Temperature** | **Measured value** | **Time** | **dMW/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Temperature**

MEAS Opt

Selection	**Time** | **Measured value** | **Intensity** | **Transmission** | **Saturated pixels** | **Temperature** | **dε/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

DOS

Selection	**Time** | **Measured value** | **Temperature** | **Volume** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Time**

TET

Selection	**Volume** | **Measured value** | **dT/dV** | **ERC** | **Time** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

y1 axis

Selection of the quantity to be shown on the y1 axis (left y axis).

DET

Selection	**Measured value** | **Volume** | **Time** | **Temperature** | **ERC** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

MET

Selection	**Measured value** | **Volume** | **Time** | **Temperature** | **dMW** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

SET

Selection	**Volume** | **Measured value** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

KFT

Selection	**Volume** | **Measured value** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

KFC / BRC

Selection	**Quantity** | **Measured value** | **Time** | **Drift** | **Charge** | **dV/dt** | **Ugen** | **Igen** | **Calculated 1…3** | **External 1…3**
Default value	**Quantity**

STAT

Selection	**Volume** | **Measured value** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

MEAS

Selection	**Measured value** | **Time** | **Temperature** | **dMW/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

MEAS T/Flow

Selection	**Measured value** | **Time** | **Flow** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

MEAS TC Cond

Selection	**Temperature** | **Measured value** | **Time** | **dMW/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

MEAS Opt

Selection	**Time** | **Measured value** | **Intensity** | **Transmission** | **Saturated pixels** | **Temperature** | **dε/dt** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

DOS

Selection	**Volume** | **Measured value** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Volume**

TET

Selection	**Volume** | **Measured value** | **dT/dV** | **ERC** | **Time** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

Color

Selection of the curve color for the quantity to be shown on the y1 axis.

Selection	**Color selection** | **blue**
Default value	**blue**

y2 axis

Selection of the quantity to be shown on the y2 axis (right y axis).

DET

Selection	**off** | **Measured value** | **Volume** | **Time** | **Temperature** | **ERC** | **Calculated 1…3** | **External 1…3**
Default value	**off**

MET

Selection	**off** | **Measured value** | **Volume** | **Time** | **Temperature** | **dMW** | **Calculated 1…3** | **External 1…3**
Default value	**off**

SET

Selection	**off** | **Measured value** | **Volume** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**off**

KFT

Selection	**off** | **Measured value** | **Volume** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**off**

KFC / BRC

Selection	**off** | **Measured value** | **Time** | **Quantity** | **Drift** | **Charge** | **dV/dt** | **Ugen** | **Igen** | **Calculated 1…3** | **External 1…3**
Default value	**off**

STAT

Selection	**off** | **Measured value** | **Volume** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**off**

MEAS

Selection	**off** | **Measured value** | **Time** | **Temperature** | **dε/dt** | **Calculated 1…3** | **External 1…3**
Default value	**off**

MEAS T/Flow

Selection	**off** | **Measured value** | **Time** | **Flow** | **Calculated 1…3** | **External 1…3**
Default value	**off**

MEAS TC Cond

Selection	**Temperature** | **Measured value** | **Time** | **dMW/dt** | **Calculated 1…3** | **External 1…3** | **off**
Default value	**off**

MEAS Opt

Selection	**Time** | **Measured value** | **Intensity** | **Transmission** | **Saturated pixels** | **Temperature** | **dMW/dt** | **Calculated 1…3** | **External 1…3** | **off**
Default value	**off**

DOS

Selection	**off** | **Measured value** | **Volume** | **Temperature** | **Time** | **dV/dt** | **Calculated 1…3** | **External 1…3**
Default value	**off**

TET

Selection	**off** | **Volume** | **Measured value** | **dT/dV** | **ERC** | **Time** | **Calculated 1…3** | **External 1…3**
Default value	**off**

Color

Selection of the curve color for the quantity to be shown on the y2 axis.

Selection	**Color selection** | **magenta**
Default value	**magenta**

Display measuring points

on | off (Default value: **off**)

If this option is activated, then in addition to the curve the single measured values are shown as crosses.

NOTICE

With curves, for which the distance between two measuring points is smaller than 5 pixels, the individual measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Display grid

on | off (Default value: **off**)

If this option is activated, a grid will be displayed.

Background

Selection of the color for the curve background.

Selection	**Color selection** | **white**
Default value	**white**

3.9 Subwindow Report

3.9.1 Report - General

Subwindow: **Workplace ► Report**

Subwindow Report

The reports of determinations are displayed in the subwindow **Report**. The subwindow can be switched on in the program part **Workplace** during the definition of the Layout and thus made visible *(see chapter 3.1.7.2, page 94)*. It can be enlarged and reduced as required; it can also be maximized.

Tabs

The subwindow **Report** is comprised of the following tabs:

- *Latest report*
  Display of the most recently automatically generated report.
- *Selected report*
  Display of the report selected in the report overview.
- *Report overview*
  Overview of the reports saved in the workplace.

3.9.2 Latest report

Tab: **Workplace ► Report ► Latest report**

The report most recently generated in the method run is automatically displayed on the tab **Latest report**. The content and format of the report are determined by the report template selected.

3.9.3 Selected report

Tab: **Workplace ► Report ► Selected report**

The report selected in the report overview is shown on the tab **Selected report**. The content and format of the report are determined by the report template selected.

3.9.4 Report overview

Tab: **Workplace ► Report ► Report overview**

The reports for the determinations since program start are shown in a table on the tab **Report overview**. The lines are arranged chronologically in ascending order. The table is automatically updated as new reports are received.

The table contains the following columns, which can be enlarged, reduced and moved with the mouse:

Date

Time of the compilation of the report, together with date, time and time zone (UTC ± ##).

Report

Command name of the **REPORT** command that generated the report.

Method

Method name.

ID1…ID16

Sample identifications **ID1…ID16**.

[View]

Displays the selected report on the tab **Selected Report**.

[Delete]

Deletes the selected reports in the report overview.

[Properties]

Opens the dialog window **Properties - Report overview**.

3.9.5 Properties report overview

Dialog window: **Workplace ► Report ► Report overview ► [Properties] ► Properties - Report overview**

Maximum number of reports

Maximum number of reports that can be saved in the report overview table. If this number is exceeded, then the oldest report will be deleted automatically.

Input range	**1 to 100**
Default value	**20**

4 Database

4.1 Database - General

4.1.1 Database - Definition

Program part: **Database**

Definition

The term **Database** is used in **tiamo** to refer to the program part in which the determinations saved in the databases can be displayed, managed, evaluated, reprocessed and printed out. The **determination databases** are also referred to as **databases**; they can, in contrast to the **configuration database**, be generated by the user and contain the determination data. Included among such determination data is the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

Organization

In **Local Server Systems** (**tiamo light**, **tiamo full**) the databases are stored on the drives administered by the computer and are only available to those users registered on that computer who have the appropriate access rights.

In **Client Server Systems** (**tiamo multi**) the databases are stored on the drives managed centrally by the server and are globally available in the whole client/server system, i.e. all users with the appropriate access rights can use these databases.

4.1.2 Database - Desktop

Program part: **Database**

Database symbol

Clicking on the database symbol in the vertical bar on the left opens the program part **Database** while, at the same time the database symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of databases currently opened *(see chapter 4.2.2, page 199)*.

Elements

The desktop of the program part **Database** comprises the following elements:

- Database-specific menu bar.
- Database-specific toolbar.
- Main window in which up to 6 subwindows can be displayed.

4.1.3 Database - Menu bar

4.1.3.1 Database - Main menus

Program part: **Database**

The menu bar in the program part **Database** includes the following main menu items:

- *File*
  Open and close databases, database management, printing.
- *Edit*
  Copy selected lines in the determination overview onto the clipboard, mark all lines.
- *View*
  Change the layout, load a view, save the view, modify the the subwindow properties.
- *Determinations*
  Search, filter, sign, delete determinations; overlay curves, calibration curves, reprocessing, etc.
- *Tools*
  Report templates, further templates.
- *Help*
  Open program help, display program information.

4.1.3.2 Database - Menu File

Program part: **Database**

Open...	Open a database *(see chapter 4.2.1, page 197)*.
Close all	Close all open databases *(see chapter 4.2.6, page 200)*.
Close	Close the database *(see chapter 4.2.6, page 200)*.
Database manager...	Administration of the determination databases *(see chapter 4.3.1, page 200)*.
Print ►	
Determination overview...	PDF file output of the determination overview *(see chapter 4.5.2.11, page 336)*.

Report...	PDF file output of the report *(see chapter 4.5.2.12, page 337)*.
Logout...	Logout user *(see chapter 2.2.3, page 17)*.
Exit	Exit the program.
1 'file name'	Open the selected database *(see chapter 4.2.1, page 197)*. The last five databases opened are displayed as selection.

4.1.3.3 Database - Menu Edit

Program part: **Database**

Copy	Copy the selected lines in the determination overview to the clipboard.
Select all	Select all lines in the current set of determinations in the determination overview.

4.1.3.4 Database - Menu View

Program part: **Database**

Update	Update the determination overview.
Change layout...	Modify the layout of the loaded database view *(see chapter 3.1.7.2, page 94)*.
Load view...	Load a saved database view *(see chapter 3.1.7.3, page 95)*.
Save view...	Save the loaded database view *(see chapter 3.1.7.4, page 95)*.
Split vertically	Split the database window vertically and display two databases side by side *(see chapter 4.2.4, page 200)*.
Split horizontally	Split the database window horizontally and display two databases, one above the other *(see chapter 4.2.5, page 200)*.
Unsplit	Undo the splitting of the database window *(see chapter 4.2.3, page 199)*.
Properties ►	
Column display	Define the column display for the subwindow **Determination overview** *(see chapter 4.5.1.3, page 294)*.
Properties Curves 1...5	Set the properties for the subwindow **Curves 1...5** *(see chapter 4.8.4.1, page 378)*.

Properties Results	Set the properties for the subwindow **Results** *(see chapter 4.7, page 360)*.
Toolbar	Switch toolbar display on/off.

4.1.3.5 Database - Menu Determinations

Program part: **Database**

Comment...	Enter a comment on the selected determination *(see chapter 4.5.2.2, page 299)*.
Search	Open the window **Search** for searching for determinations *(see chapter 4.5.2.3, page 299)*.
Filter ►	
Last filter	Use the last quick or special filter again *(see chapter 4.5.2.4.2, page 302)*.
Quick filter	Quick filtering with the content of the selected table cell *(see chapter 4.5.2.4.3, page 303)*.
Special filter...	Open the window **Special filter** for the definition of user-specific filters *(see chapter 4.5.2.4.4, page 303)*.
All statistics records	Display all related statistics data sets of the focused determination *(see chapter 4.5.2.4.5, page 304)*.
Remove filter	Remove the current filter *(see chapter 4.5.2.4.6, page 305)*.
Sign ►	
Signature 1...	Sign the selected determinations on level 1 *(see chapter 2.3.3, page 20)*.
Signature 2...	Sign the selected determinations on level 2 *(see chapter 2.3.4, page 21)*.
Show signatures...	Show all signatures for the focused determination *(see chapter 4.5.2.5.4, page 311)*.
Delete signatures 2...	Delete signatures at level 2 of the focused determination *(see chapter 2.3.5, page 23)*.
Send to...	Send the selected determinations per e-mail *(see chapter 4.5.2.7, page 334)*.
Export...	Export the selected determinations *(see chapter 4.5.2.8, page 334)*.

Import...	Import the selected determinations *(see chapter 4.5.2.9, page 335)*.
Show method...	Show the method used for the focused determination *(see chapter 4.5.2.13, page 338)*.
Show history	Show all versions of the focused determination in the determination overview *(see chapter 4.5.2.14, page 339)*.
Make current	Make the old version selected in the history view the current version again *(see chapter 4.5.2.15, page 339)*.
Show calibration curve...	Display the calibration or standard addition curve for the focused determination *(see chapter 4.5.2.16, page 339)*.
Control chart...	Display control chart and statistical evaluation of the selected determination *(see chapter 4.5.2.17, page 341)*.
Overlay curves...	Overlay the curves of the selected determinations *(see chapter 4.5.2.18, page 342)*.
Reprocess...	Reprocess the selected determinations *(see chapter 4.5.2.6.1, page 313)*.
Delete	Delete the selected determinations *(see chapter 4.5.2.10, page 335)*.

4.1.3.6 Database - Menu Tools

Program part: **Database**

Report templates ►	
New ►	
Form report	Open the window **Report template** with an empty form report *(see chapter 4.4.1.3, page 210)*.
Tabular report	Open the window **Report template** with an empty tabular report *(see chapter 4.4.1.3, page 210)*.
Open...	Open a report template to edit *(see chapter 4.4.1.3, page 210)*.
Manager...	Manage report templates *(see chapter 4.4.1.1.1, page 208)*.
Templates ►	
Control chart templates...	Manage templates for control charts *(see chapter 4.4.2, page 244)*.

Curve overlay templates...	Manage curve overlay templates *(see chapter 4.4.3.1, page 248)*.
Export templates...	Manage export templates *(see chapter 4.4.4.1, page 254)*.

4.1.3.7 Menu Help

Program parts: **Workplace / Database / Method / Configuration**

tiamo Help	Open tiamo Help.
About	Display information about the program and the installation.

4.1.4 Database - Toolbar

Program part: **Database**

Open...	Open a database *(see chapter 4.2.1, page 197)*.
Close	Close the database *(see chapter 4.2.6, page 200)*.
Database manager...	Administration of the determination databases *(see chapter 4.3.1, page 200)*.
Logout...	Logout user *(see chapter 2.2.3, page 17)*.
Copy	Copy the selected lines in the determination overview to the clipboard.
Update	Update the determination overview.
Change layout...	Modify the layout of the loaded database view *(see chapter 3.1.7.2, page 94)*.
Load view...	Load a saved database view *(see chapter 3.1.7.3, page 95)*.
Save view...	Save the loaded database view *(see chapter 3.1.7.4, page 95)*.
Split vertically	Split the database window vertically and display two databases side by side *(see chapter 4.2.4, page 200)*.
Split horizontally	Split the database window horizontally and display two databases, one above the other *(see chapter 4.2.5, page 200)*.
Unsplit	Undo the splitting of the database window *(see chapter 4.2.3, page 199)*.

Comment	Enter a comment on the selected determination *(see chapter 4.5.2.2, page 299)*.
Search	Open the window **Search** for searching for determinations *(see chapter 4.5.2.3, page 299)*.
Filter/Last filter	Use the last quick or special filter again *(see chapter 4.5.2.4.2, page 302)*.
Filter/Quick filter	Quick filtering with the content of the selected table cell *(see chapter 4.5.2.4.3, page 303)*.
Filter/Special filter...	Open the window **Special filter** for the definition of user-specific filters *(see chapter 4.5.2.4.4, page 303)*.
Filter/All statistics records	Display all related statistics data sets of the focused determination *(see chapter 4.5.2.4.5, page 304)*.
Filter/Remove filter	Remove the current filter *(see chapter 4.5.2.4.6, page 305)*.
Sign/Signature 1...	Sign the selected determinations on level 1 *(see chapter 2.3.3, page 20)*.
Sign/Signature 2...	Sign the selected determinations on level 2 *(see chapter 2.3.4, page 21)*.
Import...	Import the selected determinations (*.mdet) *(see chapter 4.5.2.9, page 335)*.
Export...	Export the selected determinations (*.mdet) *(see chapter 4.5.2.8, page 334)*.
Show method...	Show the method used for the focused determination *(see chapter 4.5.2.13, page 338)*.
Show history	Show all versions of the focused determination in the determination overview *(see chapter 4.5.2.14, page 339)*.
Make current	Make the old version selected in the history view the current version again *(see chapter 4.5.2.15, page 339)*.
Display calibration curve...	Display the calibration curve for the focused determination *(see chapter 4.5.2.16, page 339)*.
Control chart...	Display control chart and statistical evaluation of the selected determination *(see chapter 4.5.2.17, page 341)*.

Overlay curves...	Overlay the curves of the selected determinations *(see chapter 4.5.2.18, page 342)*.
Reprocess...	Reprocess the selected determinations *(see chapter 4.5.2.6.1, page 313)*.
Delete	Delete the selected determinations *(see chapter 4.5.2.10, page 335)*.
Report templates/ Open...	Open a report template to edit *(see chapter 4.4.1.3, page 210)*.
tiamo Help	Open tiamo help.

4.1.5 Database - Subwindows

Program part: **Database**

Selection

The following subwindows can be displayed in the main window:

- *Determination overview*
  Overview of the determinations saved in the database. This subwindow is permanently on display.
- *Information*
  Display of information for the focused determination.
- *Results*
  Display of the results for the focused determination.
- *Curves 1...5*
  Display of curves for the focused determination.

Presentation

The subwindows can be enlarged or made smaller to suit by dragging the separating bar between the windows.

By clicking on the button ☐ above at the right, the subwindows can be maximized so that only one subwindow is displayed in the main window. The original view of all subwindows is restored when the ☐ button in the maximized subwindow is clicked on again.

If you change the view in the subwindows, these changes will remain in effect after the database is closed and reopened.

4.1.6 Database - Functions

Program part: **Database**

In the program part **Database**, the following functions can be carried out:

Views

- *Modify the layout of the database view*
- *Load a database view*
- *Save the database view*
- *Rename the database view*
- *Delete a database view*

Database manager

- *Create a new database*
- *Rename the database*
- *Edit the database properties*
- *Backup the database*
- *Restore the database*
- *Delete the database*

Determinations

- *Overview of functions*

Templates

- *Edit report templates*
- *Edit templates for control charts*
- *Edit curve overlay templates*
- *Edit export templates*

4.1.7 Views

4.1.7.1 Views - General

Program parts: **Workplace / Database / Configuration**

Definition

The term **View** defines the contents and design of the main window in the program parts **Workplace**, **Database** and **Configuration**. The following elements belong to a view:

- Number, arrangement, sequence and size of the subwindows.
- Representation within the individual subwindows, i.e. column sequence, column width, sorting and filter.

Functions

The following functions are possible for views:

- *Change layout*
  Define the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.

- *Load view*
  Load a saved view.
- *Rename view*
  Rename a saved view.
- *Delete view*
  Delete a saved view.

Automatic save

If the corresponding option is activated in the program part **Configuration** under **Tools ► Options...** on the tab **Save** under **Save on closing**, then the current view will be saved automatically when the program is closed.

Automatic load

The standard procedure is that the view saved when the program is terminated will be loaded automatically the next time that the program is opened. As an alternative a standard view can be defined for each user group that is loaded automatically the first time that the program part is opened.

The standard procedure is that the view with the following subwindow is opened with the very first program start:

- **Workplace**
  Run, **Method**, **Live display 1**, **Report**
- **Database**
  Determination overview, **Curves 1**, **Information**, **Results**
- **Configuration**
  Devices, **Titrants / Solutions**, **Sensors**, **Common Variables**

Export/Import

Views can also be exported and imported. In this way these views can be exchanged between different client / server systems.

4.1.7.2 Change layout

Dialog window: **Workplace / Database / Configuration ► View ► Change layout... ► Change layout**

The symbol or the menu item **View ► Change layout...** opens the dialog window **Change layout**.

Select layout

Selection of a graphical symbol for the number, arrangement and sequence of the subwindows.

Selection	**'Selection of the possible combinations'**

Available subwindows

Displaying the subwindows that are still available for displaying the view.

Selection	**'Selection of the subwindows'**

Displayed subwindows

Displaying the subwindows that are shown in the view.

Selection	**'Subwindows'**

Add the selected subwindow to the view.

Remove the selected subwindow from the view.

Move the selected subwindow upward (modifies sequence).

Move the selected subwindow downward (modifies sequence).

4.1.7.3 Loading a view

Dialog window: **Workplace / Database / Configuration ► View ► Load view... ► Load view**

The symbol or the menu item **View ► Load view...** opens the dialog window **Load view**.

Name

Name of the view to be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

4.1.7.4 Saving a view

Dialog window: **Workplace / Database / Configuration ► View ► Save view... ► Save view**

The symbol or the menu item **View ► Save view...** opens the dialog window **Save view**.

Name

Name under which the view is to be saved.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

Save the view under the given name. The saved views are globally valid and available for client/server systems.

4.1.7.5 Renaming a view

Dialog window: **Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view ▶ [Rename] ▶ Rename view**

To be able to rename a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Rename]** must be pressed down. Afterwards, the window **Rename view** opens.

Rename view '%1' to

Entry of a new name for the view.

Entry	**50 characters**

4.1.7.6 Deleting a view

Function: **Workplace / Database / Configuration ▶ View ▶ Load/save view… ▶ [Delete]**

To delete a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Delete]** must be pressed down. The delete procedure must then be confirmed.

4.2 Database display

4.2.1 Open database

Dialog window: **Database ▶ File ▶ Open… ▶ Open database**

The symbol or the menu item **File ▶ Open…** is used to open the **Open database** window, in which one of the databases to be opened available on the server (or on the local server) can be selected. In this window the names of all databases available are displayed, further information is loaded afterwards. All databases are thereby displayed, even if the user does not own the rights for reading.

Database table

The database table contains information concerning all determination databases. The table cannot be edited. With a click on the column title (Columns **Name**, **Number of records**, **Size**, **Last backup**, **Next**

backup, **Comment**), the table can be sorted according to the selected column in increasing or decreasing sequence.

Name

Name of the database.

Number of records

Shows the number of data sets in the database.

Size

Shows the size of the database in KB.

Readable

Shows whether or not the database can read by the user currently logged in.

Editable

Shows whether or not the database can be edited by the user currently logged in.

Comment

Shows remarks about the database.

Opening the database

Database name

Name of the method to be opened. If a database is selected from the table, the name of the database will be entered automatically in this field. It can however also be entered manually.

Entry	**50 characters**

[Open]

Opens the selected database and shows its data sets in the Determination overview. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.

NOTICE

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

4.2.2 Select database

Program part: **Database**

The number of the currently opened databases is displayed in the left upper corner of the database symbol. If 2 or more databases are opened, then these databases, which can be displayed either next to one another or one below the other, can be selected with the aid of the database symbol.

No database is opened. **No database loaded** is displayed in the main window.

One database is opened and is displayed in the main window.

Two databases are opened. Normally only one database is displayed in the main window but the option exists of displaying two databases at once, either next to the another or one below the other.

A menu with the currently opened databases is displayed by clicking with either the left or right mouse button on the database symbol. The databases displayed in the main window are marked with a checkmark. Clicking on the desired database displays it in the main window in the place of the previously selected one.

4.2.3 Display single database

Menu item: **Database ► View ► Unsplit**

In the default settings, the most recently opened database is displayed singularly in the main window. If the display of two windows is enabled, then the symbol or the menu item **View ► Unsplit** can be used to switch back to the display of just one single database.

4.2.4 Display databases next to one another

Menu item: **Database ► View ► Split vertically**

With the symbol or the menu item **View ► Split vertically** two databases are displayed next to one another in the main window.

4.2.5 Display databases one below the other

Menu item: **Database ► View ► Split horizontally**

With the symbol or the menu item **View ► Split horizontally** two databases can be displayed one below the other in the main window.

4.2.6 Close database

Menu items: **Database ► File ► Close / Close all**

Close single database

With the symbol or the menu item **File ► Close** can be used to close the focused database.

Close all databases

All the opened databases are closed with the menu item **File ► Close all**.

4.3 Managing databases

4.3.1 Managing databases

Dialog window: **Database ► File ► Database manager... ► Database manager**

The icon or the **File ► Database manager...** menu item is used to open the **Database manager** window, in which a user with corresponding access rights can manage databases.

Database table

The database table contains information concerning all determination databases. The table cannot be edited. The table can be sorted according to the selected column (columns **Name**, **Number of records**, **Size**, **Last backup**, **Next backup** and **Comment**) in either ascending or descending order by clicking on the column title.

Name

Name of the database.

Number of records

Shows the number of records in the database.

Size

Shows the size of the database in KB.

Last backup

Shows the date and time of the last database backup.

Next backup

Shows the date and time at which the next backup is to be carried out.

Comment

Shows comments about the database.

Window menus and functions

The **[Edit]** menu beneath the database table contains the following menu items:

New...	Create a new database *(see chapter 4.3.2, page 201)*.
Delete	Deletes the selected database *(see chapter 4.3.4, page 202)*.
Rename...	Rename the selected database *(see chapter 4.3.3, page 202)*.

[Properties]

Opens the **Database manager** window for editing the database selected in the table *(see chapter 4.3.5.1, page 202)*.

[Backup]

Opens the **Backup database** window for backing up the database selected in the table *(see chapter 4.3.6, page 206)*.

[Restore]

Opens the **Restore databases** window for restoring backed-up databases *(see chapter 4.3.7, page 207)*.

[Close]

Closes the **Database manager** window.

4.3.2 Creating a new database

Dialog window: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Edit] ▶ New... ▶ New database**

The **[Edit] ▶ New...** menu item is used to open the **New database** window, in which a name for the new database must be entered.

Name

Name of the new database.

Entry	**50 characters**
Default value	**New database #**

NOTICE

The database name must be unique in the entire client/server system.

Clicking on **[OK]** opens the **Properties - Database - 'Database name'** window for editing the database properties.

4.3.3 Renaming a database

Dialog window: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Edit] ▶ Rename... ▶ Rename database**

The **[Edit] ▶ Rename...** menu item is used to open the **Rename database** window for renaming the selected database.

Rename database 'Name' to

Entry of the new database name.

Entry	**50 characters**

NOTICE

The database name must be unique in the entire client/server system.

4.3.4 Deleting a database

Menu item: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Edit] ▶ Delete**

The **[Edit] ▶ Delete** menu item is used to delete the selected database.

NOTICE

Databases that are open cannot be deleted.

4.3.5 Database properties

4.3.5.1 Database properties - Overview

Dialog window: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Properties] ▶ Properties - Database - 'Database name'**

The properties for a database are set on the following tabs:

- *General*
  General information about the database.
- *Access rights*
  Database access rights for user groups.

- *Backup*
  Definition of backup monitoring and automatic backups.
- *Monitoring*
  Definition of database monitoring.

4.3.5.2 Database properties - General

Tab: **Database ► File ► Database manager... ► Database manager ► [Properties] ► Properties - Database - 'Database name' ► General**

General information about the database.

Comment

Freely definable comments about the database.

Entry	**250 characters**

Number of records

Shows the number of records in the database.

Size

Shows the size of the database in KB.

Created

Shows the date and time when the database was created.

Created by

Shows the user (user) who created the database.

Modified

Shows the date and time of the last modification of the database properties.

Modified by

Shows the name of the user (short name) who carried out the modifications.

4.3.5.3 Database properties - Access rights

Tab: **Database ► File ► Database manager... ► Database manager ► [Properties] ► Properties - Database - 'Database name' ► Access rights**

Database access rights for user groups.

User group

Shows the user groups defined in the user administration.

Read

on | off (Default value: **on**)

Activates/deactivates the permission to open the database. The database can only be displayed but not modified (records cannot be deleted or reprocessed).

Edit

on | off (Default value: **off**)

Activates/deactivates the permission to edit the database. Records can be modified or deleted.

NOTICE

If access for editing is activated, then access rights for reading will also automatically be activated. If access for reading is deactivated, then access rights for editing will also automatically be deactivated.

4.3.5.4 Database properties - Backup

Tab: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Properties] ▶ Properties - Database - 'Database name' ▶ Backup**

Definition of backup monitoring and automatic backups.

Backup monitoring

on | off (Default value: **off**)

Activates/deactivates the backup monitoring for the selected database. If the **Backup monitoring** check box is activated, then the **Next backup** field in the database table will be highlighted in **red** when the interval time elapses.

Last backup

Shows the date and time of the last database backup.

Next backup

Date on which the next backup must take place. This date can be selected by clicking on ... in the **Select date** dialog window.

Entry	**Date selection**
Default value	**Last backup + 1 month**

Interval

Entry of the interval for the backup monitoring. After each automatically or manually triggered backup, the interval entered here will be added

automatically to the **Last backup**, and the **Next backup** field will be automatically adjusted accordingly.

Input range	**1 to 999**
Default value	**1**
Selection	**day(s)** | **week(s)** | **month(s)** | **year(s)**
Default value	**month(s)**

Start backup automatically

on | off (Default value: **off**)

Automatic start of the backup for the database in the defined **Backup directory**.

Backup directory

Selection of a directory predefined in the **Program administration** for the automatic backup.

Selection	**Selection of the backup directory** | **Default backup directory**
Default value	**Default backup directory**

NOTICE

Make sure that you have read and write permission for the selected directory.

4.3.5.5 Database properties - Monitoring

Tab: **Database ► File ► Database manager... ► Database manager ► [Properties] ► Properties - Database - 'Database name' ► Monitoring**

Definition of database monitoring.

Monitoring size

on | off (Default value: **off**)

Activates/deactivates size monitoring for the selected database. If this check box is activated, then the **Size** field in the database table will be highlighted in **red** when the limit value has been exceeded. At the same time, a corresponding message also appears when the database is opened.

Maximum size

Maximum permitted database size in MB.

Input range	**1 to 2,147,483,647 MB**
Default value	**500 MB**

Monitoring number of records

on | off (Default value: **off**)

Activates/deactivates the monitoring of the number of records for the selected database. If this check box is activated, then the **Number** field in the database table will be highlighted in **red** when the limit value has been exceeded. At the same time, a corresponding message also appears when the database is opened.

Maximum number

Maximum permitted number of records for database.

Input range	**1 to 2,147,483,647**
Default value	**1,000**

4.3.6 Backing up a database manually

Dialog window: **Database ► File ► Database manager... ► Database manager ► [Backup] ► Backup database**

[Backup] is used to open the **Backup database** dialog window:

Backup target

Backup directory

Selection of a directory predefined in the **Program administration** for the backup.

Selection	**Selection of the backup directory** | **Default backup directory**
Default value	**Default backup directory**

NOTICE

Make sure that you have read and write permission for the selected directory.

Backup name

Selection of an already existing name or entry of a new name for the backup file. If an existing backup file is selected, it will be overwritten.

Entry	**50 characters**
Default value	**Backup ##**

NOTICE

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the data is restored.

[Start]

Starts manual database backup.

4.3.7 Restoring a database

Dialog window: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Restore] ▶ Restore databases**

[Restore] is used to open the **Restore databases** dialog window:

Backup directory

Selection of a directory that is predefined in the **Program administration** and in which the backed-up databases are located.

Selection	**Selection of the backup directory** | **Default backup directory**
Default value	**Default backup directory**

Backup name

Selection of a backup file.

Selection	**Selection of backup files**

Backup date

Shows the time at which the database was backed up. This information is not available if the backup file is located on a network drive.

Database name

Shows the name of the database. This information is not available if the backup file is located on a network drive.

Number of records

Shows the number of records in the database. This information is not available if the backup file is located on a network drive.

Size

Shows the size of the database in KB.

Save as

Name under which the database is to be restored.

Entry	**50 characters**
Default value	**New database ##**

[Start]

Starts database restoring. After the start, a progress bar appears in the window. The dialog window closes automatically once the backup has been completed.

NOTICE

Existing databases cannot be overwritten, i.e., they must first be deleted so that the database can be restored under its old name.

4.4 Templates

4.4.1 Report templates

4.4.1.1 Manage report templates

4.4.1.1.1 Report template manager

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager… ▶ Report template manager**

The menu item **Tools ▶ Report templates ▶ Manager…** is used to open the window **Report template manager**.

List of report templates

The list of report templates contains information about all the saved report templates. The table cannot be edited. With a click on the column title (Column **Name**, **Saved**, **Saved by**, **Comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name

Name of report template.

Saved

Date and time when the report template was saved.

Saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Window menus

The menu **[Edit]** below the list of report templates contains the following menu items:

Rename...	Rename the selected report template *(see chapter 4.4.1.1.2, page 209)*.
Copy	Copy the selected report template(s) *(see chapter 4.4.1.1.3, page 209)*.
Delete...	Delete the selected report template(s) *(see chapter 4.4.1.1.4, page 209)*.
Export...	Export the selected report template(s) *(see chapter 4.4.1.1.5, page 210)*.
Import...	Import report templates *(see chapter 4.4.1.1.6, page 210)*.

4.4.1.1.2 Rename report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Rename... ▶ Rename report template**

With the menu item **Edit ▶ Rename...** in the window **Report template manager**, the window **Rename report template** opens for renaming the selected report template.

Rename report template 'Name' to

Entry of the new name for the report template.

Entry	**50 characters**

NOTICE

The name of the report template must be unambigous in the whole Client/Server system.

4.4.1.1.3 Copy report template

Menu item: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Copy**

With the menu item **Edit ▶ Copy** in the window **Report template manager** the selected report templates are copied under the name **Copy of 'Report template name'**.

4.4.1.1.4 Delete report templates

Menu item: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Delete...**

With the menu item **Edit ▶ Delete...** in the window **Report template manager** the selected report templates are deleted.

4.4.1.1.5 Export report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager… ▶ Report template manager ▶ [Edit] ▶ Export… ▶ Select directory for export**

With the menu item **Edit ▶ Export...** in the window **Report template manager** the selected report templates are each exported in a file with the name **'Name'.mrep**. The window **Select directory for export** opens in which the directory for export must be selected.

4.4.1.1.6 Import report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager… ▶ Report template manager ▶ [Edit] ▶ Import… ▶ Select files for import**

With the menu item **Edit ▶ Import...** in the window **Report template manager** the dialog window **Select files for import** opens in which the report templates to be imported must be selected. The report templates are then imported.

4.4.1.2 Creating new report templates

Menu item: **Database ▶ Tools ▶ Report templates ▶ New...**

New form report

The **Report template - New form report** program window is opened with an empty report template (which can then be edited) with the **Tools ▶ Report templates ▶ New... ▶ Form report** menu item.

In the **form report**, the report section always includes the whole area between the header and the footer. This means that at least one page will always be output for each determination.

New tabular report

The **Report template - New tabular report** program window is opened with an empty report template (which can then be edited) with the **Tools ▶ Report templates ▶ New... ▶ Tabular report** menu item.

In the **tabular report**, the report section can be set with the mouse. For each data set one such report section will be filled with data and placed on the page row by row. Tabular reports from several determinations can thus be created in this way.

4.4.1.3 Opening report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Open... ▶ Open report template**

The icon or the **Tools ▶ Report templates ▶ Open...** menu item is used to open the **Open report template** window, in which one of the globally available report templates can be selected and opened.

List of report templates

The list of report templates contains information about all the saved report templates. The table cannot be edited. The table can be sorted according to the selected column (columns **Name**, **Saved**, **Saved by**, **Comment**) in either ascending or descending order by clicking on the column title.

Name

Name of the report template.

Saved

Date and time when the report template was saved.

Saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Open report template

Name

Name of the report template to be opened. If a report template is selected from the table, the name will be entered automatically in this field. It can, however, also be entered manually.

Entry	**50 characters**

[Open]

Opens the **Report template** program window, in which the selected report template is shown and can be edited.

4.4.1.4 Editing report templates

4.4.1.4.1 Report template - General

4.4.1.4.1.1 Report template - Overview

Program window: **Database ▶ Report template**

Which determination data and which other items (e.g. text fields, images, graphics elements) are to be produced in a report are defined in report templates. The templates can be created or edited in their own program window and then saved globally under a unique name. They are used for the automatic production of reports in determinations or for manual report production from the database.

There are two basically different types of report template:

- **Form report**
  In the Form report the report section always includes the whole area between the header and the footer. This means that for each determination at least one page will always be produced.
- **Tabular report**
  In the Tabular report the report section can be set with the mouse. For each data set one such report section will be filled with data and placed on the page row by row. In this way tabular reports can be created from several determinations.

4.4.1.4.1.2 Report template - Desktop

Program window: **Database ▶ Report template**

Elements

The desktop of the program window **Report template** has the following elements:

- *Menu bar*
- *General toolbar*
- *Module-specific toolbar*
- *Module bar*
- *Main window*

4.4.1.4.1.3 Report template - Menu bar

4.4.1.4.1.3.1 Report template - Main menu

Program window: **Database ▶ Report template**

The menu bar in the program window **Report template** has the following main menu items:

- *File*
  Save report template, page setup, page preview, close window.
- *Edit*
  Undo, redo, cut, copy, paste, delete, enter comment.
- *View*
  Update view, page navigation.
- *Insert*
  Insert pages.
- *Tools*
  Options.
- *Help*
  Open Program Help.

4.4.1.4.1.3.2 Report template - Menu File

Program window: **Database ▶ Report template**

Save	Save an opened report template *(see chapter 4.4.1.4.2.11, page 224)*.
Save as	Save an opened report template under a new name *(see chapter 4.4.1.4.2.11, page 224)*.
Page setup...	Set up the layout for the report template *(see chapter 4.4.1.4.2.2, page 216)*.
Page preview	Set up the layout for the report template *(see chapter 4.4.1.4.2.8, page 222)*.
Exit	Close the program window **Report template**.

4.4.1.4.1.3.3 Report template - Menu Edit

Program window: **Database ▶ Report template**

Undo:	Undo the last action.
Restore:	Restore the undone action.
Cut	Cut selected items and copy them to the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Copy	Copy the selected items to the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Insert	Insert marked items from the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Delete	Delete the marked items *(see chapter 4.4.1.4.2.6, page 221)*.
Comment	Enter comments on the report template *(see chapter 4.4.1.4.2.9, page 223)*.

4.4.1.4.1.3.4 Report template - Menu View

Program window: **Database ▶ Report template**

Update	Update the view.
First page	Show the first page of the report template *(see chapter 4.4.1.4.2.4, page 219)*.
Previous page	Show the previous page of the report template *(see chapter 4.4.1.4.2.4, page 219)*.
Next page	Show the next page of the report template *(see chapter 4.4.1.4.2.4, page 219)*.
Last page	Shows the last page of the report template *(see chapter 4.4.1.4.2.4, page 219)*.

4.4.1.4.1.3.5 Report template - Menu Insert

Program window: **Database ► Report template**

Page before	Insert a new page in front of the shown page *(see chapter 4.4.1.4.2.4, page 219)*.
Page after	Inserts a new page after the shown page *(see chapter 4.4.1.4.2.4, page 219)*.

4.4.1.4.1.3.6 Report template - Menu Tools

Program window: **Database ► Report template**

Options...	Set options for the report template *(see chapter 4.4.1.4.2.10, page 223)*.

4.4.1.4.1.3.7 Report template - Menu Help

Program window: **Database ► Report template**

tiamo Help	Open tiamo Help.

4.4.1.4.1.4 Report template - General toolbar

Program window: **Database ► Report template**

Save	Save an opened report template *(see chapter 4.4.1.4.2.11, page 224)*.
Page preview	Set up the layout for the report template *(see chapter 4.4.1.4.2.8, page 222)*.
Print (PDF)...	Show the report template with the data of the selected determination as a PDF-file.
Undo:	Undo the last action.
Restore	Restore the undone action.
Cut	Cut selected items and copy them to the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Copy	Copy the selected items to the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Insert	Insert marked items from the clipboard *(see chapter 4.4.1.4.2.6, page 221)*.
Delete	Delete the marked items *(see chapter 4.4.1.4.2.6, page 221)*.
100 %	Select zoom level *(see chapter 4.4.1.4.2.7, page 222)*.

Grid	Switch the grid display on and off *(see chapter 4.4.1.4.2.10, page 223)*.
Snap to grid	Switch snap at grid on and off *(see chapter 4.4.1.4.2.10, page 223)*.

4.4.1.4.1.5 Report template - Module-specific toolbar

Program window: **Database ► Report template**

Depending on the module selected in the report template, other symbols and input fields are shown below the general toolbar, with which the properties of these modules can be directly edited *(see chapter 4.4.1.4.1.6, page 215)*.

4.4.1.4.1.6 Report template - Module bar

Program window: **Database ► Report template**

Select modules	If this option is enabled then modules in the report template can be selected, reduced/enlarged and moved *(see chapter 4.4.1.4.2.6, page 221)*.
Text field	If this option is enabled then **text fields** can be inserted in the report template *(see chapter 4.4.1.4.3.1, page 225)*.
Data field	If this option is enabled then **data fields** can be inserted in the report template *(see chapter 4.4.1.4.3.2, page 227)*.
Date field	If this option is enabled then **date fields** can be inserted in the report template in which the actual date is entered *(see chapter 4.4.1.4.3.3, page 229)*.
Time field	If this option is enabled then **time fields** can be inserted in the report template in which the actual time is entered *(see chapter 4.4.1.4.3.4, page 230)*.
Page number	If this option is enabled then fields can be inserted in the report template in which the **page number** is entered *(see chapter 4.4.1.4.3.5, page 232)*.
Number of pages	If this option is enabled then fields can be inserted in the report template in which the **number of pages** is entered *(see chapter 4.4.1.4.3.6, page 234)*.
Fixed report	If this option is enabled then **fixed reports** can be inserted in the report template *(see chapter 4.4.1.4.3.7, page 235)*.
Group field	If this option is enabled then **group fields** can be inserted in the report template *(see chapter 4.4.1.4.3.8, page 237)*.

Image	If this option is enabled then **images** can be inserted in the report template *(see chapter 4.4.1.4.3.9, page 238)*.
Line	If this option is enabled then **lines** can be inserted in the report template *(see chapter 4.4.1.4.3.10, page 239)*.
Rectangle	If this option is enabled then **rectangles** can be inserted in the report template *(see chapter 4.4.1.4.3.11, page 240)*.
Curve	If this option is enabled then **curves** can be inserted in the report template *(see chapter 4.4.1.4.3.12, page 241)*.
Calibration curve	If this option is enabled then **calibration curves** can be inserted in the report template *(see chapter 4.4.1.4.3.13, page 243)*.

4.4.1.4.2 Report template - Functions

4.4.1.4.2.1 Report template - Function overview

Program window: **Database ▶ Report template**

In the program window **Report template** the following functions can be executed:

- *Page setup*
- *Define sections in main window*
- *Insert report pages*
- *Insert modules*
- *Edit modules*
- *Zooming*
- *Show page preview*
- *Enter comment on report template*
- *Define options for report template*
- *Save report template*

4.4.1.4.2.2 Report template - Page setup

Dialog window: **Report template ▶ File ▶ Page setup... ▶ Page setup**

With the menu item **File ▶ Page setup...** in the window **Report template** the dialog window **Page setup** opens in which the report format settings can be made.

General

only for form report

Preferences

Selection	**Apply to current page** | **Apply to all pages**
Default value	**Apply to current page**

Apply to current page
The page settings are only applied for the currently selected report page.

Apply to all pages
The page settings are applied for all report pages.

Paper format

Paper format

Selection of the page format. The width and height of the paper can be defined with **User-defined**.

Selection	**A4** | **Letter** | **Legal** | **User-defined**
Default value	**A4**

Width

Width of the page format. This parameter can only be edited for **Page format**= **User-defined**

Input range	**0.0 to 499.0 mm**
Default value	**210.0 mm**

Height

Height of the page format. This parameter can only be edited for **Page format**= **User-defined**

Input range	**0.0 to 499.0 mm**
Default value	**297.0 mm**

Orientation

Selection of the page format.

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Page margins

Top

Upper page margin.

Input range	**0.0 to 499.0 mm**
Default value	**15.0 mm**

Bottom

Lower page margin.

Input range	**0.0 to 499.0 mm**
Default value	**15.0 mm**

Left

Left-hand page margin.

Input range	**0.0 to 499.0 mm**
Default value	**20.0 mm**

Right

Right-hand page margin.

Input range	**0.0 to 499.0 mm**
Default value	**20.0 mm**

Layout

Header

Height of header.

Input range	**0.0 to 499.0 mm**
Default value	**15.0 mm**

Footer

Height of footer.

Input range	**0.0 to 499.0 mm**
Default value	**15.0 mm**

Determination height

Height of the section for a single determination on a tabular report.

only for tabular report

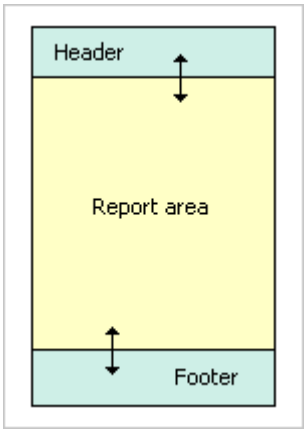
Input range	**0.0 to 499.0 mm**
Default value	**25.0 mm**

4.4.1.4.2.3 Report template - Defining sections

Program window: **Database ▶ Report template**

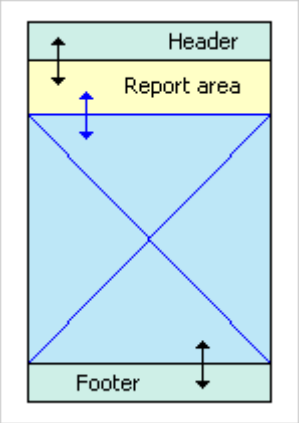
Define sections for form report

The header, footer and report sections can be enlarged and reduced with the left mouse button.



Defining sections for tabular report

The header, footer and report sections can be enlarged and reduced with the left mouse button.



4.4.1.4.2.4 Report template - Inserting pages

Menu item: **Report template ► Insert ► Page before/Page after**

NOTICE

It is not possible to insert pages in templates for tabular reports.

Inserting page before

With the menu item **Insert ► Page before** in the program window **Report template** a new empty report report page is inserted before the report page shown.

Inserting page after

With the menu item **Insert ► Page after** in the program window **Report template** a new empty report report page is inserted after the report page shown.

Navigating

In report templates with several pages the navigation bar can be used to switch to the required page.

Jumps to first page.

Jumps to previous page.

Jumps to next page.

Jumps to last page.

4.4.1.4.2.5 Report template - Inserting modules

Program window: **Database ▶ Report template**

In order to insert a module in a report template the corresponding symbol must be selected on the module bar and then placed on the report template by creating a field with the left mouse button. The Properties window of the corresponding module then opens automatically.

Form report

The following modules can be inserted in a form report:

- **Header**
  Text field, *Data field*, *Date field*, *Time field*, *Page number*, *Number of pages*, *Image*, *Line*, *Rectangle*, *Curve*, *Calibration curve*
- **Report section**
  Text field, *Data field*, *Date field*, *Time field*, *Fixed report*, *Group field*, *Image*, *Line*, *Rectangle*, *Curve*, *Calibration curve*
- **Footer**
  Text field, *Data field*, *Date field*, *Time field*, *Page number*, *Number of pages*, *Image*, *Line*, *Rectangle*, *Curve*, *Calibration curve*

Tabular report

The following modules can be inserted in a tabular report:

- **Header**
  Text field, *Date field*, *Time field*, *Page number*, *Number of pages*, *Image*, *Line*, *Rectangle*
- **Report section**
  Text field, *Data field*, *Date field*, *Time field*, *Group field*, *Image*, *Line*, *Rectangle*,

- **Footer**
  Text field, *Date field*, *Time field*, *Page number*, *Number of pages*, *Image*, *Line*, *Rectangle*

4.4.1.4.2.6 Report template - Editing modules

Program window: **Database ▶ Report template**

Enable selection

This symbol in the Module bar must be switched on in order to be able to select modules in a report template for editing.

Select a single module

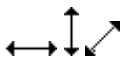
Single modules are selected with a click of the left mouse button. This automatically shows the corresponding properties of the module below the toolbar.

Select several modules

Several modules are selected by drawing a frame around the required modules with the left mouse button.

Moving, reducing, enlarging modules

When this cursor symbol appears then the selected modules can be moved about on the report template with the left mouse button pressed down.



When one of these cursor symbols appears then the selected modules can be reduced and enlarged respectively on the report template with the left mouse button pressed down.

Cutting, copying, pasting, deleting modules

Cut the selected modules and copy them to the clipboard.

Copy the selected modules to the clipboard.

Paste modules from the clipboard.

Deletes the selected module.

Edit module properties

Open the properties window for the selected module. Alternatively the properties can also be edited directly below the toolbar.

4.4.1.4.2.7 Report template - Zoom

Program window: **Database ► Report template**

With this list box on the toolbar the required zoom step for showing the report template can be selected in steps of **25%** from **25%** to **400%**.

4.4.1.4.2.8 Report template - Page preview

Preview window: **Report template ► File ► Page preview ► Report preview**

With the symbol or the menu item **File ► Page preview** in the program window **Report template** the window **Report preview** opens in which a page preview of the report template is shown with the data of the determinations selected in the determination overview.

Functions

Produces displayed report as PDF-file.

Selects the required zoom step for displaying the report preview, range **25%** to **400%** in steps of **25%**.

Select report page

In report templates with several pages the navigation bar **Page** can be used to switch to the required page.

Jumps to first page.

Jumps to previous page.

Jumps to next page.

Jumps to last page.

Selecting determination

If several determinations have been selected for the report display then the navigation bar **Determination** can be used to switch to the required determination.

Jumps to first determination.

Jumps to previous determination.

Jumps to next determination.

Jumps to last determination.

4.4.1.4.2.9 Report template - Comment

Dialog window: **Report template ► Edit ► Comment ► Comment**

With the symbol or the menu item **Edit ► Comment** in the program window **Report template** the window **Comment on report template** opens in which comments on the opened report template can be entered.

Comment

Enter comment on the report template that is shown in the List of report templates.

Entry	**1000 characters**

4.4.1.4.2.10 Report template - Options

Dialog window: **Report template ► Tools ► Options...**

With the menu item **Tools, Options** in the program window **Report templates** the window **Options for report templates** opens in which various settings for the report template can be defined.

Unit

Unit

Select the size unit for the report template.

Selection	**mm** | **cm** | **inch**
Default value	**mm**

Grid

X distance

Grid distance in X-direction.

Input range	**1.0 to 100.0 mm**
Default value	**5.0 mm**

Y distance

Grid distance in Y-direction.

Input range	**1.0 to 100.0 mm**
Default value	**5.0 mm**

Display grid

on | off (Default value: **off**)

Enable/Disable the grid display on the report template.

Snap at grid

on | off (Default value: **off**)

Enable/Disable snapping at grid on the report template.

Default font

Font

Select the default font for the report templates.

Selection	**Arial** | **Windows fonts**
Default value	**Arial**

4.4.1.4.2.11 Report template - Save

Dialog window: **Report template ▶ File ▶ Save/Save as ▶ Save report template**

With the symbol or the menu item **File ▶ Save** an existing opened report template will be saved again under its own name without opening the window **Save report template**.

When saving a newly created report template with the menu item **File ▶ Save** or when saving an existing report template with the menu item **File ▶ Save as** the window **Save report template** opens in which a name for the report template can be entered or selected.

List of report templates

The list of report templates contains information about all the saved report templates. The table cannot be edited. With a click on the column title (Column **Name**, **Saved**, **Saved by**, **Comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name

Name of report template.

Saved

Date and time when the report template was saved.

Last saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Save report template

Name

Name under which the report template is to be saved.

Entry	**50 characters**

NOTICE

The name of the report template must be unambiguous in the whole Client/Server system.

[Save]

Save the report template under the required name.

4.4.1.4.3 Report template - Modules

4.4.1.4.3.1 Report template - Text field

Program window: **Database ► Report template**

Text fields are used for showing any texts in the report.

Insert

In order to insert a text field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of image field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of image field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Switches line break on/off for multi-line text fields.

Fills the field with dots.

Text

Entry of text for the text field.

4.4.1.4.3.2 Report template - Data field

Program window: **Database ► Report template**

Data fields are used for showing determination data in a report.

Insert

In order to insert a data field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of data field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of data field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Switches line break on/off for multi-line data fields.

Fills the field with dots.

Prefix

Text placed in front of the data field contents.

Entry	**50 characters**

Data field

Shows path and name of selected data field (the field cannot be edited directly). With a window opens for selecting the data field in which all the available fields for the determination overview are shown in a tree structure. With a double-click on the required field the path and name of the data field are entered.

Suffix

Text placed after the data field contents.

Entry	**50 characters**

Preview

Shows a formatted example of text.

4.4.1.4.3.3 Report template - Date field

Program window: **Database ► Report template**

Date fields are used for showing the current date in a report.

Insert

In order to insert a date field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of date field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of date field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Fills the field with dots.

Prefix

Text placed in front of the date field contents.

Entry	**50 characters**

Suffix

Text placed after the date field contents.

Entry	**50 characters**

Sample

Shows the formatted date.

4.4.1.4.3.4 Report template - Time field

Program window: **Database ► Report template**

Time fields are used for showing the actual time in the report.

Insert

In order to insert a time field in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of time field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of time field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Fills the field with dots.

Prefix

Text placed in front of the contents of the time field.

Entry	**50 characters**

Suffix

Text to be placed after the contents of the time field.

Entry	**50 characters**

Preview

Shows the formatted time.

4.4.1.4.3.5 Report template - Page number

Program window: **Database ► Report template**

The actual page number in the report is produced in a page number field.

Insert

In order to insert a page number field into a report template the corresponding symbol must be selected on the Module bar and then placed in the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of the page number field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of the page number field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Fills the field with dots.

Prefix

Text placed in front of the page number field.

Entry	**50 characters**

Suffix

Text placed after the page number field.

Entry	**50 characters**

Preview

Shows the formatted page number.

4.4.1.4.3.6 Report template - Number of pages

Program window: **Database ► Report template**

This field shows the total number of pages in the report.

Insert

In order to insert a number of pages field into a report template, the corresponding symbol must be selected on the Module bar and then placed in the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of the field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of the field.

Input range	**0.0000 to (max. page height) mm**

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Left-justified.

Centered.

Right-justified.

Fills the field with dots.

Prefix

Text placed in front of the field contents.

Entry	**50 characters**

Suffix

Text placed after the field contents.

Entry	**50 characters**

Preview

Shows the formatted number of pages.

4.4.1.4.3.7 Report template - Fixed report

Program window: **Database ► Report template**

Fixed reports are used for outputting predefined partial reports of the determination in the report.

Insert

In order to insert a fixed report into a report template, the corresponding icon must be selected on the module bar and then placed on the report template by creating a field with the left mouse button.

Properties

X pos.

Shows the predefined X position for the fixed report.

Y pos.

Shows the Y position within the permitted range.

Input range	**0.0000 to (max. page height) mm**

Width

Shows the predefined width of the fixed report.

Height

Height of the fixed report.

Input range	**0.0000 to (max. page height) mm**

Fixed report

Selection of a predefined fixed report.

Selection	**Calculations** | **Electrode test data** | **Calibration data** | **Curves** | **Messages** | **Measuring point list** | **Method parameters** | **Sample data** | **Result list** | **Raw data (endpoints)** | **Standard addition** | **Statistical data (short)** | **Statistical data (long)** | **Titration and measuring parameters** | **Signature list Determination** | **Signature list Method** | **Variables** | **Used common variables** | **Used devices** | **Global variables used** | **Used solutions** | **Sample solution used (TC conductivity)** | **Used sensors** | **Used colorimetric sensors** | **Monitoring report**
Default value	**Calculations**

Command name

Entry of the command name for which a measuring point list is to be produced. With **not defined**, the lists for all curves present in the determination will be produced as default.

This parameter appears only when **Fixed report** = **Measuring point list**.

Entry	**50 characters**
Selection	**not defined**
Default value	**not defined**

4.4.1.4.3.8 Report template - Group field

Program window: **Database ▶ Report template**

A group field is for the purpose of grouping together a variety of fields in the report template. All of the fields gathered together in a group field can be moved together as a group. The group field prevents a page break inside the group field.

The group field always extends across the entire width of a page; only the upper edge (Y value) and the height of the field can be configured.

NOTICE

The following fields, which do not permit page break controls, cannot be inserted into a group field.

- Fixed report
- Curve
- Calibration curve

Insert

In order to insert group field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

Shows the predefined x-position for the field.

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Shows the predefined width of the fixed report.

Height

Height of the field

Input range	**0.0000 to (max. page height) mm**

4.4.1.4.3.9 Report template - Image

Program window: **Database ► Report template**

An image field is used for including any external graphics on the report template. The file formats ***.jpg** and ***.gif** are supported.

Insert

In order to insert an image into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of image field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of image field.

Input range	**0.0000 to (max. page height) mm**

Graphics file

Shows path and name of the selected graphics file (the field cannot be edited directly). With a window opens for selecting the graphics file. The path and name of the graphics file are then entered.

Size

Entry how the image is to be displayed.

Selection	**original** | **proportional** | **non-proportional**
Default value	**original**

original
Original size.

proportional
Proportional enlargement or diminishment.

non-proportional
Non-proportional enlargement or diminishment.

4.4.1.4.3.10 Report template - Line

Program window: **Database ► Report template**

Any line can be inserted in the report template.

Insert

In order to insert a line in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Length

Length of the line.

Input range	**0.0 to (max. page width) mm**

Angle

Angle of the line.

Input range	**0 to 360.000 °**

Thickness

Thickness of the line.

Input range	**0.1 to 10.0 mm**
Default value	**0.5 mm**

Selection of the line color.

Selection of the type of line.

4.4.1.4.3.11 Report template - Rectangle

Program window: **Database ► Report template**

Any rectangle can be inserted in the report template.

Insert

In order to insert a rectangle into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of the rectangle.

Input range	**0.0000 to (max. page width) mm**

Height

Height of the rectangle.

Input range	**0.0000 to (max. page height) mm**

Thickness

Thickness of the line for the rectangle.

Input range	**0.1 to 10.0 mm**
Default value	**0.5 mm**

Selection of the line color.

Selection of the type of line for the rectangle.

Switches the fill color on and off.

Selection of the fill color.

4.4.1.4.3.12 Report template - Curve field

Program window: **Database ▶ Report template**

Curve fields are used for showing determination curves in the report.

Insert

In order to insert a curve in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left mouse button.

Properties

NOTICE

The properties are saved individually for each curve field. This means that it is possible, e.g., to show several different curves for the same measuring command beside one another in several curve fields.

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of curve field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of curve field.

Input range	**0.0000 to (max. page height) mm**

Command type

Shows the command type for which a curve is to be produced.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS Opt** | **MEAS Spec** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS**
Default value	**DET**

Command name

Name of the command for which the curve is to be produced. With **not defined** all curves present in the determination with the selected **Command type** will be produced as default.

NOTICE

In the command name, the index in the format **.#** must be specified additionally (e.g. **Chloride.1**).

Selection	**not defined** | **50 characters**
Default value	**not defined**

Autoscaling

on | off (Default value: **on**)

If this check box is activated, all axes in the curve window are scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Tabs

Additional properties for the curve field can be set on the following 4 tabs:

- *x axis*
  Parameters for the graphical display of the curve on the x axis.
- *y1 axis*
  Parameters for the graphical display of the curve on the y1 axis (left-hand y axis).
- *y2 axis*
  Parameters for the graphical display of the curve on the y2 axis (right-hand y axis).
- *Options*
  Options for graphical display of curves.

4.4.1.4.3.13 Report template - Calibration curve field

Program window: **Database ▶ Report template**

Calibration curve fields are used for showing calibration or standard addition curves in the report.

Insert

In order to insert calibration curve field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Input range	**0.0000 to (max. page width) mm**

Y pos.

y-position within the permitted section.

Input range	**0.0000 to (max. page height) mm**

Width

Width of calibration curve field.

Input range	**0.0000 to (max. page width) mm**

Height

Height of calibration curve field.

Input range	**0.0000 to (max. page height) mm**

Command name

Entry of the name of the command for which the calibration curve is to be produced. With **not defined** the first calibration curve present in the determination with the selected **Command type** will be produced as default.

Selection	**not defined** | **50 characters**
Default value	**not defined**

4.4.2 Control chart templates

4.4.2.1 Managing control chart templates

Menu item: **Database ► Tools ► Templates ► Control chart templates... ► Control chart templates**

With the menu item **Tools ► Templates ► Control chart templates...**, the dialog window **Control chart templates** opens in which the globally available templates for control charts can be managed.

Template table

The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

Template name

Shows the name of the template.

Result

Shows the result for which the template can be used.

Comment

Shows the comments about the template.

Functions

[New]

Create new template. The dialog window **Properties - Control chart template** opens in which the properties for the new template can be defined.

[Properties]

The dialog window **Properties - Control chart template** opens, in which the properties of the template selected in the table can be edited.

[Delete]

Delete template.

[Copy]

Copies the template and saves it under the name **Copy of...**.

4.4.2.2 Editing control chart templates

4.4.2.2.1 Control chart template - Properties

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates... ▶ Control chart templates ▶ [Properties] ▶ Properties - Control chart - 'Name'**

Template name

Name under which the control chart template is saved per client in the configuration database.

Entry	**50 characters**

Tabs

The properties of a control chart template can be set on the following tabs:

- *Graphics parameters*
  Parameters for the graphical display of the control chart.
- *Limit values*
  Definition of warning and intervention limits for the control chart.
- *Statistics*
  Shows the statistics data for the control chart.
- *Comment*
  Entry of a comment on the template.

4.4.2.2.2 Control chart template - Graphics parameters

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates... ▶ Control chart templates ▶ [Properties] ▶ Properties - Control chart - 'Name'**

Parameters for the graphical display of the control chart.

x Axis

X value

Selection of the value to be shown on the x axis.

Selection	**Determination number** | **Date/Time**
Default value	**Determination number**

Label

Freely definable axis label for the x axis.

Entry	**25 characters**
Default value	**Number**

y axis

Result

Selection of the result column whose value is to be displayed on the y axis.

Selection	**RS01** | **RS02** | **RS03** | **RS04** | **RS05** | **RS06** | **RS07** | **RS08** | **RS09** | **RS10** | **RS11** | **RS12** | **RS13** | **RS14** | **RS15** | **RS16** | **RS17** | **RS18** | **RS19** | **RS20** | **RS21** | **RS22** | **RS23** | **RS24** | **RS25**
Default value	**RS01**

Label

Freely definable axis label for the y axis.

Entry	**25 characters**
Default value	**Result**

Background

Background color

Selection of the background color for the control chart.

Selection	**Color selection** | **white**
Default value	**white**

Measured values

Shape

Selection of the symbol for the display of the measured values.

Selection	**Symbol selection** | •
Default value	•

Color

Selection of the color for the measuring point symbol.

Selection	**Color selection** | **blue**
Default value	**blue**

Link measured values

on | off (Default value: **off**)

If this check box is activated, then the measured value points will be joined by a line.

Label measured values

on | off (Default value: **off**)

If this check box is activated, then the measured value points will be labeled with a time stamp (date, time, UTC).

4.4.2.2.3 Control chart template - Limit values

Dialog window: **Database ► Tools ► Templates ► Control chart templates... ► Control chart templates ► [Properties] ► Properties - Control chart - 'Name'**

Definition of warning and intervention limits to be shown on the control chart.

Warning limits

Warning limits are displayed in **orange** on the control chart.

Lower limit

Lower warning limit.

Entry	**10 digits**
Input range	**-1.0E8 to 1.0E8 (max. 10 digits)**

Upper limit

Upper warning limit.

Entry	**10 digits**
Input range	**-1.0E8 to 1.0E8 (max. 10 digits)**

Intervention limits

Intervention limits are displayed in **red** on the control chart.

Lower limit

Lower intervention limit.

Entry	**10 digits**
Input range	**-1.0E8 to 1.0E8 (max. 10 digits)**

Upper limit

Upper intervention limit.

Entry	**10 digits**
Input range	**-1.0E8 to 1.0E8 (max. 10 digits)**

4.4.2.2.4 Control chart template - Statistics

Dialog window: **Database ► Tools ► Templates ► Control chart templates... ► Control chart templates ► [Properties] ► Properties - Control chart - 'Name'**

Definition of the display of statistics data on the control chart.

Show statistics data

on | off (Default value: **on**)

If this check box is activated, then the statistics data for **Mean value**, **Standard deviation**, **Number of measuring points** and **Minimum and maximum values** will be shown underneath the graph display.

Draw in mean value

on | off (Default value: **on**)

If this check box is activated, then the **Mean value** will be shown on the control chart as a continuous line in the color of the measured values.

Draw in standard deviation

on | off (Default value: **on**)

If this check box is activated, then the two values **Mean value + absolute standard deviation** and **Mean value - absolute standard deviation** will be shown on the control chart as dotted lines in the color of the measured value.

4.4.2.2.5 Control chart template - Comment

Dialog window: **Database ► Tools ► Templates ► Control chart templates... ► Control chart templates ► [Properties] ► Properties - Control chart - 'Name'**

Entry of a comment on the control chart template.

Comment

Comment on the control chart.

Entry	**100 characters**

4.4.3 Curve overlay templates

4.4.3.1 Manage curve overlay templates

Menu item: **Database ► Tools ► Templates ► Curve overlay templates**

With the menu item **Tools, Templates, Curve overlay templates** the dialog window **Curve overlay templates** opens in which the globally available templates for curve overlay can be managed.

Template table

The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

Template name

Shows the name of the template.

Command type

Shows the command type for which the template can be used.

Comment

Shows the comments about the template.

Functions

[New]

Generates a new template. The dialog window **Properties - Overlay curves** opens in which the properties for the new template can be defined.

[Properties]

Open the dialog window **Properties - Overlay curves** in which the properties of the template selected in the table can be edited.

[Delete]

Delete the template selected in the table.

[Copy]

Copy the template selected in the table and save it under the name **Copy of...**.

4.4.3.2 Edit curve overlay templates

4.4.3.2.1 Curve overlay - Properties

Dialog window: **Database ► Tools ► Templates ► Curve overlay templates... ► Curve overlay templates ► [Properties] ► Properties - Curve overlay - 'Name'**

Template name

Name for the curve overlay template which is saved in the configuration database per client.

Entry	**50 characters**

Command type

Selection of the command type from which curves are to be overlaid.

Selection	**DET pH** | **DET U** | **DET Ipol** | **DET Upol** | **MET pH** | **MET U** | **MET Ipol** | **MET Upol** | **MET Cond** | **SET pH** | **SET U** | **SET Ipol** | **SET Upol** | **MEAS pH** | **MEAS U** | **MEAS Ipol** | **MEAS Upol** | **MEAS T** | **MEAS Conc** | **MEAS Cond** | **CAL MEAS pH** | **ELT MEAS** | **CAL MEAS Conc** | **CAL Cond** | **CAL TP** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS Spec** | **MEAS Opt** | **MEAS Opt Conc** | **CAL MEAS Opt** | **CAL Spec** | **MEAS TMF** | **KFT Ipol** | **KFT Upol** | **KFC** | **BRC** | **STAT pH** | **STAT U** | **DOS pH** | **DOS U** | **TET**
Default value	**DET pH**

Autoscaling

on | off (Default value: **on**)

If this check box is activated, then the. In this case the fields **Start value** and **End value** cannot be edited.

Tabs

Further properties of a template for the overlaying of curves can be set on the following 4 tabs:

- *x axis*
  Parameters for the graphical display of the overlaid curves on the x axis.
- *y axis*
  Parameters for the graphical display of the overlaid curves on the y axis.
- *Options*
  Options for the graphical display of the overlaid curves.
- *Comment*
  Enter comment on the template.

4.4.3.2.2 Curve overlay - x axis

Dialog window: **Database ► Tools ► Templates ► Curve overlay templates... ► Curve overlay templates ► [Properties] ► Properties - Curve overlay - 'Name'**

Parameters for the graphical display of the overlaid curves on the x axis.

x axis

Size

Selection of the quantity to be shown on the x axis.

Selection	**Command-dependent selection**

Label

Freely definable axis label for the x axis. With **auto** the designation from the field **Size** will be used.

Entry	**25 characters**
Default value	**auto**

Scaling

Start value

Initial value for scaling the x axis.

Input range	**-1.0E12 to 1.0E12**
Default value	**0.0**

End value

End value for scaling the x axis.

Input range	**-1.0E12 to 1.0E12**
Default value	**1000.0**

4.4.3.2.3 Curve overlay - y axis

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates... ▶ Curve overlay templates ▶ [Properties] ▶ Properties - Curve overlay - 'Name'**

Parameters for the graphical display of the overlaid curves on the y axis.

y axis

Size

Selection of the quantiy to be shown on the y axis.

Selection	**Command-dependent selection**

Label

Freely definable axis label for the y axis. With **auto** the designation from the field **Size** will be used.

Entry	**25 characters**
Default value	**auto**

Display measuring points

on | off (Default value: **on**)

If this check box is activated then the individual measuring points will be shown on the curve.

NOTICE

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Scaling

Start value

Initial value for scaling the y-axis.

Input range	**-1.0E12 to 1.0E12**
Default value	**0.0**

End value

End value for scaling the y-axis.

Input range	**-1.0E12 to 1.0E12**
Default value	**1000.0**

4.4.3.2.4 Curve overlay - Options

Dialog window: **Database ► Tools ► Templates ► Curve overlay templates... ► Curve overlay templates ► [Properties] ► Properties - Curve overlay - 'Name'**

Options for the graphical display of the overlaid curves.

Display grid

on | off (Default value: **off**)

If this check box is actjvated then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Selection	**Select line type**

Grid color

Selection of the color for the grid lines.

Selection	**Color selection** | **gray**
Default value	**gray**

Show endpoints

on | off (Default value: **off**)

If this check box is activated then the endpoints found will be indicated on the curve by the symbol ♦ and labeled with **EP#** (potentiometric endpoints), **BP#** (break point) or **FP#** (fixed endpoint).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	**Color selection** | **black**
Default value	**black**

Manual EPs

Selects the color for manually set endpoints.

Selection	**Color selection** | **pink**
Default value	**pink**

Background

Background color

Selection of the color for the curve background.

Selection	**Color selection** | **white**
Default value	**white**

Legend

Display of the data field, which is shown in the legend to identify the curves.

Open the dialog window **Legend - Field selection** for selecting the data field.

Multiple curves of the same command

Setting, which curves are displayed when the command has been run several times, e.g. because of a **LOOP** command or a multiple call of a **Track**.

Selection	**Show only last curve** | **Show all curves**
Default value	**Show only last curve**

Show only last curve
Only the curve generated during the last run of the command is displayed.

Show all curves
The curves of all runs of the command are displayed.

4.4.3.2.5 Curve overlay - Comment

Dialog window: **Database ► Tools ► Templates ► Curve overlay templates... ► Curve overlay templates ► [Properties] ► Properties - Curve overlay - 'Name'**

Entry of comment on the curve overlay template.

Comment

Comment on control chart.

Entry	**100 characters**

4.4.4 Export templates

4.4.4.1 Managing export templates

Dialog window: **Database ► Tools ► Templates ► Export templates... ► Export templates**

With the menu item **Tools ► Templates ► Export templates**, the dialog window **Export templates** is opened in which the globally available templates for manual or automatic export of determination data can be managed.

Template table

The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing order by clicking on the column title.

Name

Shows the name of the export template.

File type

Shows the file format of the export template for data export.

Comment

Shows the comment on the export template.

Functions

[New]

Create a new export template. The dialog window **Export template** opens in which the properties for the new template can be defined.

[Properties]

Open the dialog window **Export template** in which the properties of the template selected in the table can be edited.

[Delete]

Delete the selected export template.

[Copy]

Copy the selected export template and save it under the name **Copy of...**.

4.4.4.2 Editing export templates

4.4.4.2.1 Export template - Properties

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template 'Name'**

[Properties] is used to open the dialog window **Export template 'Name'** in which the properties of the selected export template can be edited.

Name

Name of the export template.

Entry	**50 characters**

Comment

Freely definable comment on the export template.

Entry	**250 characters**

Target directory

Entry or selection (with) of the path for the directory in which the export file is to be saved.

Entry	**1000 characters**

File type

Selection of the file format for data export:

Selection	***.mdet (tiamo format)** | ***.csv (comma separated)** | ***.slk (SLK format)** | ***.xml (XML format)** | ***.csv (measuring point list)**
Default value	***.mdet (tiamo format)**

***.mdet (tiamo format)**
Program-specific data exchange format that can only be imported into other tiamo databases.

***.csv (comma separated)**
Data exchange format with unformatted text that can be imported into other PC programs (e.g. Excel, Access).

***.slk (SLK format)**
Data exchange format with formatted text that can be imported into other PC programs (e.g. Excel).

***.xml (XML format)**
Data exchange format with XML code that can be imported into corresponding PC programs.

***.csv (measuring point list)**
Data exchange format for the measuring point list with unformatted text that can be imported into corresponding PC programs. The text file contains a document header with date/time of the determination and the determination ID, then the measuring point lists of the separate commands are listed one after the other. The command name is listed first for each measuring point list, followed by a header with the designations and the units of the measured values of the command. This is followed by the list of the measuring points, each measuring point is listed in a separate line and consists of a time indication and all measured values generated by the command.

[Select fields]

Opens the dialog window **Select fields** in which the required fields for the export can be selected, arranged in the required sequence and renamed.

NOTICE

Field selection is only possible for the file types ***.csv** and ***.slk**. With ***.mdet** and ***.xml** always all fields will be exported.

[Options]

Opens the dialog window **Options**, in which the separators can be defined.

NOTICE

The options can only be set for the data types ***.csv (comma separated)** and ***.csv (measuring point list)**.

File name

One of the following options can be selected for the definition of the name of the export file:

Selection	**Determination ID** | **Sample identification** | **Request on each export** | **Fixed file name (append data)**
Default value	**Determination ID**

Determination ID
If this option is selected then the name of the export file will be formed from the unambiguous **Determination ID**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format.

Sample identification
If this option is selected then the name of the export file will be formed from the selected sample identification **ID1…ID16**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format. If the generated name already exists in the directory then a version number will additionally be appended to the date.

Request on each export
If this option is selected then the name of the export file will be requested at each export. In addition to the entered name the **Computer name** and the date stamp **-YYYYMMDD-HHMMSS** will be added automatically.

Fixed file name (append data)
If this option is selected then the name of the export file will be formed from the name entered here and the suffix for the format. If the file is already present in the directory then the data will be appended to this file.

NOTICE

The option **Fixed file name** can only be selected for the file type ***.csv (comma separated)** or ***.slk (SLK format)**.

4.4.4.2.2 Export template - Selecting fields

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Select fields] ▶ Select fields**

With **[Select fields]** in the Properties window for export templates the dialog window **Select fields** opens in which the fields for data export for the file types ***.csv** and ***.slk** can be selected.

Available fields

Display of all the fields that can be exported.

Selected fields

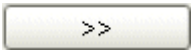
Display of all the fields that will be exported.

Default name

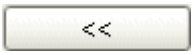
Non-editable name of the field to be exported.

Displayed name

Field name editable by the user for the exported field. The **Default name** is entered as default. If the field name is deleted then the **Default name** appears again.



Add the selected field.



Remove the selected field.

Change the sequence of the exported fields by moving the selected field upwards.

Change the sequence of the exported fields by moving the selected field downward.

4.4.4.2.3 Export template - Options for CSV format

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Options] ▶ Options for CSV format**

With **[Options]** in the Properties window for export templates, the dialog window **Options for CSV format** opens in which the separators can be defined.

Field separator

Selection of the field separator.

Selection	**;** | **,** | **Tab**
Default value	**;**

Record separator

Selection of the data set separator (**CR** = Carriage return, **LF** = Line feed).

Selection	**CR/LF** | **CR** | **LF**
Default value	**CR/LF**

Header

on | off (Default value: **on**)

If this check box is activated, the column headers are exported at the beginning of the export file.

4.4.4.2.4 Export template - Options for measurement point list

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Options] ▶ Options for measuring point list**

With **[Options]** in the Properties window for export templates, the dialog window **Options for measuring point list** opens in which the separators can be defined.

Field separator

Selection of the field separator.

Selection	**;** | **,** | **Tab**
Default value	**;**

4.4.4.2.5 Export template - Request at file export

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template**

If in the properties of the export template under **File name** the option **Request on each export** has been selected *(see chapter 4.4.4.2.1, page 255)*, then before the export of a determination the dialog **File export** is displayed. If several determinations have been selected to be exported, then this dialog will be displayed for each determination.

Target directory

Display of the target directory for the export file, which has been defined in the properties of the export template used *(see chapter 4.4.4.2.1, page 255)*.

File name

Entry of the name under which the export file is to be saved in the **Target directory**. During creating the file the user name as well as the current time stamp are automatically attached to the name entered.

[OK]

The export of the corresponding determination is carried out to the indicated file.

[Cancel]

The export of *the corresponding determination* is canceled. If several determinations have been selected to be exported, then the dialog **File export** will be displayed for the next determination.

[Cancel all]

The export of *all selected determinations* is canceled.

4.4.4.3 XML export

XML export

General

An XML export file with all determination data can be created if an XML report template is used at the export of the determinations.

Structure

An XML export file is constructed as follows:

<?xml version="1.0" encoding="ISO-8859-1" ?>	
–<DeterminationReport>	Determination report
<xmlCreator val=""/>	Program name
<xmlCreatorVersion val=""/>	Program version
<xmlCreatorBuildNo val=""/>	Build number
<subtype val=""/>	

+ <Determination>	Determination data
+ <Method>	Method data
+ <Sample>	Sample data
+ <Results dynamic="">	Results overview
+ <ResultaSingle="">	Single results
+ <Command Data dynamic="">	Command variables
+ <Comvars dynamic="">	Common variables
+ <Globalvars dynamic="">	Global variables
+ <usedDevices dynamic="">	Device data
+ <usedSensors dynamic="">	Sensor data
+ <TcSampleSolutions dynamic="">	Sample solutions (TC conductivity)
+ <ELTResults="">	Electrode test
+ <Colorreagents dynamic="">	Data of the colorimetric sensors.
+ <Method params dynamic="">	Method parameters
+ <Statistics>	Statistical data
–<System>	System data
<userName val="" />	User name (short name)
<userNameFull val="" />	User name (full name)
<clientName val="" />	Client ID
<progVersion val="" />	Program version - Build number
<licenseRoot val="" />	License code
</System>	
</DeterminationReport>	

NOTICE

dynamic= means that the following nodes can appear more than once.

The actual data is situated between **" "**.

4.4.4.3.1 XML export - Determination data

XML export

– <Determination>	Determination data
– <Identification>	Information about the identification of the determination.
<statisticLinkID val=""/>	Statistics ID: Unambiguous and unmistakable identification for the statistically linked determinations.
<determinationID val=""/>	Determination ID: Unambiguous and unmistakable identification for the determination.
<serverName val=""/>	Name of the server to which the client was connected when the determination was recorded.
<clientName val=""/>	ID of the client with which the determination has been recorded.
<detCounter val=""/>	**Sample number** which has been entered in the run window.
<startCounter val=""/>	Start counter.
</Identification>	
– <Acquisition>	Information about recording the determination.
<determinationStart val=""/>	Date and time at start of determination.
<determinationDuration val=""/>	Duration of the determination from its start to its end or stop in s.

<determinationEndState val=""/>	Determination run (way in which the determination has been ended): **regular without remarks** The determination has been finished automatically after the method has been processed normally and without any remarks. **regular with remarks** The determination has been finished automatically after the method has been processed normally but with remarks. **abort** The determination has been stopped manually with **[Stop]**, by a stop criterion or with a **SEND** command. **abort by error** The determination has been canceled automatically due to an error.
<userName val=""/>	Short name of the user logged in at the start of determination.
<userNameFull val=""/>	Full name of the user logged in at start of determination.
<determinationNote val=""/>	**Remark** on determination
<progVersion val=""/>	Program version and build number of the program at recording the determination.
<licenseRoot val=""/>	License start number of the program at recording the determination.
</Acquisition>	
– <Version>	Information about the determination version.
<signOffState val=""/>	Signature status: **no** Determination not signed. **Level 1** Determination signed on level 1. **Level 2** Determination signed on level 2.
<version val=""/>	Version of the determination.

<status val="original"/>	Determination status: **original** Determination data unaltered. **modified** Determination data modified.
<recalcDate val=""/>	Date and time when the reprocessed determination version was saved.
<recalcedBy val=""/>	Short name of the user logged in when the determination has been reprocessed.
<recalcedByuserFull val=""/>	Full name of the user logged in when the determination has been reprocessed.
<recalcReason val=""/>	Reason for the modification of the determination.
<changeComment val=""/>	User comment for the modification of the determination.
</Version>	
– <Miscellaneous>	Different determination data.
<deterComment val=""/>	Comment, which has been entered on the determination.
– <runMessages dynamic="">	Messages
– <data>	Message
<subtype val=""/>	
<msgSource val=""/>	Message source: Shows from where the message comes: **Program** Message that cannot be assigned to a particular command. **Track 'Track name' - Command 'Command name'** Message produced by a command during the run.
<msgText val=""/>	Message text.
<msgTime val=""/>	Time at which the message was created in the run (date, time, UTC in the format **YYYY-MM-DD hh:mm:ss UTC....**).
<msgTitle val=""/>	Message title and number.
</data>	

</runMessages>	
– <DetermVars dynamic="">	Determination variables
– <data>	Determination variable
<vt val=""/>	Variable type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val=""/>	*Variable identification*
<vr val=""/>	Variable value.
</data>	
</DetermVars>	
– <SystemVars dynamic="">	System variables
– <data>	System variable
<vt val=""/>	Variable type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val=""/>	*Variable identification*
<vr val=""/>	Variable value.
</data>	
</SystemVars>	
</Miscellaneous>	
– <signOff dynamic="">	Signatures
– <data>	Signature
<subtype val=""/>	
– <signature>	
<vr val=""/>	Shows at which level the determination has been signed (**Level 1** or **Level 2**).
</signature>	
– <signDate>...</signDate>	Date and time at which the determination was signed.

– <userName>...</userName>	Short name of the user who has signed the determination.
– <userNameFull>...</userNameFull>	Full name of the user who has signed the determination.
– <reason>...</reason>	Reason for signature.
– <comment>...</comment>	Comment on the signature.
</data>	
</signOff>	
</Determination>	

4.4.4.3.2 XML export - Method data

XML export

– <Method>	Method data
– <Identification>	Information about the identification of the method.
<methodName val=""/>	Name of the method.
<methodGroup val=""/>	Name of the method group to which the method belonged at the moment of the determination.
<methodID val=""/>>	Method ID: Unambiguous and unmistakable identification for the method.
<methodComment val=""/>	Method comment (**Command comment** on **START** command).
</Identification>	
– <Version>	Information about the method version.
<signOffState val=""/>	Signature status: **no** Method not signed. **Level 1** Method signed at level 1. **Level 2** Method signed at level 2.
<version val=""/>	Version of the method.

<status val="original"/>	Method status: **original** Determination method unaltered. **modified (live)** Determination method has been modified live. **modified (reprocessed)** Determination method modified by **Reprocessing**.
<savingTime val=""/>	Date and time when the modified method version was saved.
<savingUser val=""/>	Short name of the user logged in when the modified method has been saved.
<savingUserFull val=""/>	Full name of the user logged in when the modified method has been saved.
<changeReason val=""/>	Reason for the modification of the method.
<changeComment val=""/>	User comment for the modification of the method.
</Version>	
– <signOff dynamic="">	Signatures
– <data>	Signature
<subtype val=""/>	
– <signature>	
<vr val=""/>	Shows at which level the method has been signed (**Level 1** or **Level 2**).
<</signature>>	
– <signDate>...</signDate>	Date and time at which the method was signed.
– <userName>...</userName>	Short name of the user who has signed the method.
– <userNameFull>...</userNameFull>	Full name of the user who has signed the method.
– <reason>...</reason>	Reason for signature.
– <comment>...</comment>	Comment on the signature.
</data>	
</signOff>	
</Method>	

4.4.4.3.3 XML export - Sample data

XML export

– <Sample>	Sample data
– <Smpl.Data>	Sample data
– <SmplPos>	Sample position.
– <data>	
<vr val=""/>	Variable value.
<vs val=""/>	Variable status:
	OK = The value is ok and has not been monitored.
	OKL = The value is ok and has been monitored.
	LE = The value has exceeded the limit and has not been monitored.
	LEL = The value has exceeded the limit and has been monitored.
	NV = The value is invalid and has not been monitored.
	NVL = The value is invalid and has been monitored.
<vt val=""/>	Variable type:
	TX = Text
	NR = Number
	DT = Date/Time
	NA = Unknown
<vn val=""/>	*Variable name*
</data>	
</SmplPos>	
– <SmplSize>	Sample size.
– <data>...</data>	*see above*
</SmplSize>	
– <SmplUnit>	Sample size unit.
– <data>...</data>	*see above*
</SmplUnit>	
<InputTime val=""/>	Date and time at which the sample size was entered.

<InputSource val=""/>	Data source for the sample size: **manual** = manual data input. **'Device name'** = Data input from a balance or a bar-code reader (with Sartorius balances with their own data memory the memory number in parentheses is displayed additionally to the balance name). **'File name'** = Data import from a file.
<SmplModReason val=""/>	Reason for the sample data modification.
<SmplModComment val=""/>	Comment on the sample data modification.
</SmplData>	
– <Identification>	Sample identifications
– <ID__01>	Sample identification ID1.
– <data>...</data>	*see above*
</ID__01>	
...	
– <ID__02>...<ID__16>	*see above*
</Identification>	
</Sample>	

4.4.4.3.4 XML export - Results overview

XML export

– <Results dynamic="">	Results overview
– <data>	
<subtype val="" />	
<vr val="" />	Result value with the number of decimal places defined in the CALC command.
<vf val="" />	Result value with full precision.

<vs val=""/>	Result status: **OK** = The value is ok and has not been monitored. **OKL** = The value is ok and has been monitored. **LE** = The value has exceeded the limit and has not been monitored. **LEL** = The value has exceeded the limit and has been monitored. **NV** = The value is invalid and has not been monitored. **NVL** = The value is invalid and has been monitored.
<vt val=""/>	Result type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val=""/>	Result name.
<pr val=""/>	Name of the CALC command the result has been generated with.
<un val=""/>	Unit of the result.
<fo val=""/>	Formula used for the calculation of the result.
– <fv dynamic="">	Variables used for the calculation of the result.
– <data>	
<vr val="" />	Variable value.
<vs val=""/>	Variable status *(see above)*.
<vt val=""/>	Variable type *(see above)*.
<vn val=""/>	Variable name.
</data>	
</fv>	
– <sme>	Mean value of the result.
– <data>	
<vr val="" />	Mean value with the number of decimal places defined in the CALC command.
<vf val="" />	Mean value with full precision.
<vs val=""/>	Variable status *(see above)*.

</data>	
<sme>	
– <abs>	Absolute standard deviation of the result.
– <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Absolute standard deviation with full precision.
<vs val=""/>	Variable status *(see above)*.
</data>	
<abs>	
– <rel>	Relative standard deviation of the result.
– <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Relative standard deviation with full precision.
<vs val=""/>	Variable status *(see above)*.
</data>	
<rel>	
<n val="" />	Number of the result among the statistically evaluated results.
<nmax val="" />	Maximum number of statistically evaluated results.
</data>	
</Results>	

4.4.4.3.5 XML export - Single results

XML export

– <ResultsSingle>	Single results
– <RS01>	1. single result
– <data>	
<vr val="" />	Result value with the number of decimal places defined in the CALC command.
<vf val="" />	Result value with full precision.

<vs val=""/>	Result status: **OK** = The value is ok and has not been monitored. **OKL** = The value is ok and has been monitored. **LE** = The value has exceeded the limit and has not been monitored. **LEL** = The value has exceeded the limit and has been monitored. **NV** = The value is invalid and has not been monitored. **NVL** = The value is invalid and has been monitored.
<vt val=""/>	Result type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val=""/>	Result name.
<pr val=""/>	Name of the CALC command the result has been generated with.
</data>	
– <sme>	Mean value of the result.
– <data>	
<vr val="" />	Mean value with the number of decimal places defined in the CALC command.
<vf val="" />	Mean value with full precision.
<vs val=""/>	Variable status *(see above)*.
</data>	
<sme>	
– <abs>	Absolute standard deviation of the result.
– <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Absolute standard deviation with full precision.
<vs val=""/>	Variable status *(see above)*.
</data>	

<abs>	
– <rel>	Relative standard deviation of the result.
– <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Relative standard deviation with full precision.
<vs val=""/>	Variable status *(see above)*.
</data>	
<rel>	
<n val="" />	Number of the result among the statistically evaluated results.
<nmax val="" />	Maximum number of statistically evaluated results.
</data>	
<RS01>	
<RS02> … <RS25>	Further single results *(see above)*
</ResultsSingle>	

4.4.4.3.6 XML export - Command data

XML export

– <CommandData dynamic="">	Command data
– <Command>	Data on command
<subtype val="" />	
<data val="" />	Command name.Index
<commandType val="" />	Command type.
– <CommandVars dynamic="">	Command variables
– <data>	
<vt val="" />	Variable type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val="" />	Variable identification
<vr val="" />	Variable value.

</data>	
</CommandVars>	
– <Device>	Device data
– <deviceType>	Device type.
<vn val="" />	Parameter name.
<vr val="" />	Parameter value.
</deviceType>	
– <deviceName> ... <device-Name>	Device name.
– <instrNo> ...</instrNo>	Device serial number.
– <deviceProgNo> ... <device-ProgNo>	Device program number.
– <rackName> ... </rackName>	Rack name.
– <rackCode> ... </rackCode>	Rack code.
– <towerNoOne> ... </tower-NoOne>	Tower number.
– <swingHeadOneType> ... </ swingHeadOneType>	Type of Swing Head on tower 1.
– <swingHeadOneSerial> ... </ swingHeadOneSerial>	Serial number of the Swing Head on tower 1.
– <towerNoTwo> ... </tower-NoTwo>	Tower number.
– <swingHeadTwoType> ... </ swingHeadTwoType>	Type of Swing Head on tower 2.
– <swingHeadTwoSerial> ... </ swingHeadTwoSerial>	Serial number of the Swing Head on tower 2.
– <devicePorts dynamic="">	Data on the peripheral devices connected.
– <Port>	
<subtype val="" />	Type of the device connected to the port: **XML_PORT_DEVICE_DOS** = Dosing/Exchange unit **XML_PORT_DEVICE_REMOTE** = Remote Box **XML_PORT_DEVICE_STIR** = Stirrer
– <dosPortName> ... </dosPort-Name>	Number of the MSB connector the dosing device has been connected to.

– <dosType> ... </dosType>	Dosing device type.
– <dosSerial> ... </dosSerial>	Dosing device serial number.
– <exchDosUnit>	Data on exchange/dosing unit.
– <exdosTitle> ... </exdosTitle>	Designation of the exchange/dosing unit.
– <exdosName> ... </exdos-Name>	Name of the exchange/dosing unit.
– <exdosType> ... </exdosType>	Type of the exchange/dosing unit.
– <exdosOrder> ... </exdosOr-der>	Order number of the exchange/dosing unit.
– <exdosSerial> ... </exdosSe-rial>	Serial number of the exchange / dosing unit.
– <cylVol> ... </cylVol>	Volume of buret cylinder.
– <cylSerial> ... </cylSerial>	Serial number of the buret cylinder.
– <Solution>	Data on solution.
– <solTitle> ... </solTitle> ...	Solution title.
– <solutionName> ... </solution-Name>	Solution name.
– <conc> ... </conc>	Concentration.
– <concUnit> ... </concUnit>	Concentration unit.
– <solCreationTime> ... </ solCreationTime>	Production date.
– <titer> ... </titer>	Titer value.
– <titerUnit> ... </titerUnit>	Titer unit.
– <titerCreationTime> ... </titer-CreationTime>	Date and time of the last titer determination.
– <titerMethod> ... </titerMe-thod>	Name of the method with which the last titer determination was carried out.
</Solution>	
</exchDosUnit>	
– <stirrerPortName> ... </stirrer-PortName>	Number of the MSB connector the Remote Box has been connected to.
– <stirrerType> ... </stirrerType>	Stirrer type
– <serialStirrer> ... </serialStir-rer>	Stirrer serial number.

– <remotePortName> ... </remotePortName>	Number of the MSB connector the Remote Box has been connected to.
– <remoteType> ... </remoteType>	Type of Remote Box.
</Port>	
</devicePorts>	
– <Sensor>	Data on sensor.
<subtype val="" />	Type of the sensor: **XML_SENSOR_OTHER** = Other sensor **XML_SENSOR_PH** = pH sensor **XML_SENSOR_ION** = ISE sensor **XML_SENSOR_METAL** = Metal sensor **XML_SENSOR_TEMP** = Temperature sensor **XML_SENSOR_COND** = Conductivity sensor
– <measInput>	Data on measuring input.
<adcInputName val="" />	Number of measuring input.
<adcType val="" />	Type of analog/digital converter.
<adcSerial val="" />	Serial number of measuring input.
<tempSensorType val="" />	Type of temperature sensor (**Pt 1000** or **NTC**).
<tempSensorValue25 val="" />	Nominal resistance of connected NTC sensor.
<tempSensorSlope val="" />	Material constant of the NTC resistance referred to measurements of the resistance at 25 °C and 50 °C.
</measInput>	
– <sensorData>	Data on sensor.
<sensorName val="" />	Sensor name.
<sensorType val="" />	Sensor type.
<sensorOrderNo val="" />	Order number of the sensor.
<sensorSerialNo val="" />	Serial number of the sensor.
<sensorInitDate val="" />	Date on which the sensor was used for the first time.
<sensorCellConst val="" />	Cell constant of the conductivity sensor.
<sensorSlope val="" />	Slope of the sensor.
<sensorPh0 val="" />	Electrode zero point of the pH sensor.
<sensorIonVa val="" />	Ion (valency) of the ISE sensor.

<sensorE0 val="" />	Electrode zero point of the sensor.
<sensorC val="" />	Blank value of the ISE sensor.
<sensorCalTemp val="" />	Calibration temperature.
<sensorCalDate val="" />	Calibration date.
<sensorCalMethod val="" />	Calibration method.
<sensorCalMeasInput val="" />	Measuring input at calibration.
</sensorData>	
</Sensor>	
</Device>	
– <CalibData>	Calibration data
<sensorName val="" />	Sensor name.
<sensorType val="" />	Sensor type.
<sensorSlope val="" />	Slope of the sensor.
<sensorPh0 val="" />	Electrode zero point of the pH sensor.
<sensorIonVa val="" />	Ion (valency) of the ISE sensor.
<sensorE0 val="" />	Electrode zero point of the sensor.
<sensorC val="" />	Blank value of the ISE sensor.
<resultUnit val="" />	Concentration unit of calibration.
<variance val="" />	Variance of calibration.
<sensorCalTemp val="" />	Calibration temperature.
<sensorCalTempType val="" />	Calibration mode.
<sensorCalDate val="" />	Calibration date.
<sensorCalMethod val="" />	Calibration method.
<sensorCalUser val="" />	User.
<sensorEltTime val="" />	Date of the electrode test.
<sensorEltResult val="" />	Result of the electrode test.
– <CalibrationTable>	Calibration solutions.
– <header>	Column headers.
<<RowDesc val="" />	Column header for buffers/standards.
<NominalVal val="" />	Column header for nominal value.
<MeasVal val="" />	Column header for measured value.
<CalTemp val="" />	Column header for calibration temperature.

<CalDur val="" />	Column header for duration of measurement.
<header>	
– <body dynamic="">	
– <data>	
<RowDesc> ... </RowDesc>	Buffer/Standard.
<NominalVal> ... </NominalVal>	Nominal value.
<MeasVal> ... </MeasVal>	Measured value.
<CalTemp> ... </CalTemp>	Calibration temperature.
<CalDur> ... </CalDur>	Duration of measurement in s.
</data>	
</body>	
</CalibrationTable>	
</CalibData>	
– <CalibOptData>	Calibration data colorimetric sensors
<crCalibOptDataName val="" />	Name of the colorimetric sensor.
<crCalibOptDataWavelength val="" />	Wavelength.
<crCalibOptDatac0 val="" />	Calibration coefficient zeroth-order.
<crCalibOptDatac1 val="" />	Calibration coefficient first-order.
<crCalibOptDatac2 val="" />	Calibration coefficient second-order.
<crCalibOptDatac3 val="" />	Calibration coefficient third-order.
<crCalibOptDataConfidence val="" />	Confidence interval.
<crCalibOptDataConfidenceUnit val="" />	Unit of the confidence interval.
<crCalibOptDataOutlier val="" />	Number of outliers.
<crCalibOptDataCoeffDeterm val="" />	Coefficient of determination.
<crCalibOptDataCalibTemp val="" />	Calibration temperature.
<crCalibOptDataCalibTempUnit val="" />	Unit of the calibration temperature.
<crCalibOptDataCalibRangeAt val="" />	Minimum concentration of the calibration range.

<crCalibOptDataCalibRangeTo val="" />	Maximum concentration of the calibration range.
<crCalibOptDataCalibRangeUnit val="" />	Unit of the calibration range.
<crCalibOptDataCalibTime val="" />	Calibration date.
<crCalibOptDataCalibMethod val="" />	Calibration method.
<crCalibOptDataDetermID val="" />	Determination ID.
<crCalibOptDataUser val="" />	User.
– <crCalibOptTable>	Calibration solutions.
– <header>	Column headers.
<<RowDesc val="" />	Column header of the standards.
<ConcVal val="" />	Column header for the concentration value.
<MeasVal val="" />	Column header for measured value.
<CalTemp val="" />	Column header for calibration temperature.
<CalDur val="" />	Column header for duration of measurement.
<header>	
– <body dynamic="">	
– <data>	
<RowDesc> ... </RowDesc>	Buffer/Standard.
<ConcVal> ... </ConcVal>	Concentration value.
<MeasVal> ... </MeasVal>	Measured value.
<CalTemp> ... </CalTemp>	Calibration temperature.
<CalDur> ... </CalDur>	Duration of measurement in s.
</data>	
</body>	
</crCalibOptTable>	
– </CalibOptData>	
– <StdAddData>	Standard addition data
<slope val="" />	Calculated slope of the standard addition curve.
<e0 val="" />	Calculated axis intercept of the standard addition curve.

<ion val="" />	Ion (Valency).
<conc val="" />	Calculated concentration.
<concUnit val="" />	Concentration unit.
<variance val="" />	Variance.
– <StdAddTable>	Standard addition solutions.
– <header>	Column headers.
<RowDesc val="" />	Column header for measuring solution.
<dV val="" />	Column header for addition volume.
<MeasVal val="" />	Column header for measured value.
<dU val="" />	Column header for measured value differential.
<Dur val="" />	Column header for duration of measurement.
</header>	
– <body dynamic="">	
– <data>	
<RowDesc> ... </RowDesc>	Measuring solution.
<dV> ... </dV>	Addition volume in mL.
<MeasVal> ... </MeasVal>	Measured value in mV.
<dU> ... </dU>	Measured value differential in mV.
<Dur> ... </Dur>	Duration of measurement in s.
</data>	
</body>	
</StdAddTable>	
</StdAddData>	
– <MeasPoints content-Type="table">	Measuring points
– <tableHeader>	Column headers.
– <th>	
<vr val="" />	Column header.
</th>	
</tableHeader>	
– <tableBody>	Measuring points.
– <td>	

<vr val="" />	
<vf val="" />	
</td>	
</tableBody>	
</MeasPoints>	
– <EndPoints dynamic="">	Endpoints
– <data>	
<ept val="" />	Designation of the endpoint.
<epvx val="12.1835" />	X value of the endpoint.
<epux val="mL" />	Unit of the x value of the endpoint.
<epvy val="518.5" />	Y value of the endpoint.
<epuy val="mV" />	Unit of the y value of the endpoint.
</data>	
</EndPoints>	
– <Monitoring dynamic="">	Monitoring data
– <Monitoring>	Data on monitoring.
<subtype val="" />	Monitoring type.
<monType val="" />	Monitored value.
– <MonitorTable>	Events during monitoring.
– <header>	Column headers.
<time val="" />	Column header for time.
<limit val="" />	Column header for limit value type.
<limitVal val="" />	Column header for limit value.
<monVal val="" />	Column header for measured value.
<volume val="" />	Column header for volume.
<otherVal val="" />	Column header for temperature, measured value pH or measured value mV.
<action val="" />	Column header for action.
</header>	
– <body dynamic="">	
– <data>	
<time> ... </time>	Time in s.

<limit> ... </limit>	Limit value type.
<limitVal> ... </limitVal>	Limit value.
<monVal> ... </monVal>	Measured value.
<volume> ... </volume>	Volume in mL.
<otherVal> ... </otherVal>	Temperature, measured value pH or measured value mV.
<action> ... </action> ...	Action.
</data>	
</body>	
</MonitorTable>	
</Monitoring>	
</Monitoring>	
</Command>	
</CommandData>	

4.4.4.3.7 XML export - Common Variables

XML export

– <Comvars dynamic>	Common variables
– <data>	
<subtype val="" />	
<vr val="" />	Variable value.
<vs val="" />	Variable status: **OK** = The value is ok and has not been monitored. **OKL** = The value is ok and has been monitored. **LE** = The value has exceeded the limit and has not been monitored. **LEL** = The value has exceeded the limit and has been monitored. **NV** = The value is invalid and has not been monitored. **NVL** = The value is invalid and has been monitored.

<vt val="" />	Variable type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val="" />	Variable name.
<un val="" />	Unit of the variable.
<am val="" />	Assignment method.
<at val="" />	Assignment date.
</data>	
</Comvars dynamic>	

4.4.4.3.8 XML export - Global Variables

XML export

– <Globalvars dynamic>	Global variables
– <data>	
<subtype val="" />	
<vr val="" />	Variable value.
<vs val="" />	Variable status: **OK** = The value is ok and has not been monitored. **OKL** = The value is ok and has been monitored. **LE** = The value has exceeded the limit and has not been monitored. **LEL** = The value has exceeded the limit and has been monitored. **NV** = The value is invalid and has not been monitored. **NVL** = The value is invalid and has been monitored.
<vt val="" />	Variable type: **TX** = Text **NR** = Number **DT** = Date/Time **NA** = Unknown
<vn val="" />	Variable name.

<un val="" />	Unit of the variable.
<am val="" />	Assignment method.
<at val="" />	Assignment date.
</data>	
</Globalvars dynamic>	

4.4.4.3.9 XML export - Device data

XML export

– <usedDevices dynamic="">	Device data
– <Device>	Data on device.
<subtype val="" />	
– <deviceType>	Device type.
<vn val="" />	Parameter name.
<vr val="" />	Parameter value.
</deviceType>	
– <deviceName> ... </device-Name>	Device name.
– <instrNo> ... </instrNo>	Device serial number.
– <deviceProgNo> ... </device-ProgNo>	Device program number.
– <rackName> ... </rackName>	Rack name.
– <rackCode> ... </rackCode>	Rack code.
– <towerNoOne> ... </tower-NoOne>	Tower number.
– <swingHeadOneType> ... </ swingHeadOneType>	Type of Swing Head on tower 1.
– <swingHeadOneSerial> ... </ swingHeadOneSerial>	Serial number of the Swing Head on tower 1.
– <towerNoTwo> ... </tower-NoTwo>	Tower number.
– <swingHeadTwoType> ... </ swingHeadTwoType>	Type of Swing Head on tower 2.
– <swingHeadTwoSerial> ... </ swingHeadTwoSerial>	Serial number of the Swing Head on tower 2.
– <spectroData>	

– <detectorType> ... </detector-Type>	Detector type of spectrometer.
– <dateRecDarkRefSpec> ... </ dateRecDarkRefSpec>	Recording time of dark and reference spectrum.
– <userRecDarkRefSpec> ... </ userRecDarkRefSpec>	User during recording of the dark and the reference spectrum.
– <methodRecDarkRefSpec> ... </methodRecDarkRefSpec>	Method during recording of the dark and the reference spectrum.
– <detIDRecDarkRefSpec> ... </ detIDRecDarkRefSpec>	Determination ID of the recording of the dark and reference spectrum.
– <calibDate> ... </calibDate>	Calibration date.
– <calibUser> ... </calibUser>	User during calibration.
– <calibMethod> ... </calibMethod>	Calibration method.
– <calibDetID> ... </calibDetID>	Determination ID of calibration.
– <tmfData>	
– <valTMF> ... </valTMF>	Transmission factor.
– <determDateTMF> ... </ determDateTMF>	Calibration date.
– <userNameTMF> ... </userNameTMF>	User name.
– <methodNameTMF> ... </ methodNameTMF>	Calibration method.
– </tmfData>	
– </spectroData>	
– <devicePorts dynamic="">	Data on the peripheral devices connected.
– <Port>	
<subtype val="" />	Type of the device connected to the port: **XML_PORT_DEVICE_DOS** = Dosing/Exchange unit **XML_PORT_DEVICE_REMOTE** = Remote Box **XML_PORT_DEVICE_STIR** = Stirrer
– <dosPortName> ... </dosPort-Name>	Number of the MSB connector the dosing device was connected to.
– <dosType> ... </dosType>	Dosing device type.
– <dosSerial> ... </dosSerial>	Dosing device serial number.

– <exchDosUnit>	Data on exchange/dosing unit.
– <exdosTitle> ... </exdosTitle>	Designation of the exchange/dosing unit.
– <exdosName> ... </exdosName>	Name of the exchange/dosing unit.
– <exdosType> ... </exdosType>	Type of the exchange/dosing unit.
– <exdosOrder> ... </exdosOrder>	Order number of the exchange/dosing unit.
– <exdosSerial> ... </exdosSerial>	Serial number of exchange/dosing unit.
– <cylVol> ... </cylVol>	Cylinder volume of exchange/dosing unit.
– <cylSerial> ... </cylSerial>	Cylinder serial number of exchange/dosing unit.
– <Solution>	Data on solution.
– <solTitle> ... </solTitle>	Solution title.
– <solutionName> ... </solutionName>	Solution name.
– <conc> ... </conc>	Concentration.
– <concUnit> ... </concUnit>	Concentration unit.
– <solCreationTime> ... </solCreationTime>	Production date.
– <titer> ... </titer>	Titer value.
– <titerUnit> ... </titerUnit>	Titer unit.
– <titerCreationTime> ... </titerCreationTime>	Date and time of the last titer determination.
– <titerMethod> ... </titerMethod>	Name of the method with which the last titer determination was carried out.
</Solution>	
</exchDosUnit>	
– <stirrerPortName> ... </stirrerPortName>	Number of the MSB connector the stirrer was connected to.
– <stirrerType> ... </stirrerType>	Stirrer type.
– <serialStirrer> ... </serialStirrer>	Serial number.
– <remotePortName> ... </remotePortName>	Number of the MSB connector the Remote Box was connected to.

– <remoteType> ... </remote-Type>	Type of Remote Box.
– <multiPortValvePortName> ... </multiPortValvePortName>	Name of the multi-port valve.
– <multiPortValveType> ... </ multiPortValveType>	Type of the multi-port valve.
– <multiPortValveSerial> ... </ multiPortValveSerial>	Serial number of the multi-port valve.
</Port>	
</devicePorts>	
</Device>	
</usedDevices>	

4.4.4.3.10 XML export - Sensor data

XML export

– <usedSensors dynamic="">	Sensor data
– <Sensor>	Data on sensor.
<subtype val="" />	Type of the sensor: **XML_SENSOR_OTHER** = Other sensor **XML_SENSOR_PH** = pH sensor **XML_SENSOR_ION** = ISE sensor **XML_SENSOR_METAL** = Metal sensor **XML_SENSOR_TEMP** = Temperature sensor **XML_SENSOR_COND** = Conductivity sensor
– <measInput>	Data on measuring input.
<adcInputName val="" />	Number of measuring input.
<adcType val="" />	Type of analog/digital converter.
<adcSerial val="" />	Serial number of measuring input.
<tempSensorType val="" />	Type of temperature sensor (**Pt 1000** or **NTC**).
<tempSensorValue25 val="" />	Nominal resistance of connected NTC sensor.
<tempSensorSlope val="" />	Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.
</measInput>	
– <sensorData>	Data on sensor.

<sensorName val="" />	Sensor name.
<sensorType val="" />	Sensor type.
<sensorOrderNo val="" />	Order number of the sensor.
<sensorSerialNo val="" />	Serial number of sensor.
<sensorInitDate val="" />	Date on which the sensor was used for the first time.
<sensorSlope val="" />	Slope of the sensor.
<sensorCellConst val="" />	Cell constant of the conductivity sensor.
<sensorPh0 val="" />	Electrode zero point of the pH sensor.
<sensorIonVa val="" />	Ion (valency) of the ISE sensor.
<sensorE0 val="" />	Electrode zero point of the sensor.
<sensorC val="" />	Blank value of the ISE sensor.
<sensorCalTemp val="" />	Calibration temperature.
<sensorCalDate val="" />	Calibration date.
<sensorCalMethod val="" />	Calibration method.
<sensorCalUser val="" />	User
<sensorCalMeasInput val="" />	Measuring input at calibration.
<sensorEltTime val="" />	Date of the electrode test.
<sensorEltResult val="" />	Result of the electrode test.
<thermoProbe> ... </thermoProbe>	Data of the thermoprobe sensor.
</sensorData>	
</Sensor>	
</usedSensors>	

4.4.4.3.11 XML export - Sample solutions (TC conductivity)

XML export

– <TcSampleSolutions dynamic="">	Sample solutions (TC conductivity)
– <TcSampleSolution>	Data on sample solution (TC conductivity).
– <tcSolutionName> ... </tcSolutionName>	Name of the sample solution (TC conductivity).
– <tcAssignDate> ... </tcAssignDate>	Assignment date for sample solution (TC conductivity).

– <tcAssignMethod> ... </tcAssignMethod>	Assignment method for sample solution (TC conductivity).
– <tcStartTemp> ... </tcStartTemp>	Start temperature of the sample solution (TC conductivity).
– <tcStopTemp> ... </tcStopTemp>	Stop temperature of the sample solution (TC conductivity).
– <c0> ... </c0>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
– <c1> ... </c1>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
– <c2> ... </c2>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
– <c3> ... </c3>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
– <c4> ... </c4>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
– <tcUserName> ... </tcUserName>	User name during determination of the TC data.
– <tcMeasInput> ... </tcMeasInput>	Measuring input during determination of the TC data.
– <DeterID> ... </tcDeterID>	Determination ID during determination of the TC data.
</TcSampleSolution>	
</TcSampleSolutions>	

4.4.4.3.12 XML export - Electrode test

XML export

– <ELTResults="">	Electrode test
– <electrodType> ... </electrodType>	Electrode type
– <eltBufferResult1> ... </eltBufferResult1>	Results for buffer pH 9.
– <eltBufferResult2> ... </eltBufferResult2>	Results for buffer pH 4.
– <eltBufferResult3> ... </eltBufferResult3>	Results for buffer pH 7.
– <eltDoubleBufferResult1> ... </eltDoubleBufferResult1>	Results for buffer pH 9/4.

– <eltDoubleBufferResult2> ... </eltDoubleBufferResult2>	Results for buffer pH 4/7.
– <eltDoubleBufferResult3> ... </eltDoubleBufferResult3>	Results for buffer pH 7/9.
– <eltDriftResult> ... </eltDriftResult>	Results for drift measurements.
</ELTResults>	

4.4.4.3.13 XML export - Colorimetric sensors

XML export

– <Colorreagents dynamic="">	Data of the colorimetric sensors.
– <Colorreagent>	Data of the colorimetric sensor.
<crName val="" />	Name of the sensor.
<crWavelength val="" />	Wavelength.
<crc0 val="" />	Calibration coefficient zeroth-order.
<crc1 val="" />	Calibration coefficient first-order.
<crc2 val="" />	Calibration coefficient second-order.
<crc3 val="" />	Calibration coefficient third-order.
<crConfidence val="" />	Confidence interval.
<crOutlier val="" />	Number of outliers.
<crCoeffDeterm val="" />	Coefficient of determination.
<crCalibTemp val="" />	Calibration temperature.
<crCalibRange val="" />	Calibration range.
<crCalibTime val="" />	Calibration date.
<crCalibMethod val="" />	Calibration method.
<crCalibDetermID val="" />	Determination ID.
<crUser val="" />	User.
</Colorreagent>	
</Colorreagents>	

4.4.4.3.14 XML export - Method parameters

XML export

– <MethodParams dynamic="">	Method parameters
– <Command>	Data on command.
<subtype val="" />	
<COMMANDTYPE val="" />	Command type.
– <BLOCKNAME>	Command name.
<vn val="" />	Parameter designation.
<vr val="" />	Parameter value.
</BLOCKNAME>	
– <'Parameter name'>	Data on tab or parameter
<vn val="" />	Parameter name.
<vr val="" />	Parameter value.
<un val="" />	Parameter unit.
</'Parametername'>	
</Command>	
</MethodParams >	

4.4.4.3.15 XML export - Statistical data

XML export

– <Statistics>	Statistical data
<subtype val="" />	
<nMax val="" />	Maximum number of statistically evaluated results.
– <StatisticsShort dynamic="">	Statistical data on the individual results
– <data>	
<subtype val="" />	
– <resName>	
<vr val="" />	Result name.
</resName>	
– <n> ... </n>	Number of the result among the statistically evaluated results.
– <sme> ... </sme>	Mean value of the result.
– <un> ... </un>	Result unit.
– <abs> ... </abs>	Absolute standard deviation of the result.
– <rel> ... </rel> ...	Relative standard deviation of the result.

</data>	
– <min> ... </min> ...	Minimum value of the result.
– <max> ... </max> ...	Maximum value of the result.
</StatisticsShort>	
– <StatisticsOverview content-Type="table">	Statistical data overview
<subtype val="" />	
– <tableHeader>	Column headers (dynamic).
– <th>	
<vr val="" />	Column header.
</th>	
</tableHeader>	
– <tableBody>	Table content (dynamic).
– <td>	
<vr val="" />	Field content.
</td>	
</tableBody>	
</StatisticsOverview>	
</Statistics>	

4.5 Determination overview

4.5.1 Determination overview - General

4.5.1.1 Determination overview - Overview

Subwindow: **Database ▶ Determination overview**

General

The subwindow **Determination overview** shows selected data for the determinations contained in the open database in tabular form. It is always shown in the program part **Database**, i.e. it cannot be removed from the Database view. The subwindow can be enlarged and reduced as required; it can also be maximized.

Elements

The subwindow **Determination overview** includes the following tools:

- *Determination table*
- *Filter selection*

- *Navigation bar*

4.5.1.2 Determination overview - Table

Subwindow: **Database ► Determination overview**

Data display

In the determination table the information about the determinations defined under **Column display** is shown. If the contents of a field is larger than the column width then the whole contents will be shown as a **tooltip** if the mouse cursor is kept on the field.

If the value of a result is monitored and lies within the limits defined, then it will be shown in **green**. If it is outside these limits then the value will be shown in **red**.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Updating

As long as the program part **Database** remains open modifications in the determination table, caused by running determinations or by other users (addition, editing or deletion of data sets), will not be shown automatically. The table must either be updated with **View ► Update** or newly sorted or filtered. Each switch from a different program part to the program part **Database** automatically updates the determination table.

Table view

With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the border between column titles**:
  Sets the column width.
- **Double-click on the border between column titles**
  Sets the optimal column width.
- **Drag the column title**
  Moves the column to the required location.

Data record selection and table navigation

The determinations selected in the table are shown in **turquoise**, the focused determination whose data is shown in the other Subwindows is indicated by an arrow in front of the line number. There are various opportunities for data set selection in the table.

In the determination table it is not possible to show more than 200 determinations at once. If more than 200 data sets are present in the database then the Navigation bar must be used to switch to further sets of determinations.

4.5.1.3 Determination overview - Column display

Dialog window: **Database ► View ► Properties ► Column display… ► Column display**

View ► Properties ► Column display… opens the dialog window **Column display**. Here you can define the columns that are to be shown in the determination table.

Available columns

Shows all the fields that can be shown as columns in the determination table.

Displayed columns

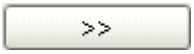
Shows all the fields that will be shown as columns in the determination table.

Default name

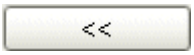
Non-editable name of the field that is displayed as column.

Displayed name

Editable name (by double click) of the column displayed in the determination overview.



Adds the selected column to the table.



Removes the selected column from the table.

Move selected column upwards.

Move selected column downwards.

4.5.1.4 Determination overview - Filter selection

Subwindow: **Database ► Determination overview**

Filter

Selection of the filter according to which the Determination table is to be filtered:

Selection	**All determinations** | **All statistics records** | **Quick filter** | **Temporary filter** | **Filter name**
Default value	**All determinations**

All determinations
The table is shown unfiltered.

All statistics records
The table is filtered so that all determinations are shown that are linked statistically with the selected determination.

Quick filter
The table is filtered according to the last defined **Quick filter**

Temporary filter
The table is filtered according to the last defined, not saved **Special filter**.

Filter name
The table is filtered according to the selected and saved **Special filter**.

Statistics

With the statistics filter selected here the determinations shown in the Determination table can be additionally filtered according to the statistical data generated by the method independently of any other filters that may have been used.

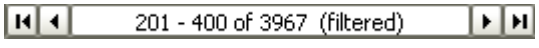
Selection	**All** | **Last**

All
All determinations are shown for all statistics series.

Last
Only the last determination is shown for all statistics series.

4.5.1.5 Determination overview - Navigation bar

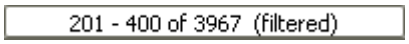
Subwindow: **Database ► Determination overview**



The navigation bar shown below the determination table is used for navigation in extensive tables in which all the determinations cannot be shown at once. It contains the following tools:

Jump to the first set of determinations in the table.

Jump back to the previous set of determinations in the table.



Display the selected set **#### - ####** of determinations in the table. If the table has not been filtered then the total number of all determinations will be shown. If the table has been filtered the total number of filtered determinations is shown with **(filtered)**.

Jump further to the next set of determination in the table.

Jump to the last set of determinations in the table.

4.5.1.6 Determination overview - Table navigation

Subwindow: **Database ▶ Determination overview**

In the determination table navigation can be carried out with the mouse and the vertical and horizontal scroll bars. The following possibilities are also provided by the keyboard:

[↑]

Moves the line cursor up by one field.

[↓]

Moves the line cursor down by one field.

[Ctrl] [End]

Jumps to the last determination in the current set.

[Ctrl] [Home]

Jumps to the first determination in the current set.

[Page Up]

Pages backward within the current set.

[Page Down]

Pages forward within the current set.

[Alt] [End]

Jumps to last determination (of all).

[Alt] [Home]

Jumps to first determination (of all).

[Alt] [↑]

Jumps to first data set of previous set.

[Alt] [↓]

Jumps to first data set of next set.

In the determination table it is not possible to show more than 200 determinations at once. If more than 200 determinations are present in the database then the Navigation bar must be used to switch to further sets of determinations.

4.5.1.7 Determination overview - Data record selection

Subwindow: **Database ► Determination overview**

The determinations selected in the table are shown in **turquoise**, the focused determination whose data is shown in the other Subwindows is indicated by an arrow in front of the line number. When a database is opened the first determination is always selected and focused.

The following possibilities are available for the selection of determinations in the determination table:

- **Single determinations**
  Single determinations are selected by clicking on them with the mouse within the line (including line number). This determination, whose data is shown in the other opened subwindows, is now focused and receives an arrow in front of the line number.
- **Several determinations in sequence**
  In order to select several determinations in sequence the required range can be selected with the left mouse button pressed down. It is also possible to select a range with a click on the first determination and **[Shift] & click** on the last determination. The last determination to be selected receives the focus.
- **Several determinations not in sequence**
  In order to select several determinations not in sequence the individual determinations must be selected with the **Ctrl key** and the left mouse button. The last determination to be selected receives the focus.
- **All determinations**
  With **[Ctrl] [A]** or by clicking on the uppermost left-hand table field all the filtered determinations within the current set of determinations are selected. The focus is retained.

4.5.1.8 Determination overview - Functions

Subwindow: **Database ► Determination overview**

With the determinations selected in the Determination table the following functions can be carried out:

Editing determinations

- *Update determination overview*
- *Enter determination comment*
- *Sign determinations*
- *Export determinations*
- *Import determinations*
- *Send determinations to*
- *Reprocess determinations*
- *Delete determinations*

Search and filter determinations

- *Search determinations*
- *Filter determinations*

Other functions

- *Print determination overview*
- *Determinations - Print report*
- *Display determinations method*
- *Determinations - Display history*
- *Determinations - Display calibration curve*
- *Determinations - Control chart*
- *Determinations - Overlay curves*
- *Print overlaid curves*
- *Print control chart*

4.5.2 Determination overview - Functions

4.5.2.1 Update determination overview

Menu item: **Database ► View ► Update**

The menu item **View ► Update** or the symbol is used to update the determination table.

NOTICE

The determination table is updated automatically when the database is opened and when a change is made from another program part to the program part **Database**, but afterwards only when the table is newly sorted or filtered.

4.5.2.2 Determination comment

Dialog window: **Database ▶ Determinations ▶ Comment… ▶ Determination comment**

With the menu item **Determinations ▶ Comment…** or the symbol the dialog window **Determination comment** opens in which new comments on the selected determination can be entered and existing comments can be edited.

Comments entered this way appear automatically as a tooltip when the cursor is kept on the number field of a line in the determination table for more than 1 second. In addition, it is also displayed in the subwindow **Information**.

NOTICE

The background of a line number is displayed in dark gray if there is a comment in this line.

4.5.2.3 Searching for determinations

Dialog window: **Database ▶ Determinations ▶ Search… ▶ Search - Database**

With the menu item **Determinations ▶ Search…** or the symbol the dialog window **Search - Database** for searching for determinations is opened.

Search in

Selection of the data field to be searched in.

Selection	**All fields** | **'Field name'**

All fields
It is being searched in all fields of the database.

'Field name'
It is being searched in the selected field only. Available are always the 10 most recently selected fields.

[More...]

Open the dialog window **Search – Field selection**. All fields are listed in tree-form. A field can be included in the search by marking it and then closing the dialog with **[OK]**.

Details

Depending on the data field, under Details further selection fields are dynamically created in order to be able to select the required property.

Search options

Type

Selection of the format type for the fields for which several types are possible. With fields with a fixed type only this one will be displayed.

Selection	**Text** | **Date** | **Number**
Default value	**Text**

Operator

Selection of the relational operator for the search condition.

for fields of the type = Text

Selection	**=** | **<>** | **empty** | **not empty**
Default value	**=**

for fields of the type = Date

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **outside limits** | **Today**
Default value	**=**

invalid
It is being searched for values with the entry **invalid** .

outside limits
It is being searched for values which exceed the limit values defined for the selected fields (values presented in red).

Today
It is being searched for the current date. In addition, a range of days can also be defined in the field **Search word** in which, starting from the current date, the search is to be carried out.

for fields of the type = Number

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **outside limits**
Default value	**=**

invalid
It is being searched for values with the entry **invalid** .

outside limits
It is being searched for values which exceed the limit values defined for the selected fields (values presented in red).

Search word

Enter a search word for searching the selected data field. For fields of the **Type** = **Date** the date can be selected by pressing on **[...]** in the dialog window **Select date**.

for fields of the type = Text

Entry	**256 characters** Definition of a text expression as search word. The last 10 search words are saved and can be selected. The following wildcards can be used in the search word:
Selection	**^?** | **^#** | **^$** | **^***

^?
Wildcard for any character.

^#
Wildcard for any number.

^$
Wildcard for any letter.

^*
Wildcard for any character string.

for fields of the type = Date

Entry	**all possible date values** Definition of a date as search word. The last 10 search words are saved and can be selected.

for fields of the type = Date and Operator = Today

Input range	**-9999 to 9999**
Default value	**0** Definition of a numerical value as range of days in which, starting from the current date, the search is to be carried out. The last 10 search words are saved and can be selected.

for fields of the type = Number

Entry	**all possible numerical values** Definition of a numerical value as search word. The last 10 search words are saved and can be selected.

Search direction

Selection of the search direction.

Selection	**Total** | **Downward** | **Upward**
Default value	**Total**

Total
It is being searched down to the end of the database and then again from above down to the selected data record.

Downward
It is being searched to the end of the databse.

Upward
It is being searched to the beginning of the databse.

Match case

on | off (Default value: **off**)

If this option is enabled, then differentiation will be made between upper and lower case letters during searches in **Text**-type fields.

Search for whole word only

on | off (Default value: **off**)

If this option is enabled, then the field contents must be identical with the search word during searches in **Text**-type fields (no part-search).

[Search next]

Search next occurrence of the search word.

4.5.2.4 Filtering determinations

4.5.2.4.1 Filtering determinations - Overview

Subwindow: **Database ► Determination overview**

The following possibilities exist for filtering determinations in the determination table:

- *Filter selection in the filter bar*
- *Quick filter*
- *Special filter*
- *Last filter*
- *Remove filter*

4.5.2.4.2 Determinations - Last filter

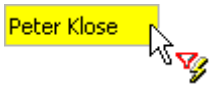
Menu item: **Database ► Determinations ► Filter ► Last filter**

The most recently used filter is reactivated with the **Determinations ► Filter ► Last filter** menu item or the icon.

4.5.2.4.3 Determinations - Quick filter

Menu item: **Database ▶ Determinations ▶ Filter ▶ Quick filter**

The **Determinations ▶ Filter ▶ Quick filter** menu item or the icon can be used to carry out a quick filtering for the content of the selected tabular field. After this function has been selected, the field in the determination table in which the cursor is located will have a colored background during navigation. At the same time, the following special filter icon appears:



By double-clicking with the left mouse button you can set the content of the selected field as filter criterion and apply it directly to the table.

NOTICE

The quick filter can be applied again within the filtered table, so that the number of entries can be limited step by step.

4.5.2.4.4 Determinations - Special filter

Dialog window: **Database ▶ Determinations ▶ Filter ▶ Special filter... ▶ Special filter - Database "Database name"**

The **Determinations ▶ Filter ▶ Special filter...** menu item or the icon is used to open the **Special filter - Database** dialog window for defining user-specific filters.

Filter

Selection of the filter to be loaded for editing.

Selection	**'Filter name'** | **New filter**
Default value	**New filter**

'Filter name'
The saved filter is loaded.

New filter
An empty table with the name **New filter** is loaded.

[Save filter]

Opens the **Save filter** dialog window, in which the filter criteria entered in the table can be saved as a special filter under the required name.

[Delete filter]

The currently loaded special filter is deleted.

Table view

The overview table shows all the defined filter criteria and cannot be directly edited. The filter criteria will be numbered automatically in sequence. The table view can be adapted with the left mouse button as follows:

- **Dragging the margin between column titles**
  Sets the column width
- **Double-clicking on the margin between column titles**
  Sets the optimal column width

If the content of a field is larger than the column width, then the entire content will be shown as a **tooltip** if the mouse cursor hovers over the field.

For the meaning of the columns, *see Editing filter criterion*.

Functions

The **[Edit]** menu beneath the filter table contains the following menu items:

Edit line	Opens the **Edit filter criterion** dialog window, in which the filter criterion of the line selected in the table can be edited.
Insert new line	Inserts a new, empty line above the line selected in the table. The **Edit filter criterion** dialog window opens automatically.
Cut lines	Transfers the selected lines to the clipboard.
Copy lines	Copies the selected lines to the clipboard.
Insert lines	Pastes lines from the clipboard above the selected line.
Delete lines	Deletes the selected lines.

[Apply filter]

Applies filter criteria to the determination table.

4.5.2.4.5 Determinations - All statistics records

Menu item: **Database ▶ Determinations ▶ Filter ▶ All statistics records**

With the **Determinations ▶ Filter ▶ All statistics records** menu item or the symbol all determinations statistically linked with the selected determination are displayed.

4.5.2.4.6 Determinations - Deleting a filter

Menu item: **Database ▶ Determinations ▶ Filter ▶ Delete filter**

With the **Determinations ▶ Filter ▶ Delete filter** menu item or the icon the most recently used filter will be deleted and all determinations will be displayed.

4.5.2.4.7 Determinations - Saving a filter

Dialog window: **Database ▶ Determinations ▶ Filter ▶ Special filter… ▶ Special filter - Database "Database name" ▶ [Save filter] ▶ Save filter**

The **[Save filter]** button in the **Special filter - Database "Database name"** dialog window opens the **Save filter** dialog window for saving a special filter.

All the saved special filters are shown in the upper field.

Filter name

Name under which the special filter is to be saved.

Entry	**50 characters**

[Save]

Saves the filter under the given name.

NOTICE

The filters are saved globally in the configuration database and are therefore available for all clients.

4.5.2.4.8 Determinations - Editing the filter criterion

Dialog window: **Database ▶ Determinations ▶ Filter ▶ Special filter ▶ Special filter - Database "Database name" ▶ [Edit] ▶ Edit line ▶ Edit filter criterion 'Filter name'**

The **Edit ▶ Edit line** command in the **Special filter - Database "Database name"** dialog window opens the **Edit filter criterion #** dialog window, in which the filter criterion selected in the filter table can be edited.

Link

Selection of the type of link (logical operator) with the preceding filter criterion.

Selection	**AND** | **OR**
Default value	**AND**

AND
Logical "AND" link.

OR
Logical "OR" link.

Field

Selection of the data field for which a criterion is to be formulated.

Selection	**'Field name'** Filtering is carried out only for the selected field. The 10 most recently selected fields are always available for selection.

[Other…]

Open the **Filter - Field selection** dialog window. In this window, all fields that can be used for filtering are listed in tree form. A field can be included by highlighting it and closing the dialog window with **[OK]**.

Details

Depending on the data field, further list boxes are dynamically created under Details in order to be able to select the desired property.

Condition

Type

Selection of the type of format for fields in which several types are possible. Only this type will be shown for fields with a fixed type.

Selection	**Text** | **Number** | **Date**
Default value	**Text**

Operator

Selection of the comparison operator for the filter criterion.

NOTICE

Some operators are available only for specific fields.

For fields of the type = text

Selection	**=** | **<>** | **empty** | **not empty**
Default value	**=**

For fields of the type = date

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **out of limits** | **Today**
Default value	**=**

invalid
Values with the **invalid** entry are filtered for.

out of limits
Values that are outside of the limit values defined for the selected fields will be filtered for (values shown in red).

Today
A search is made for the current date. In the **Comparative value** field, a range in days can also be defined, according to which filtration should be carried out, starting from the current date.

For fields of the type = number

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **out of limits**
Default value	**=**

invalid
Values with the **invalid** entry are filtered for.

out of limits
Values that are outside of the defined limit values for the selected fields are filtered for (values shown in red).

Comparative value

Selection or entry of the comparative value for the filter criterion. For **Type** = **Date** fields, the date can be selected by clicking on **[...]** in the **Select date** dialog window.

For fields of the type = text

Entry	**256 characters** Definition of a text expression as comparative value. ***** can be used as a wildcard for any character string if the option **Use asterisk (*) as wildcard** is enabled.

For fields of the type = date

Entry	**all possible date values** Definition of a date as comparative value.

For fields of the type = date and operator = today

Input range	**-9,999 to 9,999**
Default value	**0** Definition of a numerical value as a range in days in which, starting from the current date, filtering is to be carried out.

For fields of the type = number

Entry	**all possible numerical values** Definition of a numerical value as comparative value.

Match case

on | off (Default value: **off**)

If this check box is activated, then the filtering of fields of the **Text** type is case-sensitive.

Use asterisk (*) as wildcard

on | off (Default value: **off**)

If this check box is activated then the asterisk ***** can be used as a wildcard for any character strings when filtering **Text**-type fields.

4.5.2.5 Determination overview - Functions

4.5.2.5.1 Rules for electronic signatures

Program parts: **Method / Database**

In tiamo, methods and determination can be **electronically signed** at two levels. The following rules apply for this:

- **Signature levels**
  Methods and determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.
- **Multiple signing**
  Methods and determinations can be signed several times at each level. All signatures are saved and documented in the Audit Trail.
- **Signing at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.
- **Signing at Level 2**
  Level 2 can only be signed if signatures already exist at Level 1.
- **Different users**
  The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
  Each signature must be accompanied by a reason selected from predefined default reasons. Additionally, a further comment can be entered.
- **Saved data**
  For each signature, signature date, user name, full name, reason and comments are saved.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when creating a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Signing methods**
  Methods can only be signed individually.

- **Signature options**
  The options for electronic signatures are set in the **Signatures** tab in the **Security settings** dialog window.

4.5.2.5.2 Signature Level 1

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Signature 1... ▶ Signature Level 1**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Signature 1... ▶ Signature Level 1**

In the window **Signature Level 1**, methods or determinations can be signed at level 1.

NOTICE

Methods or determinations which have been signed at level 1 can be modified and deleted. If the modified method or determination is saved as a new version then all existing signatures will be deleted automatically, i.e. the method or determination must be signed again.

Info

Display of information for signing and deleting signatures. The following messages are possible:

Selection	**Signature possible** | **Signature 1 not possible (signature 2 exists)** | **Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)
The selected method or determination can no longer be signed at level 1 as it has already been signed at level 2.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 1**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 1 if the user belongs to a user group with the corresponding authorization.

4.5.2.5.3 Signature Level 2

Dialog window: **Database ► Determinations ► Sign ► Signature 2... ► Signature Level 2**

Dialog window: **Method ► File ► Method manager... ► Method manager ► [Sign] ► Signature 2... ► Signature Level 2**

In the window **Signature Level 2**, methods or determinations can be signed at level 2.

NOTICE

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be modified nor deleted. In order to be able to edit such methods or determinations again, the signatures on level 2 must first be deleted.

Info

Information for signing and deleting signatures is displayed in this box. The following messages are possible:

Selection	**Signature possible** | **Signature 2 not possible (signature 1 missing)** | **Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)
The selected method or determination cannot be signed at level 2 as it has not yet been signed at level 1.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization.

4.5.2.5.4 Display determination signatures

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Display signatures... ▶ Signatures - Determination 'Determination ID'**

With the menu item **Determinations ▶ Sign ▶ Show signatures...** the window **Signatures - Determination 'Determination ID'** opens with a table in which information about all the signatures for the selected determination is shown.

Signature

Shows at which level the determination has been signed (**Level 1** or **Level 2**).

Signature date

Date and time at which the determination was signed.

User

Short name of the user who signed the determination.

Full name

Full name of the user who signed the determination.

Reason

Reason for signature.

Signature comment

Comment on the signature.

4.5.2.5.5 Delete signatures level 2

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

In the window **Delete Signatures Level 2**, all signatures on level 2 for the selected method or determination can be deleted.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Delete]

Delete signatures 2.

NOTICE

Signatures 2 can only be deleted if the user belongs to a user group with the corresponding authorization.

4.5.2.6 Determinations - Reprocessing

4.5.2.6.1 Reprocessing - General

Dialog window: **Reprocessing**

Reprocessing determinations

The determinations saved in the database can be reprocessed at any time. The variables, methods, statistics and curve evaluation can be modified and the results recalculated. The reprocessed determination can then be saved in the database as a new version.

NOTICE

Determinations signed at level 2 cannot be reprocessed.

Opening the reprocessing window

The reprocessing of determinations that have been selected in the sub-window **Determination overview** takes place in the independent dialog window **Reprocessing** which is opened with **Determinations ► Reprocess...** or the symbol . By default, the first of the selected determinations is always shown when de windows is opened.

Closing the reprocessing window

The dialog window **Reprocessing** is closed with **[OK], [Cancel]** or with the Windows button for closing.

NOTICE

The reprocessing window cannot be closed while recalculations are still running.

4.5.2.6.2 Reprocessing - Window

Dialog window: **Reprocessing**

Subwindows

The dialog window **Reprocessing** contains the following two subwindows that can be enlarged and reduced by dragging the separating bar between them:

- *Modifications*
  Modification of variables, method, statistics, curve evaluation
- *Result view*
  Shows the current results

Functions

If determinations have been modified in the subwindow **Modifications** then the following functions can be triggered:

[Recalculate]

Recalculate the selected determination(s) with the modifications on variables, method, statistics or curve evaluation made in the subwindow **Modifications**.

During recalculation, a progress bar is shown; recalculation can be aborted clicking on next to the progress bar. The results of the recalculation are added automatically to the subwindow **Results view**.

This button is inactive until modifications have actually been made. After the recalculation further data can be modified and then recalculation triggered again.

[Reset]

Reset all modifications made and unsaved during reprocessing to the original data and results.

This button is inactive for as long as no modifications have been made or when the recalculation has not yet been triggered.

[OK]

Close the dialog window **Reprocessing**. Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1**.

This button is inactive for as long as reprocessing has not yet been triggered and if not all of the selected determinations could have been recalculated.

[Cancel] or

Close the dialog window **Reprocessing**. The result of the reprocessing made since the last saving will not be saved.

NOTICE

If the option **Comment on modification of determinations** is enabled under **Configuration ► Tools ► Security settings ► Audit Trail/Modifications**, the dialog window **Modification comment determination** is displayed before saving.

4.5.2.6.3 Reprocessing rules

Dialog window: **Reprocessing**

The following rules apply for reprocessing the selected and modified determinations:

- **Number of determinations**
  No more than 100 determinations (including statistically linked determinations) may be selected for reprocessing.
- **Statistically linked determinations**
  If determinations are selected for reprocessing that are statistically linked with other determinations that have not been selected then these determinations will also be automatically reprocessed when saving and then saved as new versions. Determinations that are statistically linked with each other must always be reprocessed in the same sequence as they were recorded. If no modification is made to a determination then this determination will retain its original determination status (i.e. **original** for non-modified determinations).

NOTICE

If the selected determination belongs to a statistics series still running, the results modified during reprocessing will not be taken into account in the automatically generated reports of the following determinations of the statistics series.

In this case, the end of the statistics series has to be waited for. After this, all determinations of the statistics series contain the right results and the original reports can be printed from the database.

- **Start test**
  During the start test all device tests and device monitoring will be ignored.
- **Special tracks**
  During reprocessing the series start, series end and error tracks are not run through again.

- **Tracks with "Return immediately"**
  If the method contains tracks with the option **Return immediately** enabled, then a warning will appear, that it can no longer be guaranteed that the method will proceed in the same way during reprocessing as during the determination itself.
- **Monitoring** If the method contains monitoring of variables and results then the corresponding messages will be shown and included in the report, but no e-mails will be sent nor will beeps be produced. If one of the two actions **Stop determination** or **Stop determination and series** is enabled, then reprocessing will be canceled.
- **Titration and measuring commands**
  For DET, MET, SET, KFT, KFC, MEAS, CAL MEAS only the evaluations with existing data will be recalculated, all other parameters will be ignored. For commands that generate data, which are carried out during the determination but are no longer carried out during reprocessing, all the existing values will be deleted. If commands that generate data are carried out for the first time during the recalculation then the recalculation will be canceled.
- **Waiting and timeout periods**
  All waiting and timeout periods of commands are set to **0** during recalculating.
- **Non-executed commands**
  The commands REQUEST, WAIT, RECEIVE, SEND, TRANSFER, STIR, SCAN, CTRL, MOVE, SWING, LIFT, PUMP, RACK, HEATER, FLOW, ELT, ADD, LQH, PREP and EMPTY will be run through but not executed.
- **Report commands**
  The command REPORT is run through and a new original report is generated, but the defined output targets will be ignored. The command REPORT only can be executed correctly during reprocessing when the defined report template already has been used by a REPORT command during the regular determination run. If the necessary report template is not existing in the original determination, a message entry is created, the REPORT command is skipped and the reprocessing will be continued.
- **Command variables**
  If a method contains calculations using command variables the determination can only be recalculated correctly if the DATABASE command is executed after the corresponding commands.
- **Solution variables**
  If titrants are modified in the method then their associated variables (e.g. **Titer**, **Slope**) will in any case (even when at the same time the corresponding variables have been modified under **Variables**) be taken from the *(see chapter 6.6.2.1, page 1387)* and updated for the recalculation.

- **Assign titer, common variables and global variables**
  If a determination without statistics is recalculated in which a titer, a common variable or a global variable has been assigned, then the assignment will only take place when the recalculation is confirmed with **[OK]**. If a determination with statistics is recalculated in which a titer, a common variable or a global variable has been assigned, then the assignment with the data of the last recalculated determination will only take place after the recalculation is confirmed with **[OK]**.

4.5.2.6.4 Modifications

4.5.2.6.4.1 Modifications - Overview

Subwindow: **Database ▶ Determination overview ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Modifications**

In the subwindow **Modifications** of the dialog window **Reprocessing** modifications can be made on the following 4 tabs:

- *Variables*
  Modification of the variables used in the selected determination.
- *Method*
  Modification of the method used in the selected determination.
- *Statistics*
  Modification of statistics data.
  The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.
- *Curve evaluation*
  Manual modification of the curve evaluation.
  The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

4.5.2.6.4.2 Modifications - Overview

Subwindow: **Database ▶ Determination overview ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Modifications**

In the subwindow **Modifications** of the dialog window **Reprocessing** modifications can be made on the following 4 tabs:

- *Variables*
  Modification of the variables used in the selected determination.
- *Method*
  Modification of the method used in the selected determination.
- *Statistics*
  Modification of statistics data.
  The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.

- *Curve evaluation*
  Manual modification of the curve evaluation.
  The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

4.5.2.6.4.3 Modifications - Method

Tabs: **Database ► Determination overview ► Determinations ► Reprocess... ► Reprocessing ► Modifications ► Method**

On the tab **Method** the method used in the selected determination and its tracks and commands is displayed. A precondition is that the method is identical for all the selected determinations. The method structure can be modified as required for the recalculation, i.e. all the functions of the Method editor are available.

Method name:

Shows the method name.

Version:

Shows the version of the method. For original methods the additional text **(original)** appears after the version number. As soon as the method has been modified the additional text **(modified)** appears after the version number. This information is saved in the determination data when saving the recalculated determination.

Saved:

Shows the date and time when the method version was saved.

[Save as]

Saves the modified method under the same name or under a new name. If the modified method is saved under the name of an existing method then all the earlier method versions will be deleted and a new version with the number **1** will be generated.

[Modify method]

Open the dialog window **Method editor**. Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands; however, the modified method cannot be directly saved there. If the dialog window is closed with **[OK]**, the method will be checked *(see chapter 5.2.5, page 409)*. The modified method then appears on the tab **Methods** with the addition **(modified)**. This modified method is then applied to the selected determinations with **[Recalculate]** and can be saved at any time with **[Save as]**.

4.5.2.6.4.4 Modifications - Statistics

Tab: **Database ► Determination overview ► Determinations ► Reprocess... ► Reprocessing ► Modifications ► Statistics**

On the tab **Statistics** the single results for the statistics calculation can subsequently be switched on and off.

Results with statistics

Result name

Selection of the statistically evaluated result by using the result name for which the single results of all determinations are shown.

Selection	**Result name**

Table of single results

For the result selected above the following data for the individual determinations is shown:

Determination start

Shows the date and time at which the determination was started.

Version

Shows the version number of the determination.

Sample size

Shows the sample size.

Result value

Shows the result value. The statistics data (mean value, standard deviations, etc.) for the selected determination are listed in the subwindow **Result view** *(see chapter 4.5.2.6.5, page 331)*.

[Determination on/off]

All single results of the selected determination for statistical calculations can be switched off or on. If the determination is switched off then an asterisk (*****) appears behind all result values in the table and the line is shown as inactive (gray); if it is switched on again then the asterisks will disappear. However, updating the statistics data always only takes place with **[Recalculate]**.

[Result on/off]

Switch the selected single result for the statistical calculations off or on. If the result is switched off, an asterisk (*****) appears behind the result value, is it switched on again, the asterisk disappears. However, updating the statistics data always only takes place with **[Recalculate]**.

NOTICE

If the results of a determination are switched off, the statistics for these results will be switched off when this determination is recalculated, i.e. no data for the mean value and standard deviations will be shown. However, the determinations remain statistically linked to each other so that the results can also be switched on again.

4.5.2.6.4.5 Modify variable

Dialog window: **Reprocessing ► Modifications ► Variables ► [Modify] ► Modifiy variable**

In the dialog window **Modify variable** the value of the selected variable is modified.

Variable

Shows the name of the variable.

Value

Value of the variables. With variables of the type **Date** the date must be entered in the dialog window *(see chapter 2.5.1, page 84)*.

Input range	**-1.0E99 to 1.0E99 (max. 15 digits)** (for **Type** = **Number**)
Entry	**100 characters** (for **Type** = **Text**)
Selection	**'Date'** (for **Type** = **Date/Time**)

4.5.2.6.4.6 Curve evaluation

4.5.2.6.4.6.1 Modifications - Curve evaluation

Tab: **Database ► Determinations ► Reprocess... ► Reprocessing ► Modifications ► Curve evaluation**

On the tab **Curve evaluation** the curves that can be manually evaluated are displayed.

Command name

Selection of the measuring command (**command name.index - command type**) for which the curve is to be shown for reprocessing.

Selection	**Command name**

[Edit]

The dialog window **Curve evaluation** opens for manually reprocessing the curve evaluation.

4.5.2.6.4.6.2 Edit curve evaluation

Dialog window: **Database ► Determinations ► Reprocess... ► Reprocessing ► Modifications ► Curve evaluation ► [Edit] ► Curve evaluation**

In the dialog window **Curve evaluation** the evaluation of the selected curve can be reprocessed manually.

In the curve those EP's are indicated, which have values for the dimensions of the x and y axis, i.e. manually set EP's are possibly not indicated.

Command name

Selection	**Command name**

Command name
Selection of the measuring command for which the curve is to be shown for reprocessing.

Toolbar

The toolbar above the curve contains symbols for the following functions for re-evaluation of the curve:

Set EP manually

By moving the mouse a point on the curve is selected. The current X and Y values are shown graphically with a blue cross hair and numerically above the curve in the fields **X** and **Y**. A new endpoint can be set by clicking with the left mouse button. This function is activated as standard when the window **Curve evaluation** is opened.

Set EP with intersection lines

By moving the mouse a point on the curve is selected to which the tangent is automatically applied. The first tangent is set by clicking the left mouse button. The mouse is then used to select a second point to which the second tangent is to be applied. The second tangent is set with clicking the left mouse button and at the same time a new endpoint is set at the point where both tangents intersect.

Set EP with parallel tangents

By moving the mouse a point on the curve is selected to which the tangent is automatically applied. At the same time a tangent parallel to it is applied to the other leg of the curve. The two tangents are set with a click of the left mouse button and at the same time a new endpoint is set at the intersection of the middle line of the two tangents with the curve.

NOTICE

If new endpoints are set manually or by intersection or tangent evaluation or if existing endpoints are deleted then the endpoints will always be renumbered from left to right. During recalculation the automatic evaluations will generally no longer be used for curves, i.e. the endpoints defined in the curve evaluation are retained.

Set horizontal auxiliary lines

By moving the mouse a horizontal auxiliary line is drawn in the graph; this can be set by clicking the left mouse button. This function is only active when under **Curve evaluation ► Properties ► Properties - Curves 1 ► Options** the option **Show evaluation lines** is enabled.

Set vertical auxiliary lines

By moving the mouse a vertical auxiliary line is drawn in the graph; this can be set by clicking the left mouse button. This function is only active when under **Curve evaluation ► Properties ► Properties - Curves 1 ► Options** the option **Show evaluation lines** is enabled.

Delete endpoints and auxiliary lines

With the context-sensitive menu item **Delete EP#** the selected endpoint can be deleted, with **Delete ###.###** the selected auxiliary line can be deleted.

Zooming

By drawing out a rectangle with the left mouse button the selected area can be zoomed.

Reset zoom

The graph will be reset to zoom level 100%.

Copy to clipboard

The content of the curve window is copied to the clipboard.

Define properties for the graph display

The dialog window **Properties - Curves #** is opened for graph display. The curve properties defined for each command type are saved for the reprocessing window per client.

Show EP list

The dialog window **Endpoints** is opened in which all endpoints of the selected curve are displayed in a table. If an endpoint is added to or deleted from the curve then the table will be updated automatically.

Show coordinates

The current coordinates of the cursor are shown in the coordinate display:

X:

X-coordinate.

Y:

Y-coordinate.

4.5.2.6.4.6.3 Curve evaluation - Endpoint list

Dialog window: **Database ► Determinations ► Reprocess... ► Reprocessing ► Modifications ► Curve evaluation ► [Edit] ► Curve evaluation ► Show EP list ► Endpoints**

The dialog window **Endpoints** opened with the icon shows all automatically found and manually set endpoints of the selected curve in tabular form. The endpoints are sorted according to ascending volume, if an endpoint is deleted from or added to the curve then the table will be updated automatically.

Endpoint

Designation of the endpoint with number. The following names are possible:

Selection	**EP#**

EP#
Endpoint that has been determined automatically by potentiometric evaluation or set manually by using the intersection or tangent method.

Selection	**BP#**

BP#
Endpoint that has been determined by automatic break point evaluation.

Selection	**FP#**

FP#
Endpoint that has been determined by automatic fixed point evaluation.

Volume

Volume value in mL for endpoint.

Measured value

Measured value (pH) for endpoint.

ERC

ERC value for the endpoint.

Time

Time for the endpoint.

Temperature

Temperature for the endpoint.

NOTICE

Manually set endpoints only have two measured quantities, for the other measured quantities **invalid** is entered.

[Delete]

Delete selected endpoint.

[Exit]

Close dialog window.

4.5.2.6.4.6.4 Curve evaluation - Properties

4.5.2.6.4.6.4.1 Properties curve evaluation - Overview

Dialog window: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Icon 'Properties and Graphical display' ▶ Properties - 'Curve #'**

The properties of the curve display in the dialog window **Properties - 'Curve #'** can be set on the following 4 tabs:

- *x axis*
  Parameters for the graphical display of the curves on the x axis.
- *y axis*
  Parameters for the graphical display of the curves on the left y axis.
- *y2 axis*
  Parameters for the graphical display of the curves on the right y axis.

- *Options*
  Options for graphical display of curves.

4.5.2.6.4.6.4.2 Properties curve evaluation - x axis

Tab: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties ▶ x axis**

On the tab **x axis** the parameters for the graphical display of the curves on the x axis can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection	**Command-dependent selection**

Command-dependent selection
Selection of the quantity to be shown on the x axis.

Label

Freely definable axis label for the x axis.

Selection	**50 characters** | **auto**
Default value	**auto**

auto
The designation from the field **Size** will be used.

Scaling

Fixed scaling of the x axis between the start value and the end value.

Start value

Initial value for scaling the x axis.

Only editable when the option Autoscaling is disabled.

Input range	**-1.0E12 to 1.0E12**
Default value	**-1.0E12**

End value

End value for scaling the x axis.

Only editable when the option Autoscaling is disabled.

Input range	**-1.0E12 to 1.0E12**
Default value	**1.0E12**

4.5.2.6.4.6.4.3 Properties curve evaluation - y axis

Tab: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties ▶ y axis**

On the tab **y axis** the parameters for the graphical display of the curves on the y axis (left y axis) can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection	**Command-dependent selection**

Command-dependent selection
Selection of the quantiy to be shown on the y axis.

Label

Freely definable axis label for the y axis.

Selection	**50 characters** | **auto**
Default value	**auto**

auto
The designation from the field **Size** will be used.

Scaling

Fixed scaling of the y axis between the start value and the end value.

Start value

Initial value for scaling the y-axis.

Only editable when the option Autoscaling is disabled.

Input range	**-1.0E12 to 1.0E12**
Default value	**-1.0E12**

End value

End value for scaling the y-axis.

Only editable when the option Autoscaling is disabled.

Input range	**-1.0E12 to 1.0E12**
Default value	**1.0E12**

Curve

Curve color

Selection of the color for the curve line.

Selection	**13 colors** | **blue**
Default value	**blue**

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	**5 symbols** | **No symbol**
Default value	**No symbol**

No symbol
Measuring points are not shown.

NOTICE

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	**13 colors** | **blue**
Default value	**blue**

Smoothing

Smoothing

on | off (Default value: **on**)

Switches smoothing on/off for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Smoothing factor y-axis

Factor for smoothing on the y axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Show with original curve

on | off (Default value: **off**)

If this check box is activated, then the original curve (solid line, same color) will be shown in addition to the smoothed curve (dotted line).

4.5.2.6.4.6.4.4 Properties curve evaluation - y2 axis

Tab: **Database ► Determinations ► Reprocess... ► Reprocessing ► Curve evaluation ► [Edit] ► Curve evaluation ► Properties ► y2 axis**

On the tab **y2 axis** the parameters for the graphical display of the curves on the y2 axis (right y axis) can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection	**Command-dependent selection** | **off**
Default value	**off**

Command-dependent selection
Selection of the quantity to be shown on the y2 axis.

Label

Freely definable axis label for the y2 axis.

Selection	**50 characters** | **auto**
Default value	**auto**

auto
The designation from the field **Size** will be used.

Curve

Curve color

Selection of the color for the curve line.

Selection	**13 colors** | **red**
Default value	**red**

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	**5 symbols** | **No symbol**
Default value	**No symbol**

No symbol
Measuring points are not shown.

NOTICE

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	**13 colors** | **red**
Default value	**red**

Smoothing

Smoothing

on | off (Default value: **on**)

Switches smoothing on/off for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Smoothing factor y-axis

Factor for smoothing on the y axis.

Input range	**0.01 to 1000**
Default value	**0.01**

4.5.2.6.4.6.4.5 Properties curve evaluation - Options

Tab: **Database ► Determinations ► Reprocess... ► Reprocessing ► Curve evaluation ► [Edit] ► Curve evaluation ► Properties ► Options**

On the tab **Options** the parameters for the graphical display of the curves can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Display grid

Display grid

on | off (Default value: **off**)

If this check box is actjvated then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Selection	**5 line types**

Grid color

Selection of the grid line color.

Selection	**13 colors** | **gray**
Default value	**gray**

Background

Background color

Selection of the color for the curve background.

Selection	**13 colors** | **white**
Default value	**white**

Show endpoints

Show endpoints

on | off (Default value: **on**)

If this check box is activated then the endpoints found will be shown on the curve by the symbol ♦ and labeled with **EP#** (potentiometric endpoint), **BP#** (break point), **FP#** (fixed endpoint), **HP** (HNP), **MI** (minimum value) or **MA** (maximum value).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	**13 colors** | **black**
Default value	**black**

Manual EPs

Selects the color for manually set endpoints.

Selection	**13 colors** | **pink**
Default value	**pink**

Show evaluation lines

Show evaluation lines

on | off (Default value: **off**)

If this check box is activated the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Selection of the color for the tangents and auxiliary lines.

Selection	**13 colors** | **light green**
Default value	**light green**

Auxiliary lines

Selection of the color for the auxiliary lines.

Selection	**13 colors** | **blue**
Default value	**blue**

4.5.2.6.5 Result view

Subwindow: **Database ► Determinations ► Reprocess... ► Reprocessing ► Result view**

In the subwindow **Result view** of the dialog window **Reprocessing** results and raw data are displayed on the following two tabs:

4.5.2.6.5.1 Result view - Results overview

Tab: **Database ► Determinations ► Reprocess... ► Reprocessing ► Result display ► Result overview**

In the subwindow **Result view** of the dialog window **Reprocessing** the results calculated during the **CALC** commands and the variables used for are displayed and updated with each recalculation.

The following elements are shown for each **CALC** command:

Title

Name of the calculation command.

Result

Result name, result value with defined number of decimal places, result unit.

Statistical evaluations

Results of the statistical evaluation (mean value, absolute and relative standard deviations, number of measured values used for the statistics and statistics set counter).

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between the result view of the individual determinations:

Jump to the first determination.

Jump to the previous determination.

Jump to the next determination.

Jump to the last determination.

NOTICE

If a result value is being monitored and lies inside the limits defined in the **CALC** command then the text will be shown in **green**, if it lies outside the limits the value will be shown in **red**.

4.5.2.6.5.2 Result view - Raw data

Tab: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Result display ▶ Raw data**

On the tab **Raw data** of the subwindow **Result view** the raw data generated in commands with evaluations will be shown and updated at each recalculation.

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between the result view of the individual determinations:

Jump to the first determination.

Jump to the previous determination.

Jump to the next determination.

Jump to the last determination.

4.5.2.6.6 Modification comment for determinations

Dialog window: **Database ▶ Determinations ▶ Delete/Reprocess...**

If the option **Comment on modification** of determinations is switched on in the security settings then before the modified sample data is accepted the window **Modification comment determination** first appears in which a **Reason** must be selected and a **Comment** on the modification must be entered.

Reason

Selection from the default reasons defined for the category **Modifications of determinations** in the **Security settings** dialog window.

Selection	**Selection from default reasons**

Comment

Entry of a comment on the modification of the determinations.

Entry	**1000 characters**

4.5.2.7 Sending determinations to

Dialog window: **Database ► Determinations ► Send to...**

The menu item **Determinations ► Send to...** opens the dialog window **Send determinations per E-mail**.

Selection	**Determination ID** | **Sample identification** | **Name**
Default value	**Determination ID**

Determination ID
The name of the export file is formed out of an unambiguous determination ID, the computer name, the date stamp -**YYYYMMDD-HHMMSS** and the suffix for the format.

Sample identification
Selection of the sample identification. The name of the export file is formed out of this ID, the computer name, the date stamp **YYYYMMDD-HHMMSS** and the suffix for the format. If the created name exists already in the directory, a version number will be appended additionally to the date.

Name
Name under which the export file of a determination is saved as an attachment to the E-mail message. If more than one determination is selected, then a sequential number will be added to this name for each determination.

After each confirmation of the file name with **[OK]** every determination is exported to a separate ***.idet** file. The standard Windows E-mail Client will open with an empty message and the export files will automatically be added as an attachment.

4.5.2.8 Exporting determinations

Dialog window: **Database ► Determinations ► Export... ► Export determinations**

Click on the icon or the **Determinations ► Export...** menu item to open the dialog window **Export determinations** for exporting the selected determinations.

Selection

Selection of determinations for export.

Selection	**All selected data records** | **All filtered data records**
Default value	**All selected data records**

All selected data records
All those determinations are exported that have been selected (marked) in the determination table.

All filtered data records
All those determinations from the whole determination table are exported that correspond to the set filter.

Export template

Selection of the Export template for data export.

Selection	**'Export template'**

4.5.2.9 Importing determinations

Dialog window: **Database ► Determinations ► Import... ► Import determinations**

The icon or the **Determinations ► Import...** menu item opens the **Import determination** dialog window, in which the determinations to be imported must be selected. These determinations are then imported into the open database.

NOTICE

Exported determinations can only be imported in the file format ***.mdet**.

NOTICE

Examples of determinations which can be imported into an open database can be found in the program directory under **...\tiamo\examples\determinations\...**.

4.5.2.10 Deleting determinations

Menu item: **Database ► Determinations ► Delete**

With the symbol or the menu item **Determinations ► Delete**, the selected determinations are deleted after the confirmation request.

NOTICE

If a database is opened simultaneously on several clients and if determinations are deleted on a client then these will still be shown in the determination table of the other clients until the table is updated. All the fields of these determinations will then have the entry **deleted**.

NOTICE

If the check box **Comment on modification of determinations** in the **Security settings** is activated, then the window **Modification comment determination** will appear before the modification is saved.

4.5.2.11 Determination overview - Print

Dialog window: **Database ► File ► Print ► Determination overview... ► Print determination overview (PDF)**

The Menu item **File ► Print ► Determination overview...** opens the dialog window **Print determination overview (PDF)**.

Selection

Selection	**Selected determinations** | **All filtered determinations**
Default value	**Selected determinations**

Selected determinations
If this option is selected, then a list with all determinations that are selected (marked) in the determination table will be produced.

All filtered determinations
If this option is selected, then a list with all the determinations in the determination table that meet the filter criterion will be produced.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
If this option is selected then the determination table will be produced in portrait format.

Landscape
If this option is selected then the determination table will be produced in landscape format.

[OK]

The determination table is produced in the required format as a PDF file and opened directly with Acrobat Reader; it can then be printed out and/or saved.

4.5.2.12 Determinations - Print report

Dialog window: **Database ▶ File ▶ Print ▶ Report... ▶ Report output**

The menu item **File ▶ Print ▶ Report...** opens the dialog window **Report output**.

Selection

Selection	**Selected determinations** | **All filtered determinations**
Default value	**Selected determinations**

Selected determinations
If this option is selected, then the reports will be produced for all determinations that are selected (marked) in the determination table.

All filtered determinations
If this option is selected, then the reports will be produced for all the determinations in the determination table that meet the filter criterion.

Report type

Selection	**Original report(s)** | **Report template**
Default value	**Original report(s)**

Original report(s)
If this option is selected then the reports produced during the determination will appear at the **Output target** defined below.

Report template
If this option is selected then reports according to the selected Report template will be produced at the **Output target** defined below.

NOTICE

Original report is used to refer to a report, which has been automatically generated at the creation of the **determination version**. If a determination is being reprocessed, a new determination version and therefore also a new original report is created.

In order to print the report of the non-reprocessed determination the determination 1 must be selected.

Output target

Printer

on | off (Default value: **on**)

If this check box is activated, the reports are printed on the selected printer.

PDF file

on | off (Default value: **off**)

If this check box is activated the reports are put out as PDF files under the entered file name.

NOTICE

If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

4.5.2.13 Determinations - Show method

Menu item: **Database ▶ Determinations ▶ Show method...**

The menu item **Determinations ▶ Display method...** or the symbol opens the dialog window **Determination method 'Method name'** in which the method used for the selected determination is shown with its tracks and commands.

Show command properties

With a double-click on a command or the context-sensitive menu item **Properties** the properties window of the corresponding command opens in which the parameters are shown.

Zoom

The standard presentation of the determination method shows all the tracks completely. The following zoom levels for the display of the method can be selected with the context-sensitive menu item **Zoom**:

Selection	**200 %** | **150 %** | **100 %** | **75 %** | **50 %** | **25 %** | **Fit to width** | **Fit to height** | **Fit in window**
Default value	**Fit in window**

Fit to width
Adjust to width of the window.

Fit to height
Adjust to height of the window.

Fit in window
Adjust to both height and width of the window.

Saving method

[Save as...]

With this button the determination method can be saved in a method group. The window **Save method** opens in which the method group can be selected and a method name entered or selected.

4.5.2.14 Determinations - Displaying history

Menu item: **Database ▶ Determinations ▶ Show history**

Switch history view on/off

With the menu item **Determinations ▶ Display history...** or the symbol only the currently focused determination in the Determination table as well as all the previous versions of this determination will be shown.

If the History view with the menu item **Determinations ▶ Display history...** or the symbol is disabled again, then the original selection of determinations in the Determination table will appear again.

4.5.2.15 Determinations - Make current

Menu item: **Database ▶ Determinations ▶ Make current**

Make old version current

With the menu item **Determinations ▶ Make current...** or the symbol the determination version selected in the determination table will again be made the current determination version. This creates a new determination whose version number is increased by **+1** compared with the last version to have been saved.

4.5.2.16 Determinations - Showing calibration curve

Dialog window: **Database ▶ Determinations ▶ Show calibration curve... ▶ Calibration curve/Calibration data**

With the menu item **Determinations, Show calibration curve...** or the symbol the calibration or standard addition curve is shown for the determination selected in the dialog window **Calibration curve/Calibration data**.

Calibration curve for CAL LOOP pH

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the calibration curve and calibration data will be displayed for each **CAL LOOP pH** command *(see chapter 5.6.5.12, page 1141)*. The command type is shown above the calibration curve. The curve display shows the measured values and the line calculated from these measured values. Listed below are the individual measured values and the results: **Slope**, **E(0)**, **Variance**.

Calibration curve for CAL LOOP Conc

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the calibration curve and calibration data will be displayed for each **CAL LOOP Conc** command *(see chapter 5.6.5.6, page 1114)*. The command type is shown above the calibration curve. The curve display shows the measured values and the line calcu-

lated from these measured values. Listed below are the individual measured values and the results: **Slope**, **E(0)**, **c(blank)**, **Variance**.

Calibration curve for CAL LOOP Opt

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the calibration curve and calibration data will be displayed for each **CAL LOOP Opt** command. The command type is shown above the calibration curve. The curve display shows the measured values and the line calculated from these measured values. Listed below are the individual measured values and the results: **conc ['Unit']**, **ε[mAU]**, **T [°C]**, **t [s]**, **Standard #**, **Wavelength**, **c0**, **c1**, **c2**, **c3**, **Confidence interval**, **Number of outliers**, **Calibration range**.

Standard addition curve for STDADD

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the standard addition curve and evaluation data will be displayed for each **STDADD** command *(see chapter 5.6.4.17.1, page 1073)*. The command type is shown above the calibration curve. The curve display shows the measured values and the line calculated from these measured values. Listed below are the individual measured values and the results: **Slope**, **pH(0)**, **'Concentration of the measuring ion'**, **Variance**, **Coefficient of determination**.

Calibration data for CAL Cond

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the calibration data will be displayed for each **CAL Cond** command *(see chapter 5.6.5.4.1, page 1102)*. Displayed are the command type, the measured values and the cell constant calculated with these measured values.

Calibration curve for ELT LOOP

In the **Calibration curve/Calibration data** dialog window a tab marked with the command name showing the calibration curve and calibration data will be displayed for each **ELT LOOP** command *(see chapter 5.6.5.8, page 1123)*. The command type is shown above the calibration curve. The curve display shows the measured values and the line calculated from these measured values. Listed below are the individual measured values and the results: **Slope**, **pH(0)**, **Variance**.

NOTICE

Calibration curves cannot be printed out directly from the dialog window **Calibration curve/Calibration data**. Instead, you should use a report with a report template which contains the fixed report *(see chapter 4.4.1.4.3.13, page 243)*.

4.5.2.17 Determinations - Control chart

Dialog window: **Database ► Determinations ► Control chart... ► Control chart**

With the **Determinations, Control chart...** menu item or the symbol the **Control chart - 'Template name'** dialog window opens, in which a control chart containing statistical evaluation (mean value, number of determinations, absolute and relative standard deviation) is shown for the selected determinations according to the loaded template.

Template

Selection	**Default** | **'Template name'**
Default value	**Default**

Default
Selection of the saved templates for control charts *(see chapter 4.4.2.2.1, page 245)*. When the dialog window is opened, the last template to have been loaded will be loaded. If a new template is selected, then the display will be updated automatically.

[Templates]

Opens the **Templates for control charts** dialog window *(see chapter 4.4.2.2.1, page 245)*.

Graph display

Shows the measured values together with warning and intervention limits and statistical values according to the settings of the selected template. If the cursor is moved to a point, then the number, date, value and determination ID appear as a tooltip.

If **Determination number** is selected as x value in the template, then the measured values for the determinations selected in the determination overview will be displayed in equidistant spacing according to the selected sorting. Additionally, the sorting and, for the first and last point, the date and time are shown as the legend.

If **Date/Time** is selected as x value in the template, then the measured values for the determinations selected in the determination overview will be displayed chronologically starting with the earliest determination. The time difference to the earliest determination is shown on the x axis (automatically in minutes, hours or days).

[Print (PDF)]

Opens the **Print control chart (PDF)** *(see chapter 4.5.2.20, page 343)* dialog window. The content of the control chart can be shown as a PDF file in the required format.

4.5.2.18 Determinations - Overlay curves

Menu item: **Database** ▶ **Determinations** ▶ **Overlay curves…** ▶ **Overlay curves**

The **Determinations, Overlay curves…** menu item or the symbol opens the **Overlay curves** dialog window, in which overlaid curves of the selected determinations are shown according to the loaded template.

Template

Selection of a saved template for showing overlaying curves.

Selection	**Standard** | **"Template"** | **Last saved template**
Default value	**Last saved template** If a new template is selected, then the display will be updated automatically.

NOTICE

The **Command type** for which the overlaying of curves is possible is defined in the template. Curves from the selected determinations can only be overlaid when the determination method contains a command with this **Command type** (e.g. **DET**).

Command name

Selection of the command whose curves are to be displayed with the selected template.

Selection	**"Command"** This selection is only necessary if the method contains several commands of the same **Command type**.

[Templates]

Opens the **Curve overlay templates** dialog window.

Graph display

Shows the curves according to the settings of the selected template. The command type (e.g. **DET pH**) is shown centrally above the graph. At the right of the curve the legend is shown with the line number in the determination table belonging to the determination.

The legend consists of the content of a data field which can be defined in the options of the template and of a counter identifying the curves if the same command has been executed several times during a determination.

[Print (PDF)]

Opens the **Print curves (PDF)** *(see chapter 4.5.2.19, page 343)* dialog window. The content of the curve overlay with legend can be shown as a PDF file in the required format.

4.5.2.19 Printing overlaid curves

Dialog window: **Database ► Determinations ► Overlay curves… ► Overlay curves ► [Print (PDF)] ► Print curves (PDF)**

With **[Print (PDF)]** in the **Overlay curves** dialog window, the **Print curves (PDF)** dialog window is opened.

Orientation

Selection	**Portrait format** | **Landscape format**
Default value	**Landscape format**

Portrait format
Print overlaid curves in portrait format.

Landscape format
Print overlaid curves in landscape format.

Comment

Possibility of entering comments on the overlaid curves which will be produced along with it.

Entry	**1,000 characters**

[OK]

Closes the dialog window. The overlaid curves are output in the required format as a PDF file and opened directly with Acrobat Reader; it can then be printed and/or saved.

4.5.2.20 Print control chart

Dialog window:Database ► Determinations ► Control chart... ► Control chart ► [Print (PDF)] ► Print control chart (PDF)

In the dialog window **Print control chart (PDF)** the format for the printout of the control chart is indicated.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Landscape**

Portrait
Produces control chart in portrait format.

Landscape
Produces control chart in landscape format.

Comment

Possibility of entering comments on the control chart which will be produced together with the control chart.

Entry	**1000 characters**

[OK]

The control chart is shown in the required format as a PDF file and opened directly with the Acrobat Reader; it can then be printed out and/or saved.

4.6 Subwindow Information

4.6.1 Information - Overview

Subwindow: **Database ▶ Information**

General

In the subwindow **Information** general information about the focused determination in the determination table is shown. The subwindow can be switched on in the program part **Database** during the definition of the layout and thus made visible. It can be enlarged and reduced as required; it can also be maximized.

Tabs

Information about the determination is shown on the following tabs:

- *Determination*
  Display of general information about the determination.
- *Method*
  Display of general information about the method used.
- *Sample*
  Display of general information about the sample used.
- *Configuration*
  Display of general information about the devices, sensors and common variables used.
- *Messages*
  Display of messages about the determination.
- *Determination comment*
  Display of the comment on the determination.

4.6.2 Information - Determination

Tab: **Database ▶ Information ▶ Determination**

Display of general information about the determination.

Identification

Information about the identification of the determination.

Determination ID:

Unambiguous and unmistakable identification for the determination.

Server name:

Computer name of the server to which the client was connected when the determination was recorded.

Computer name:

Name of the computer the determination has been recorded with.

Sample number:

Display of the **Sample number** entered in the run window.

Start counter:

Display of the start counter which is increased by +1 at the start of each determination. The start counter is saved for each client and cannot be reset.

Recording

Information about recording the determination.

Determination start:

Date and time at start of determination.

Duration of determination:

Duration of the determination from its start to its end or termination in s.

Determination run:

Way in which the determination has been ended:

Selection	**regular without remarks** | **regular with remarks** | **stop** | **stop by error**

regular without remarks
The determination has been finished automatically after the method has been processed normally and without any remarks.

regular with remarks
The determination has been finished automatically after the method has been processed normally but with remarks.

stop
The determination has been canceled manually with **[Stop]**, by a stop criterion or with a **SEND** command.

stop by error
The determination has been canceled automatically due to an error.

User (short name):

Short name of the user.

NOTICE

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings *(see chapter 6.2.2.2, page 1315)*.

Active	User who started the determination.
Inactive	User logged in when finishing determination.

User (full name):

Full name of the user.

NOTICE

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings *(see chapter 6.2.2.2, page 1315)*.

Active	User who started the determination.
Inactive	User logged in when finishing determination.

Remarks:

Display of the **Remarks** about the determination entered in the run window of the workplace.

Program version:

Display of program version and build number of **tiamo** with which the determination has been recorded.

License ID:

Display of the license serial number with which the determination has been recorded.

Status/Version

Information about the determination version.

Determination status:

Selection	**original** | **modified**

original
Determination data unaltered.

modified
Determination data modified.

Determination version:

Version of the determination. The unaltered original determination has the version number **1**, reprocessed determinations have a version number **>1**.

Reprocessing date:

Date and time when the reprocessed determination version was saved.

Reprocessed by (short name):

Short name of the user logged in when the determination has been reprocessed. If a new version has been generated automatically by reprocessing statistically linked determinations without modification of determination data, *tiamo* will be displayed here.

Reprocessed by (full name):

Full name of the user logged in when the determination has been reprocessed. If a new version has been generated automatically by reprocessing statistically linked determinations without modification of determination data, **New generated version for statistics** will be displayed here.

Reprocessed with program version:

Display of program version and build number of **tiamo** the determination has been reprocessed with.

Modification reason determination:

Reason for the determination modification.

Modification comment determination:

User comment on the determination modification.

Signature Level #

Information about the signatures at level 1 or level 2 in chronological order.

Signature date:

Date and time at which the determination was signed.

Signed by (short name):

Short name of the user who has signed the determination.

Signed by (full name):

Full name of the user who has signed the determination.

Signature reason:

Reason for signature selected by the user.

Signature comment:

User comment on signing the determination.

4.6.3 Information - Method

Tab: **Database ► Information ► Method**

Display of general information about the method used.

Identification

Information about the identification of the method.

Method name:

Name of the method.

Method group:

Name of the method group to which the method belonged at the moment of the determination.

Method ID:

Unambiguous and unmistakable identification for the method.

Method comment:

Method comment (**Command comment** on **START** command).

Status/Version

Information about method version.

Method status:

Selection	**original** | **modified (live)** | **modified (reprocessed)**

original
Method when creating the determination.

modified (live)
Method has been modified live.

modified (reprocessed)
Method has been reprocessed.

Method version:

Version of the method the determination has been created with.

Method saving date:

Date and time when the modified method version was saved.

Method saved by (short name):

Short name of the user logged in when the modified method has been saved.

Method saved by (full name):

Full name of the user logged in when the modified method has been saved.

Modification reason method:

Reason for the modification of the method.

Modification comment method:

User comment for the modification of the method.

Signature Level #

Information about the signatures at level 1 or level 2 in chronological order.

Signature date:

Date and time at which the method was signed.

Signed by (short name):

Short name of the user who has signed the method.

Signed by (full name):

Full name of the user who has signed the method.

Signature reason:

Reason for signature selected by user.

Signature comment:

User comment on signing the method.

4.6.4 Information - Sample

Tab: **Database ► Information ► Sample**

Display of general information about the sample used.

Sample data

Information about the sample. The only sample data shown is that for which a value is available.

Sample size:

Value of the sample size.

Sample size unit:

Unit of the sample size.

Input date:

Date and time at which the sample size was entered.

Data source:

Data source for the sample size: for manual input **manual** is shown, for automatic input from a balance or barcode reader the corresponding device name, for data import from a file the corresponding file name.

NOTICE

For Sartorius balances with their own data memory, the memory number shown in parentheses will be shown in addition to the balance name (e.g. **M-# 429**).

Sample position:

Position of the sample.

Identifications

Information about the sample identifications.

ID1…ID16:

Display of the sample identifications entered for the sample. The identifications will only be shown when a value is present.

NOTICE

If for the method variables assigned to the sample data variables **ID1 … ID16, Sample size, Sample size unit, Sample position** a different name is defined in the **START** command then the title shown here will consist of this name with the standard name shown in brackets (e.g. **Batch (ID2)**).

Live modification

Information on the last live modification of sample data.

Modification reason sample data:

Reason for the sample data modification.

Modification comment sample data:

User comment for the modification of the sample data.

4.6.5 Information - Configuration

Tab: **Database ► Information ► Configuration**

Display of general information about the devices, sensors and common variables used.

Device 'Device name'

Information about the device used (only the existing device information will be shown).

Device type:

Type of device.

Program version:

Device program version.

Device serial number:

Serial number of the device.

Rack name:

Name of the rack on the sample changer.

Rack code:

Rack code of the rack on the sample changer.

Tower:

Number of the tower on which a Swing Head is used.

Swing Head type:

Type of Swing Head connected to the tower.

Swing Head serial number:

Serial number of the Swing Head connected to the tower.

Measuring input:

Number of the measuring input (+ designation **iConnect** for intelligent sensors).

ADC type:

Type of the analog/digital converter.

ADC serial number:

Serial number of measuring input.

Temperature sensor:

Type of the connected temperature sensor.

Stirrer:

Stirrer connector at device.

Stirrer type:

Type of stirrer.

Serial number:

Serial number of the stirrer.

Dosing device:

Dosing connector at device.

Dosing device type:

Dosing device type.

Dosing device serial number:

Serial number of the dosing device.

Solution name:

Name of the solution.

Concentration:

Concentration value and unit of the solution.

Production date:

Date at which the solution was produced.

Titer:

Titer value and unit of the solution at the start of the determination.

Date titer det.:

Date of the titer determination.

Titer method:

Method with which the titer has been determined.

Exchange/Dosing unit:

Type of exchange or dosing unit.

Name:

Designation of the exchange or dosing unit.

Order number:

Order number of the exchange or dosing unit.

Serial number:

Serial number of the exchange or dosing unit.

Cylinder volume:

Cylinder volume of the exchange or dosing unit.

Cylinder serial number:

Serial number of the cylinder.

Remote Box:

Connector at device.

Oven program version:

Program version of the oven module.

Oven serial number:

Serial number of the oven module.

Detector type:

Type of the detector built in the spectrometer.

Date dark/reference spectrum:

Date and time of the recording of the dark spectrum and the reference spectrum.

User dark/reference spectrum:

User logged in during recording the dark spectrum and the reference spectrum.

Method dark/reference spectrum:

Method with which the dark spectrum and the reference spectrum have been recorded.

Determination ID dark/reference spectrum:

Determination in which the dark spectrum and reference spectrum have been recorded.

Date calibration:

Date and time of the wavelength calibration of the spectrometer.

User calibration:

User logged in during wavelength calibration of the spectrometer.

Method calibration:

Method with which the wavelength calibration of the spectrometer has been carried out.

Determination ID calibration:

Determination in which the wavelength calibration of the spectrometer has been carried out.

Sensor 'Sensor name'

Information about the sensor used.

Sensor type:

Type of sensor (+ designation **IS** for intelligent sensors).

Ion:

Ion and valency for ISE electrodes.

Order number:

Order number of the sensor.

Sensor serial number:

Serial number of the sensor.

Device:

Name of the device the sensor is connected to.

Measuring input:

Number of the measuring input to which the sensor is connected (+ designation **iConnect** for intelligent sensors).

Slope:

Electrode slope of the sensor used (in % for pH sensor or in mV for ISE).

E (0):

Electrode zero point of the sensor used (in mV only for ISE).

pH (0):

Electrode zero point of the sensor used (dimensionless for pH sensor).

c (blank):

Blank value of the ISE sensor used.

Cell constant:

Cell constant of the conductivity sensor used.

Calibration temperature:

Temperature during the calibration.

Calibration date:

Display of date and time of the last calibration.

Calibration method:

Display of the method the calibration has been carried out with.

User:

Display of the user logged in during the calibration or who entered the calibration data manually.

Measuring input:

Display of the measuring input the calibration has been carried out with.

a ... e:

Display of the calibration data a ... e (for the Thermoprobe only).

Common variable 'Name'

Information about the common variable used.

Value:

Value and unit of the common variables after the last value assignment.

Assignment date:

Date and time of last value assignment.

Assignment method:

Method with which the value has been assigned.

Global variable 'Name'

Information about the global variable used.

Value:

Value and unit of the global variables after the last value assignment.

Assignment date:

Date and time of last value assignment.

Assignment method:

Method with which the value has been assigned.

Sample solution (TC conductivity) 'Name'

Information about the sample solution used.

Assignment date:

Date and time of last value assignment.

Assignment method:

Method with which the value has been assigned.

Start temperature:

Temperature at the start of the determination of the temperature coefficient:

Stop temperature:

Temperature at the end of the determination of the temperature coefficient.

c0:

Coefficient zeroth-order of the Chebyshev polynomial.

c1:

Coefficient first-order of the Chebyshev polynomial.

c2:

Coefficient second-order of the Chebyshev polynomial.

c3:

Coefficient third-order of the Chebyshev polynomial.

c4:

Coefficient fourth-order of the Chebyshev polynomial.

User:

Name of the user logged in at the start of the determination.

Measuring input:

Shows the type of measuring input and serial number (e.g. 1.845.0010 11458 for iConnect).

Determination ID:

Unambiguous and unmistakable identification for the determination.

Colorimetric sensor

Information about the colorimetric sensor used.

Wavelength:

Wavelength at which the calibration of the instrument has been carried out.

c0:

Calibration coefficient zeroth-order.

c1:

Calibration coefficient first-order.

c2:

Calibration coefficient second-order.

c3:

Calibration coefficient third-order.

Confidence interval:

Measured values for the determination of the calibration curve must lie within the confidence interval. Values outside this range are called outliers, they are not integrated in the calculation of the calibration coefficient.

Number of outliers:

Number of outliers (values outside the confidence interval).

Coefficient of determination:

Coefficient of determination (R^2), calculated using the calibration function and the confidence interval.

R^2 defines the amount of the scattering of y (absorbance) which can be explained by x (concentration), its values are between **0** and **1**. The closer R^2 is to 1, the greater the probability of a linear dependence between x and y. If $R^2 = 0$, there is no correlation. 5 decimal places are shown.

Calibration range:

Minimum and maximum concentration of the calibration solution. Within this range, the calibration curve shows a monotonously rising or falling function. This value cannot be changed. It is defined by the method and corresponds with the range between the first and the last calibration point used.

Concentration unit:

Concentration unit for the upper and the lower limit value of the calibration range.

Calibration temperature:

Temperature during the calibration. The display also shows whether the temperature was measured with a Pt1000 or an NTC temperature sensor or entered manually.

Calibration date:

Display of date and time of the last calibration entered after each automatic calibration or manual entry.

Calibration method:

Display of the method name with which the last calibration has been carried out. If the calibration data has been entered manually, then **manual** will appear here.

User:

Display of the short name of the user logged in during the calibration or who entered the calibration data manually. If work is not carried out using login, then the user logged in under Windows will be entered automatically.

4.6.6 Information - Messages

Tab: **Database ► Information ► Messages**

Display of messages generated during the determination run.

'Time'

Display of the time at which the message was generated in the run (date, time, UTC in the format **YYYY-MM-DD hh:mm:ss UTC.....**).

Message title:

Display of message title and number.

Message text:

Display of the message.

Message source:

Shows from where the message comes:

Selection	**Program** | **Track 'track name' - command 'command name'**

Program
Message that cannot be assigned to a particular command.

Track 'track name' - command 'command name'
Message produced by a command during the run.

4.6.7 Information - Determination comment

Tab: **Database ► Information ► Determination comment**

Display of the comment on the determination.

Determination comment:

Display of the comment entered for the determination.

4.7 Subwindow Results

4.7.1 Results - General

Subwindow: **Database ► Results**

In the subwindow **Results** in the program part **Database** the results calculated in the calculation commands and the variables used for are shown. It shows the results overview, the raw data of the commands with evaluations as well as the results calculated in the calculation commands, statistical evaluations, formulas and all variables used for for the determination selected in the determination overview.

When navigating in the determination overview this data will be updated automatically (with a certain delay).

The subwindow **Results** can be switched on and made visible in the definition of the layout in the program part **Database**. It can be enlarged and reduced as required; it can also be maximized.

Tabs

The results of the determination are shown on the following tabs:

- *Results overview*
  Shows the results overview for all calculation commands.
- *Raw data*
  Display of evaluation raw data for commands with evaluations.
- *"Command name"*
  Show the results for a single calculation command. A tab with the corresponding command name is provided for each calculation command.

4.7.2 Results - Results overview

Tab: **Database ► Result ► Results overview**

On the tab **Results overview** the results for all calculation commands and (if existent and desired) the corresponding statistical evaluations are displayed. The display of the statistical evaluations can be selected in the dialog window **Properties result window**

Command "Command name"

For each **CALC** command a results overview is shown according to the following pattern:

"Command name"

Name of the **CALC** command.

NOTICE

Only the last results having been calculated will be shown. For example, if there are several commands that generate a result with the same name, then the corresponding result data will be shown only for that command that was the last to calculate the result. Nothing will be shown for the other commands.

"Result"

Shows the result name and result value with the defined number of decimal places and units.

NOTICE

If a result value is monitored and lies within the limit value defined in the CALC command then the text will be shown in green, if it lies outside the limits it will be shown in red text color.

Mean value:

Shows the mean value for statistically evaluated results.

s(abs):

Shows the absolute standard deviation for statistically evaluated results.

s(rel):

Shows the relative standard deviation for statistically evaluated results.

Minimum:

Shows the minimum value for statistically evaluated results.

Maximum:

Shows the maximum value for statistically evaluated results.

n:

Shows the number of measurements for statistically evaluated results.

4.7.3 Results - Raw data

Tab: **Database ▶ Results ▶ Results**

On the tab **Raw data** the evaluation results of commands with evaluations are shown.

"Command name"

For each CALC command the raw data is displayed in six columns:

Column 1

Display of the command type.

Column 2

Display of the variable designation for the raw data.

Columns 3-6

Display of the raw data.

The following tables show the raw data depending on the command type. For each variable the **Variable name**, **Unit** and **Number of decimal places** is indicated.

Table 1 Command DET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **pH**, **3**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **pH**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **pH**, **3**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **pH**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **pH**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **pH**, **3**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **pH**, **3**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 2 Command DET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **mV**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **mV**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 3 Command DET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **mV**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **mV**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 4 Command DET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **µA**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **µA**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **µA**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **µA**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **µA**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **µA**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **µA**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 5 Command MET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **pH**, **3**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **pH**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **pH**, **3**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **pH**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **pH**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **pH**, **3**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **pH**, **3**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 6 Command MET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **mV**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **mV**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 7 Command MET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **mV**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **mV**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 8 Command MET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **µA**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **µA**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
HP#	**HP#.VOL**, **mL**, **4**	**HP#.MEA**, **µA**, **1**	**HP#.TIM**, **s**, **1**	**HP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **µA**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **µA**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **µA**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**
GP	**GP.VOL**, **mL**, **4**	**GP.MEA**, **µA**, **1**	**GP.TIM**, **s**, **1**.	**GP.TEM**, **°C**, **1**

Table 9 Command MET Cond

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mS/cm**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mS/cm**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mS/cm**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mS/cm**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**
BP#	**BP#.VOL**, **mL**, **4**	**BP#.MEA**, **mS/cm**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**

Table 10 Command SET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **pH**, **3**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **pH**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **pH**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **pH**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 11 Command SET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 12 Command SET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **mV**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 13 Command SET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	**EP#.VOL**, **mL**, **4**	**EP#.MEA**, **µA**, **1**	**EP#.TIM**, **s**, **1**	**EP#.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **µA**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **µA**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **µA**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 14 Command KFT Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	**EP.VOL**, **mL**, **4**	**EP.MEA**, **mV**, **1**	**EP.TIM**, **s**, **1**	**EP.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 15 Command KFT Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	**EP.VOL**, **mL**, **4**	**EP.MEA**, **µA**, **1**	**EP.TIM**, **s**, **1**	**EP.TEM**, **°C**, **1**
DRI	**DRI**, **µL/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **µA**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **µA**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **µA**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 16 Command KFC

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	**EP.MEA**, **mV**, **1**	**EP.QTY**, **µg**, **1**	**EP.TIM**, **s**, **1**	**EP.TEM**, **°C**, **1**
DRI	**DRI**, **µg/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.MEA**, **mV**, **1**	**FP#.QTY**, **µg**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**

Table 17 Command BRC

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	**EP.MEA**, **mV**, **1**	**EP.QTY**, **µg**, **1**	**EP.TIM**, **s**, **1**	**EP.TEM**, **°C**, **1**
DRI	**DRI**, **µg/min**, **1**			
DTI	**DTI**, **s**, **1**			
FP#	**FP#.MEA**, **mV**, **1**	**FP#.QTY**, **µg**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**

Table 18 Command STAT pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	**MR.MRT**, **mL/min**, **4**	**MR.MRS**, **mL/min**, **4**	**MR.MRC**, **'empty'**, **3**	
RE#	**RE#.DRT**, **mL/min**, **4**	**RE#.DRS**, **mL/min**, **4**	**RE#.DRC** , **'empty'**, **3**	
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **pH**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **pH**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **pH**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 19 Command STAT U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	**MR.MRT**, **mL/min**, **4**	**MR.MRS**, **mL/min**, **4**	**MR.MRC**, **'empty'**, **3**	
RE#	**RE#.DRT**, **mL/min**, **4**	**RE#.DRS**, **mL/min**, **4**	**RE#.DRC**, **'empty'**, **3**	
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **mV**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **mV**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **mV**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**

Table 20 Command TET

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	**EP.VOL**, **mL**, **4**	**EP.MEA**, **°C**, **3**	**EP.TIM**, **s**, **1**	
FP#	**FP#.VOL**, **mL**, **4**	**FP#.MEA**, **°C**, **3**	**FP#.TIM**, **s**, **1**	
MI	**MI.VOL**, **mL**, **4**	**MI.MEA**, **°C**, **3**	**MI.TIM**, **s**, **1**	
MA	**MA.VOL**, **mL**, **4**	**MA.MEA**, **°C**, **3**	**MA.TIM**, **s**, **1**	

Table 21 Command MEAS pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **pH**, **3**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **pH**, **3**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **pH**, **3**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **pH**, **3**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **pH**, **3**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 22 Command MEAS U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **mV**, **1**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 23 Command MEAS Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **mV**, **1**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **mV**, **1**	**FP#.TIM**, **s**,**1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **mV**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **mV**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **mV**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 24 Command MEAS Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **µA**, **1**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **µA**, **1**	**FP#.TIM**, **s**,**1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **µA**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **µA**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **µA**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 25 Command MEAS T

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **°C**, **1**			
FP#	**FP#.MEA**, **°C**, **3**	**FP#.TIM**, **s**, **1**		
MI	**MI.MEA**, **°C**, **1**	**MI.TIM**, **s**, **1**		
MA	**MA.MEA**, **°C**, **1**	**MA.TIM**, **s**, **1**		
BP#	**BP#.MEA**, **°C**, **1**	**BP#.TIM**, **s**, **1**		

Table 26 Command MEAS T/Flow

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **°C**, **1**			
EGF	**EGF**, **mL/min**, **1**			
MI	**MI.MEA**, **°C**, **1**	**MI.GFL**, **mL/min**, **1**	**MI.TIM**, **s**, **1**	
MA	**MA.MEA**, **°C**, **3**	**MA.GFL**, **mL/min**, **1**	**MA.TIM**, **s**, **1**	

Table 27 Command MEAS Conc

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **'selected unit'**, **3**			
ETE	**ETE**, **°C**, **1**			

Table 28 Command MEAS Cond

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **mS/cm**, **4**			
RTE	**RTE**, **°C**, **1**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **mS/cm**, **4**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **mS/cm**, **4**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **mS/cm**, **4**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **mS/cm**, **4**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 29 Command MEAS TC Cond

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
TC	**TC.MIN**, **%/°C**, **2**	**TC.MAX**, **%/°C**, **2**		

Table 30 Command MEAS Ref

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
PK#	**PK#.WVL**, **nm**, **1**	**PK#.MEA**, **mAU**, **1**		

Table 31 Command MEAS TMF

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **mAU**, **1**			
ETE	**ETE**, **°C**, **1**			
TMF	**TMF**, , **4**			

Table 32 Command MEAS Spec

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
PK#	**PK#.WVL**, **nm**, **1**	**PK#.MEA**, **mAU**, **1**		

Table 33 Command MEAS Opt

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **mAU**, **1**			
ETE	**ETE**, **°C**, **1**			
FP#	**FP#.MEA**, **mAU**, **1**	**FP#.TIM**, **s**, **1**	**FP#.TEM**, **°C**, **1**	
MI	**MI.MEA**, **mAU**, **1**	**MI.TIM**, **s**, **1**	**MI.TEM**, **°C**, **1**	
MA	**MA.MEA**, **mAU**, **1**	**MA.TIM**, **s**, **1**	**MA.TEM**, **°C**, **1**	
BP#	**BP#.MEA**, **mAU**, **1**	**BP#.TIM**, **s**, **1**	**BP#.TEM**, **°C**, **1**	

Table 34 Command MEAS Opt Conc

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	**EME**, **'selected unit'**, **1**			
ETE	**ETE**, **°C**, **1**			

Table 35 Command CAL LOOP pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	**SLO**, **%**, **1**			
ENP	**ENP**, **–**, **3**			

Table 36 Command CAL LOOP Conc

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	**SLO**, **mV**, **1**			
ENP	**ENP**, **–**, **3**			
BLV	**BLV**, **'unit from configuration'**, **2**			

Table 37 Command CAL Cond

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
CLC	**CLC**, **/cm**, **3**			
RTE	**RTE**, **°C**, **1**			

Table 38 Command CAL Spec

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
CP#	**CP#.REF**, **nm**, **1**	**CP#.MEA**, **nm**, **1**	**± CP#.TOL**, **nm**, **1**	
C0	**C0**, **–**, **4**			
C1	**C1**, **–**, **16**			
C2	**C2**, **–**, **16**			
C3	**C3**, **–**, **16**			

Table 39 Command ELT LOOP

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	**SLO**, **%**, **1**			
ENP	**ENP**, **–**, **3**			

Table 40 Command CAL LOOP Opt

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
COR	**COR**, **–**, **1**			
OUT	**OUT**, **–**, **1**			
C0	**C0**, **–**, **16**			
C1	**C1**, **–**, **16**			
C2	**C2**, **–**, **16**			
C3	**C3**, **–**, **16**			

Table 41 Command STDADD

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	**SLO**, **mV**, **1**			
ENP	**ENP**, **mV**, **1**			
RES	**RES**, **'selected unit'**, **1**			
VAR	**VAR**, **'empty'**, **3**			

Table 42 Command DOS pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	**MR.MRT**, **mL/min**, **4**	**MR.MRS**, **mL/min**, **4**	**MR.MRC**, **'empty'**, **3**	

Table 43 Command DOS U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	**MR.MRT**, **mL/min**, **4**	**MR.MRS**, **mL/min**, **4**	**MR.MRC**, **'empty'**, **3**	

4.7.4 Results - Calculation

Tab: **Database ▶ Results ▶ Command name**

For each calculation command the results and (if existent and desired) the corresponding statistical evaluations are displayed on a separate tab **Calculation_#**. The sequence of the shown results corresponds to that defined in the calculation command. The display of the statistical evaluations can be selected in the dialog window **Properties result window**

For every single result a maximum of the following information is displayed:

Result "Result name"

Result "Result name"

Display of the result with variable name.

NOTICE

Only the last results having been calculated will be shown. For example, if there are several commands that generate a result with the same name, then the corresponding result data will be shown only for that command that was the last to calculate the result. Nothing will be shown for the other commands.

"Result"

Shows the result name and result value with the defined number of decimal places and units.

NOTICE

If a result value is monitored and lies within the limit value defined in the CALC command then the text will be shown in green, if it lies outside the limits it will be shown in red text color.

Mean value:

Shows the mean value for statistically evaluated results.

s(abs):

Shows the absolute standard deviation for statistically evaluated results.

s(rel):

Shows the relative standard deviation for statistically evaluated results.

Minimum:

Shows the minimum value for statistically evaluated results.

Maximum:

Shows the maximum value for statistically evaluated results.

n:

Shows the number of measurements for statistically evaluated results.

Assignment:

Assigns the result to one of the result columns **RS01**...**RS25** in the **Determination overview**.

Formula:

Shows the formula used for calculating the result.

'Variable name':

'Displays the variables used in the formula.

NOTICE

Variables that have not been created during the determination are not displayed and lead to invalid results.

4.7.5 Results - Properties

Dialog window **Database ► View ► Properties ► Properties ► Properties result window**

In the dialog window **Properties result window** the information to be displayed in the result window can be selected.

Display for results overview

Selection of the information to be displayed on the tab **Results overview**.

Results

on | off (Default value: **on**)

Shows all results.

Statistics

on | off (Default value: **off**)

Shows the statistics results.

Display for calculation commands

Selection of the information to be displayed on the tabs **Calculation_#**.

Results

on | off (Default value: **on**)

Shows the results defined in the calculation command.

Statistics

on | off (Default value: **off**)

Shows the statistics results.

Assignment

on | off (Default value: **on**)

Shows the assignment.

Formula

on | off (Default value: **on**)

Shows the calculation formula.

Variables

on | off (Default value: **off**)

Displays the variables used in the formula.

4.8 Subwindow Curves

4.8.1 Curves - General

Subwindow: **Database ▶ Curves**

Subwindow Curves

The subwindows **Curves 1...5** are subwindows in the program part **Database**, in which the measuring points generated by the measuring commands for the focused determination in the **Determination table** are shown as a graph. When navigating in the determination overview this data will be updated automatically (with a certain delay).

The subwindows **Curves 1...5** can be switched on in the program part **Database** during the definition of the layout and thus made visible. They can be enlarged and reduced as required; they can also be maximized.

Tabs

In the curve window a tab with the corresponding command name and the run index (e.g. **Chloride.1**) is provided for each run of a measuring command; their sequence is determined by the method.

Display of curves

The curves of the selected determination are shown on the tabs with the properties defined per window and per command type. The command type (e.g. **DET pH**) is shown above the left-hand y axis.

Curves can be **zoomed** as often as required by spanning a section of the curve display with the left mouse button pressed down. Zooming can be undone with a double-click on the section of the graph or with the context-sensitive menu command **Show All**.

NOTICE

When a new determination is selected the complete curve is always shown, i.e. the zoom range is not retained when the determination is changed.

Curves can be copied into the clipboard with the context-sensitive menu command **Copy graphics**.

The curves for the command **MET Cond** and for the evaluation of conductivity are automatically shown with tangents. However, only when plotting **Measured value** against **Volume** or **Volume** against **Measured value**.

Display of the monitoring report

With the context-sensitive menu item **Monitoring report…** in the curve window the dialog window **Monitoring report - 'Command name'** opens for displaying the measuring point list with the selected curve.

The column **Monitoring** is displayed as default for **STAT** and **DOS** commands and can contain the following entries:

Selection	**_Meas.v.** | **¯Meas.v.** | **_Dos.r.** | **¯Dos.r.** | **_Temp.** | **¯Temp.** | *****
Default value	*****

_Meas.v.
Lower limit value for measured value monitoring infringed.

¯Meas.v.
Upper limit value for measured value monitoring infringed.

_Dos.r.
Lower limit value for dosing rate monitoring infringed.

¯Dos.r.
Upper limit value for dosing rate monitoring infringed.

_Temp.
Lower limit value for temperature monitoring infringed.

¯Temp.
Upper limit value for temperature monitoring infringed.

***
The dosing has been paused.

4.8.2 Curves - Measuring point list

Subwindow: **Database ► Curves**

With the context-sensitive menu item **Measuring point list…** in the curve window the dialog window **Measuring point list - 'Command name.#'** opens for showing the measuring point list for the selected curve.

The display of the measuring points in the table can be defined per window and per command type in the **Properties - Curve #**.

4.8.3 Curves - Monitoring report

Subwindow: **Database ► Curves**

If the method contains commands of the type **STAT** or **DOS**, then with the context-sensitive menu item **Monitoring report…** in the curve window the dialog window **Monitoring report - 'Command name'** can be opened. In this window information on limit violations occurred are displayed for each monitoring switched on.

The following columns are displayed:

Time [s]

Time in s until limit violation.

Limit

Selection	**lower** | **upper** | **ok**

lower
Lower limit value exceeded.

upper
Upper limit value exceeded.

ok
Measured value within the limits again.

[pH]/[U]

Limit for the measured value.

Meas.v. [pH]/Meas.v. [U]

Measured value at limit violation time.

Volume [mL]

Dosed volume at limit violation time.

Temp. [°C]

Temperature at limit violation time.

Action

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**

Cancel determination
The running **STAT** command has been canceled, then the determination has been finished.

Cancel command (Titrando only)
The running **STAT** command has been canceled, then the next command has been carried out.

Wait for [Continue]
Reagent dosing in the running **STAT** command has been interrupted until it has been continued by a manual command.

Wait for limit ok
Reagent dosing in the running **STAT** command has been interrupted until the monitored measured value has been within the limits again (including hysteresis). Afterwards reagent dosing has been resumed automatically.

none
No action has been carried out.

4.8.4 Properties

4.8.4.1 Curve properties - Overview

Dialog window: **Database ▶ Curves ▶ Properties curves #**

The properties for the display of curves can be set on the following tabs:

- *x axis*
  Parameters for the graphical display of the curves on the x axis.
- *y1 axis*
  Parameters for the graphical display of the curves on the y1 axis (left-hand y axis).
- *y2 axis*
  Parameters for the graphical display of the curves on the y2 axis (right-hand y axis).

- *Options*
  Options for the graphical display of curves.
- *Measuring point list*
  Parameters for the display of the measuring point list.

4.8.4.2 Curve properties - x axis

Tab: **Database ► Curves ► Properties curves # ► x axis**

Parameters for the graphical display of the curves on the x axis.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS TMF** | **MEAS Spec** | **MEAS Opt** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

NOTICE

When the dialog window is opened, those **Command type** will be selected per default which applies for the curve shown in the curve window.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Selection of the quantity to be shown on the x axis.

For DET commands

Selection	**Volume [mL]** | **Measured value** | **ERC** | **Time [s]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3**
Default value	**Volume [mL]**

For MET commands

Selection	**Volume [mL]** | **Measured value** | **dMW** | **Time [s]** | **Temperature [°C]** | **Calculated 1…3** | **External 1…3**
Default value	**Volume [mL]**

For SET, STAT, DOS and KFT commands

Selection	**Time [s]** | **Measured value** | **Volume [mL]** | **dV/dt [µL/min]** | **Temperature [°C]** | **Calculated 1…3** | **External 1…3**
Default value	**Time [s]**

For KFC commands

Selection	**Time [s]** | **Measured value** | **Amount [µg]** | **Charge [mAs]** | **Drift [µg/min]** | **dV/dt [µ/min]** | **Ugen** | **Igen [mA]** | **Calculated 1…3** | **External 1…3**
Default value	**Time [s]**

For BRC commands

Selection	**Time [s]** | **Measured value** | **Amount [µg]** | **Charge [mAs]** | **Drift [µg/min]** | **dV/dt [µ/min]** | **Ugen** | **Igen [mA]** | **Calculated 1…3** | **External 1…3**
Default value	**Time [s]**

For TET commands

Selection	**Volume [mL]** | **Measured value [°C]** | **dT/dV [°C/mL]** | **ERC** | **Time [s]** | **Calculated 1…3** | **External 1…3**
Default value	**Volume [mL]**

For MEAS commands

Selection	**Time [s]** | **Measured value** | **dMW/dt** | **Temperature [°C]** | **Calculated 1…3** | **External 1…3**
Default value	**Time [s]**

For MEAS T/Flow commands

Selection	**Time [s]** | **Measured value** | **Flow [mL/min]** | **Calculated 1…3** | **External 1…3**
Default value	**Time [s]**

For MEAS TC Cond commands

Selection	**Temperature [°C]** | **Measured value** | **Time [s]** | **dMW/dt** | **Calculated 1…3** | **External 1…3**
Default value	**Temperature [°C]**

For MEAS Ref commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Transmission [%]** | **Saturated pixels**
Default value	**Wavelength [nm]**

For MEAS TMF commands

Selection	**Time [s]** | **Transmission [%]** | **Absorbance [mAU]** | **dε/dt [mAU/min]** | **Temperature [°C]**
Default value	**Time [s]**

For MEAS Spec commands

Selection	**Wavelength [nm]** | **Absorbance [mAU]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Intensity Ref [Counts]** | **Transmission [%]** | **Saturated pixels**
Default value	**Wavelength [nm]**

For MEAS Opt commands

Selection	**Time [s]** | **Measured value** | **Intensity [Counts]** | **Transmission [%]** | **Saturated pixels** | **Temperature [°C]** | **dε/dt [mAU/min]** | **Calculated 1...3** | **External 1...3**
Default value	**Time [s]**

For CAL Spec-commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Saturated pixels**
Default value	**Wavelength [nm]**

Label

Freely definable axis label for the x axis. With **auto** the designation from the field **Size** will be used.

Selection	**50 characters** | **auto**
Default value	**auto**

Scaling

Start value

Initial value for scaling the x axis.

Only editable when autoscaling is deactivated.

Input range	**-1.0E12 to 1.0E12**
Default value	**-1.0E12**

End value

End value for scaling the x axis.

Only editable when autoscaling is deactivated.

Input range	**-1.0E12 to 1.0E12**
Default value	**1.0E12**

4.8.4.3 Curve properties - y1 axis

Tab: **Database ► Curves ► Properties curves # ► y1 axis**

Parameters for the graphical display of the curves on the y1 axis (left-hand y axis).

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS TMF** | **MEAS Spec** | **MEAS Opt** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

NOTICE

When the dialog window is opened, those **Command type** will be selected per default which applies for the curve shown in the curve window.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Selection of the quantity to be shown on the y1 axis.

For DET commands

Selection	**Volume [mL]** | **Measured value** | **ERC** | **Time [s]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

For MET commands

Selection	**Volume [mL]** | **Measured value** | **dMW** | **Time [s]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

For SET, STAT, DOS and KFT commands

Selection	**Time [s]** | **Measured value** | **Volume [mL]** | **dV/dt [µL/min]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3**
Default value	**Volume [mL]**

For KFC commands

Selection	**Time [s]** | **Measured value** | **Amount [µg]** | **Charge [mAs]** | **Drift [µg/min]** | **dV/dt [µ/min]** | **Ugen** | **Igen [mA]** | **Calculated 1...3** | **External 1...3**
Default value	**Amount [µg]**

For BRC commands

Selection	**Time [s]** | **Measured value** | **Amount [µg]** | **Charge [mAs]** | **Drift [µg/min]** | **dV/dt [µ/min]** | **Ugen** | **Igen [mA]** | **Calculated 1...3** | **External 1...3**
Default value	**Amount [µg]**

For TET commands

Selection	**Volume [mL]** | **Measured value [°C]** | **dT/dV [°C/mL]** | **ERC** | **Time [s]** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value [°C]**

For MEAS commands

Selection	**Time [s]** | **Measured value** | **dMW/dt** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

For MEAS T/Flow commands

Selection	**Time [s]** | **Measured value** | **Flow [mL/min]** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

For MEAS TC Cond commands

Selection	**Temperature [°C]** | **Measured value** | **Time [s]** | **dMW/dt** | **Calculated 1...3** | **External 1...3**
Default value	**Measured value**

For MEAS Ref commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Transmission [%]** | **Saturated pixels**
Default value	**Intensity [Counts]**

For MEAS TMF commands

Selection	**Time [s]** | **Transmission [%]** | **Absorbance [mAU]** | **dε/dt [mAU/min]** | **Temperature [°C]**
Default value	**Transmission [%]**

For MEAS Spec commands

Selection	**Wavelength [nm]** | **Absorbance [mAU]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Intensity Ref [Counts]** | **Transmission [%]** | **Saturated pixels**
Default value	**Absorbance [mAU]**

For MEAS Opt commands

Selection	**Time [s]** | **Measured value** | **Intensity [Counts]** | **Transmission [%]** | **Saturated pixels** | **Temperature [°C]** | **dε/dt [mAU/min]** | **Calculated 1…3** | **External 1…3**
Default value	**Measured value**

For CAL Spec-commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Saturated pixels**
Default value	**Intensity [Counts]**

Label

Freely definable axis label for the y1 axis. With **auto** the designation from the field **Size** will be used.

Selection	**50 characters** | **auto**
Default value	**auto**

Scaling

Start value

Initial value for scaling the y1 axis.

Only editable when autoscaling is deactivated.

Input range	**-1.0E12 to 1.0E12**
Default value	**-1.0E12**

End value

End value for scaling the y1 axis.

Only editable when autoscaling is deactivated.

Input range	**-1.0E12 to 1.0E12**
Default value	**1.0E12**

Curve

Curve color

Selection of a color for the line of the curve.

Selection	**13 colors** | **blue**
Default value	**blue**

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	● | ✕ | ✷ | ■ | ▲ | **no symbol**
Default value	**no symbol**

no symbol
Measuring points are not shown.

NOTICE

With curves, for which the distance between two measuring points is smaller than 5 pixels, the individual measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can perhaps be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	**13 colors** | **blue**
Default value	**blue**

Smoothing

Smoothing

on | off (Default value: **on**)

Activates/Deactivates smoothing for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Smoothing factor y-axis

Factor for smoothing on the y axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Show with original curve

on | off (Default value: **off**)

If this check box is activated, then the original curve (solid line, same color) will be shown in addition to the smoothed curve (dotted line).

4.8.4.4 Curve properties - y2 axis

Tab: **Database ► Curves ► Properties curves # ► y2 axis**

Parameters for the graphical display of the curves on the y2 axis (right-hand y axis).

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS TMF** | **MEAS Spec** | **MEAS Opt** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

NOTICE

When the dialog window is opened, those **Command type** will be selected per default which applies for the curve shown in the curve window.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Selection of the quantity to be shown on the y2 axis.

For DET commands

Selection	**Volume [mL]** | **Measured value** | **ERC** | **Time [s]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For MET commands

Selection	**Volume [mL]** | **Measured value** | **dMW** | **Time [s]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For SET, STAT, DOS and KFT commands

Selection	**Time [s]** | **Measured value** | **Volume [mL]** | **dV/dt [µL/min]** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For KFC commands

Selection	**Time [s]** | **Measured value** | **Charge [mAs]** | **Amount [µg]** | **Drift [µg/min]** | **Ugen** | **Igen [mA]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For BRC commands

Selection	**Time [s]** | **Measured value** | **Amount [mAs]** | **Water [µg]** | **Drift [µg/min]** | **Ugen** | **Igen [mA]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For TET commands

Selection	**Volume [mL]** | **Measured value [°C]** | **dT/dV [°C/mL]** | **ERC** | **Time [s]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For MEAS commands

Selection	**Time [s]** | **Measured value** | **dMW/dt** | **Temperature [°C]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For MEAS T/Flow commands

Selection	**Time [s]** | **Measured value** | **Flow [mL/min]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For MEAS TC Cond commands

Selection	**Temperature [°C]** | **Measured value** | **Time [s]** | **dMW/dt** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For MEAS Ref commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Transmission [%]** | **Saturated pixels** | **off**
Default value	**off**

For MEAS TMF commands

Selection	**Time [s]** | **Transmission [%]** | **Absorbance [mAU]** | **dε/dt [mAU/min]** | **Temperature [°C]** | **off**
Default value	**off**

For MEAS Spec commands

Selection	**Wavelength [nm]** | **Absorbance [mAU]** | **Intensity [Counts]** | **Intensity Dark [Counts]** | **Intensity Ref [Counts]** | **Transmission [%]** | **Saturated pixels** | **off**
Default value	**off**

For MEAS Opt commands

Selection	**Time [s]** | **Measured value** | **Intensity [Counts]** | **Transmission [%]** | **Saturated pixels** | **Temperature [°C]** | **dε/dt [mAU/min]** | **Calculated 1...3** | **External 1...3** | **off**
Default value	**off**

For CAL Spec-commands

Selection	**Wavelength [nm]** | **Intensity [Counts]** | **Saturated pixels** | **off**
Default value	**off**

Label

Freely definable axis label for the y1 axis. With **auto** the designation from the field **Size** will be used.

Selection	**50 characters** | **auto**
Default value	**auto**

Curve

Curve color

Selection of a color for the line of the curve.

Selection	**13 colors** | **pink**
Default value	**pink**

Symbol

Selection of the symbol for the display of the individual measuring points.

Not editable for MEAS Ref and MEAS Spec commands

Selection	**5 symbols** | **no symbol**
Default value	**no symbol**

no symbol
Measuring points are not shown.

NOTICE

With curves, for which the distance between two measuring points is smaller than 5 pixels, the individual measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can perhaps be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Not editable for MEAS Ref and MEAS Spec commands

Selection	**13 colors** | **pink**
Default value	**pink**

Smoothing

Smoothing

on | off (Default value: **on**)

Activates/Deactivates smoothing for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Input range	**0.01 to 1000**
Default value	**0.01**

Smoothing factor y-axis

Factor for smoothing on the y axis.

Input range	**0.01 to 1000**
Default value	**0.01**

4.8.4.5 Curve properties - Options

Tab: **Database ▶ Curves ▶ Properties curves # ▶ Options**

Options for the graphical display of curves.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS TMF** | **MEAS Spec** | **MEAS Opt** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

NOTICE

When the dialog window is opened, those **Command type** will be selected per default which applies for the curve shown in the curve window.

Autoscaling

on | off (Default value: **on**)

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Displaying the grid

Display grid

on | off (Default value: **off**)

If this check box is activated then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Selection	**Line types** | **dotted**
Default value	**dotted**

Grid color

Selection of the color for the grid lines.

Selection	**13 colors** | **gray**
Default value	**gray**

Background

Background color

Selection of the color for the curve background.

Selection	**13 colors** | **white**
Default value	**white**

Showing the endpoints

Show endpoints

on | off (Default value: **on**)

If this check box is activated then the endpoints found will be shown on the curve by the symbol ♦ and labeled with **EP#** (potentiometric endpoints), **BP#** (break point), **FP#** (fixed endpoint), **HP** (HNP), **MI** (minimum value) or **MA** (maximum value).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	**13 colors** | **black**
Default value	**black**

Manual EPs

Selection of the color for manually set endpoints.

Selection	**13 colors** | **pink**
Default value	**pink**

Showing evaluation lines

Show evaluation lines

on | off (Default value: **off**)

If this check box is activated the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Selection of the color for the tangents and evaluation lines.

Selection	**13 colors** | **light green**
Default value	**light green**

Auxiliary lines

Selection of a color for the auxiliary lines.

Selection	**13 colors** | **blue**
Default value	**blue**

4.8.4.6 Curve properties - Measuring point list

Tab: **Database ► Curves ► Properties curves # ► Measuring point list**

Parameters for the display of the measuring point list.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	**DET** | **MET** | **SET** | **MEAS** | **MEAS T/Flow** | **MEAS TC Cond** | **MEAS Ref** | **MEAS TMF** | **MEAS Spec** | **MEAS Opt** | **CAL Spec** | **KFT** | **KFC** | **BRC** | **STAT** | **DOS** | **TET**
Default value	**DET**

NOTICE

When the dialog window is opened, those **Command type** will be selected per default which applies for the curve shown in the curve window.

Autoscaling

on | off (Default value: **on**)

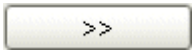
If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Available columns

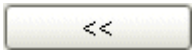
Display of all fields that can be displayed as columns in the measuring point list. The display depends on the command type.

Displayed columns

Display of all fields that will be displayed as columns in the measuring point list.



Adds the selected column to the measuring point list.



Removes the selected column from the measuring point list.

Modifies the sequence of displayed columns by moving the selected column up and down.

5 Method

5.1 Method - General

5.1.1 Method - Definition

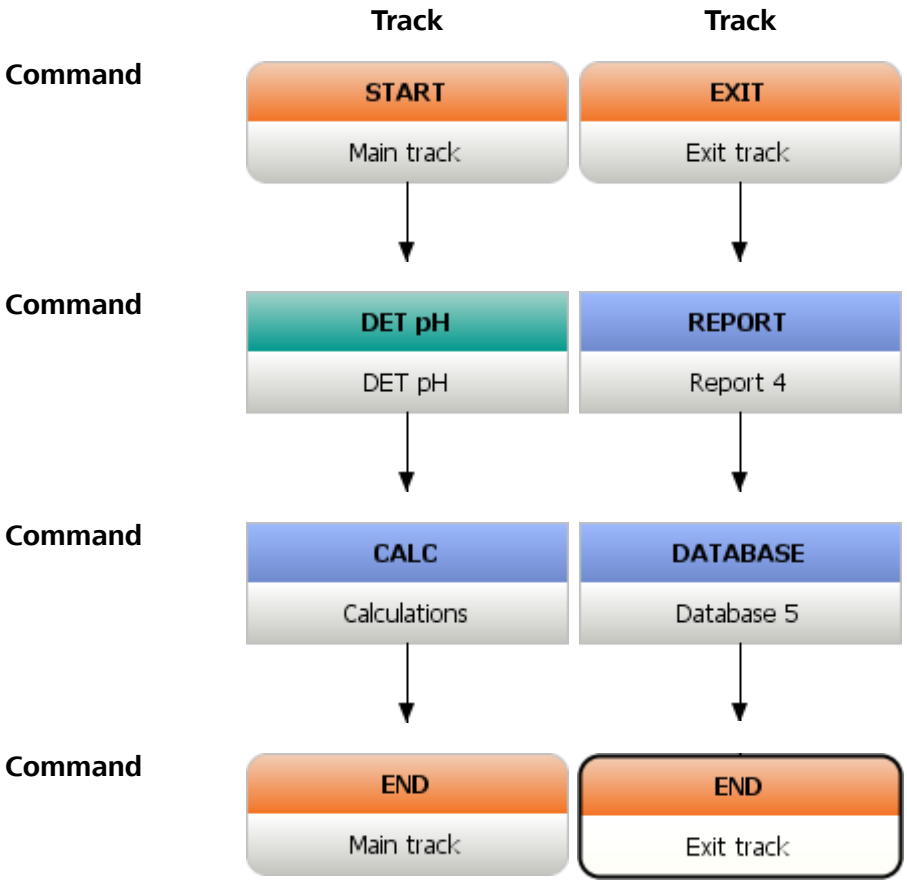
Program part: **Method**

Definition

In **tiamo** a **method** is an instruction for processing a sample, which can be created in the program part **Method** and be started in the program part **Workplace**.

Structure

Each method contains **tracks** consisting of individual **commands**.



Management

Methods are organized in **Method groups** and are always automatically assigned a new version i.e. each time a method is stored a new **version** is created. Methods can also be **signed at two levels** and be locked

against further modifications. Methods are stored in the **configuration database** and globally accessible for all clients.

5.1.2 Method - Desktop

Program part: **Method**

Method symbol

Clicking on the method symbol in the vertical bar on the left opens the program part **Method** while, at the same time the method symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of methods currently opened *(see chapter 5.2.3, page 402)*.

Elements

The desktop of the program part **Method** comprises the following elements:

- Method-specific menu bar.
- Method-specific toolbar.
- Main window, in which several methods can be opened but only two methods can be shown at the same time.

5.1.3 Method - Menu bar

5.1.3.1 Method - Main menus

Program part: **Method**

The menu bar in the program part **Method** contains the following main items:

- *File*
  Create, open, save, close, check, manage, print methods; logout.
- *Edit*
  Define method properties, recalculate calibration data, update calibration data and chromatograms.
- *View*
  Switch the toolbar on and off.
- *Insert*
  Command, track.
- *Help*
  Open tiamo help, display information on the program.

5.1.3.2 Method - Menu File

Program part: **Method**

New...	Create a new method *(see chapter 5.2.1, page 400)*.
Open...	Open an existing method *(see chapter 5.2.2, page 400)*.
Save	Save the selected method *(see chapter 5.2.6, page 409)*.
Save as...	Save the selected method under a new name *(see chapter 5.2.6, page 409)*.
Close all	Close all opened methods *(see chapter 5.2.9, page 412)*.
Close	Close the selected method *(see chapter 5.2.9, page 412)*.
Method check	Check the selected method for plausibility *(see chapter 5.2.5, page 409)*.
Method manager...	Open the method manager *(see chapter 5.3.1, page 413)*.
Method groups...	Open the method groups manager *(see chapter 5.4.1, page 424)*.
Print (PDF)	PDF file output of the method report *(see chapter 5.2.8, page 412)*.
Logout...	Log out the user. The dialog window **Login** opens *(see chapter 2.2.3, page 17)*.
Exit	Exit the program.
1 'Method name'	Open the selected method.

5.1.3.3 Method - Menu Edit

Program part: **Method**

Properties...	Open the properties window of the command selected in the method *(see chapter 5.2.4.2.8, page 408)*.
Undo:	Undo the last modification of the method.
Restore:	Restore the last undone modification of the method.
Cut	Cut the selected elements (commands, tracks) and copy them to the clipboard.
Copy	Copy the selected elements (commands, tracks) to the clipboard.

Insert	Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
Delete	Delete the selected elements (commands, tracks).
Comment...	Newly enter or edit a comment on the selected command *(see chapter 5.2.4.2.9, page 408)*.

5.1.3.4 Method - Menu View

Program part: **Method**

Split vertically	Split method window vertically and display two methods side by side *(see chapter 5.2.3.2, page 403)*.
Split horizontally	Split method window horizontally and display two methods below each other *(see chapter 5.2.3.3, page 403)*.
Unsplit	Undo the splitting of the method window *(see chapter 5.2.3.1, page 403)*.
Toolbar	Switch the toolbar display on/off.

5.1.3.5 Method - Menu Insert

Program part: **Method**

New command...	Insert a new command above the selected command *(see chapter 5.2.4.2.1, page 406)*.
New track...	Insert a new track on the right hand side of the selected track *(see chapter 5.2.4.1.1, page 404)*.

5.1.3.6 Menu Help

Program parts: **Workplace / Database / Method / Configuration**

tiamo Help	Open tiamo Help.
About	Display information about the program and the installation.

5.1.4 Method - Toolbar

Program part: **Method**

New...	Create a new method *(see chapter 5.2.1, page 400)*.
Open...	Open an existing method *(see chapter 5.2.2, page 400)*.

Save	Save the selected method *(see chapter 5.2.6, page 409)*.
Close	Close the selected method *(see chapter 5.2.9, page 412)*.
Method manager...	Open the method manager *(see chapter 5.3.1, page 413)*.
Method groups...	Open the method groups manager *(see chapter 5.4.1, page 424)*.
Print (PDF)	PDF file output of the method report *(see chapter 5.2.8, page 412)*.
Method check	Check the selected method for plausibility *(see chapter 5.2.5, page 409)*.
Properties...	Open the properties window of the command selected in the method *(see chapter 5.2.4.2.8, page 408)*.
Undo:	Undo the last modification of the method.
Restore:	Restore the last undone modification of the method.
Cut	Cut the selected elements (commands, tracks) and copy them to the clipboard.
Copy	Copy the selected elements (commands, tracks) to the clipboard.
Insert	Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
Delete	Delete the selected elements (commands, tracks).
Comment...	Newly enter or edit a comment on the selected command *(see chapter 5.2.4.2.9, page 408)*.
New command...	Insert a new command above the selected command *(see chapter 5.2.4.2.1, page 406)*.
New track...	Insert a new track on the right hand side of the selected track *(see chapter 5.2.4.1.1, page 404)*.
100 % **Zoom method**	Selection of the zoom level *(see chapter 5.2.3.4, page 403)*.
Manual control	Manual control of the connected devices *(see chapter 8.1, page 1610)*.
Split vertically	Split method window vertically and display two methods side by side *(see chapter 5.2.3.2, page 403)*.

Split horizontally	Split method window horizontally and display two methods below each other *(see chapter 5.2.3.3, page 403)*.
Unsplit	Undo the splitting of the method window *(see chapter 5.2.3.1, page 403)*.
Logout...	Logout user *(see chapter 2.2.3, page 17)*.
tiamo Help	Open *tiamo* Help.

5.1.5 Method - Functions

Program part: **Method**

In the program part **Method**, the following functions can be carried out:

Method editor

- *Creating a new method*
- *Opening a method*
- *Select method*
- *Editing tracks*
- *Checking a method*
- *Saving a method*
- *Closing a method*

Managing methods

- *Managing methods*
- *Renaming a method*
- *Copying a method*
- *Moving a method*
- *Deleting a method*
- *Exporting a method*
- *Importing a method*
- *Signing methods*
- *Showing the method history*

Managing method groups

- *Managing methods*
- *Edit method groups*

5.2 Method editor

5.2.1 Creating a new method

Menu item: **Method ► File ► New...**

The icon or the **File ► New...** menu item opens the **New method** window, in which a method template can be selected for the new method.

Templates

Selection	**Method templates** | **Empty method**
Default value	**Empty method**

Method templates
Selection of a method template as a basis for creating a new method.

Empty method
A template containing only the **START** and **END** commands is loaded.

Description

Description of the selected method template.

[OK]

Opens the selected template for editing.

5.2.2 Opening a method

Menu item: **Method ► File ► Open...**

The icon or the **File ► Open** menu item opens the **Open method** window. One of the globally available methods can be selected and opened.

Method group

Method group

Selection of the method group whose methods are to be displayed in the method table *(see chapter 5.4.1, page 424)*.

Selection	**Method groups** | **Main group**
Default value	**Main group**

Method table

The method table contains information about all methods of the selected method group. The table cannot be edited. The table can be sorted according to the selected column (columns **Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) in either ascending or descending order by clicking on the column title.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who saved the method.

Version

Version number of the method.

Signed

Shows whether and at which level the method has been signed.

Selection	**no** | **Level 1** | **Level 2**

no
The method has not been signed yet. It can be opened for editing and can be deleted.

Level 1
The method has been signed electronically at level 1. It can be opened for editing and can be deleted. If the method is modified and saved again, a new version is created and all the signatures will be deleted.

Level 2
The method has been signed electronically at level 2. The method is locked now and it can neither be opened for editing nor deleted.

Method comment

Comment on the method entered as *(see chapter 5.2.4.2.9, page 408)* in the **START** command.

Opening a method

Method name

Name of the method to be opened. If a method is selected from the table, the method name will be entered automatically in this field. It can, however, also be entered manually.

Entry	**50 characters**

[Open]

Opens the selected method in the main window in the place of the method that is already opened. The method name is displayed in the title

bar of the program; the number of currently opened methods is displayed in the left upper corner of the method icon.

NOTICE

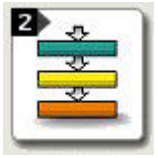
A maximum of nine methods can be opened, but only two can be displayed at the same time *(see chapter 5.2.3.1, page 403)*.

5.2.3 Select method

The number of the currently opened methods is displayed in the left upper corner of the method symbol. If 2 or more methods are opened, then these two methods, which can displayed either *(see chapter 5.2.3.2, page 403)* or *(see chapter 5.2.3.3, page 403)* in the main window, can be selected with the aid of the method symbol.

No method is opened. No method is displayed in the main window.

One method is opened and is displayed in the main window.



Two methods are opened. Normally only one method is displayed in the main window but the option exists of displaying two methods at once, either *next to one another (see Chapter 5.2.3.2, page 403)* or *one below the other (see Chapter 5.2.3.3, page 403)*.

A menu with the currently opened methods is displayed by clicking with either the left or right mouse button on the method symbol. The methods displayed in the main window are marked with a checkmark. Clicking on the desired method displays it in the place of the previously selected one.

5.2.3.1 Display single method

Menu item: **Method ► View ► Unsplit**

In the default settings, the most recently opened method is displayed singularly in the main window. If the display of two methods is switched on, the display can be changed to only one method with the icon or the menu item **View ► Unsplit**.

5.2.3.2 Display methods next to one another

Menu item: **Method ► View ► Split vertically**

With the symbol or the menu item **View ► Split vertically**, two methods are displayed next to one another in the main window.

5.2.3.3 Display method one below the other

Menu item: **Method ► View ► One below the other**

With the symbol or the menu item **View ► Split horizontally** two methods are displayed one below the other in the main window.

5.2.3.4 Zoom for methods

Context-sensitive menu item: **Zoom**

The following zoom levels for the display of the method can be selected either with the context-sensitive menu item **Zoom** or with the icon

:

Selection	**200 %** Zooms in the view to 200%.
Selection	**150 %** Zooms in the view to 150%.
Selection	**100 %** Adjusts view to 100%.
Selection	**75 %** Zooms out of the view to 75%.
Selection	**50 %** Zooms out of the view to 50%.
Selection	**25 %** Zooms out of the view to 25%.
Selection	**Fit to width** Adjust to width of the window.
Selection	**To height** Adjust to height of the window.

Selection	**Fit to window** Adjust to both height and width of the window.

5.2.4 Editing a method

5.2.4.1 Edit tracks

The following functions for tracks are available for a method currently opened in the main window:

5.2.4.1.1 Insert new track

Menu item: **Method ► Insert ► New track...**

With the icon or the menu item **Insert ► New track...** the window **New track** opens for selection of the desired track type:

- *Normal track*
- *Series start track*
- *Series end track*
- *Exit track*
- *Error track*

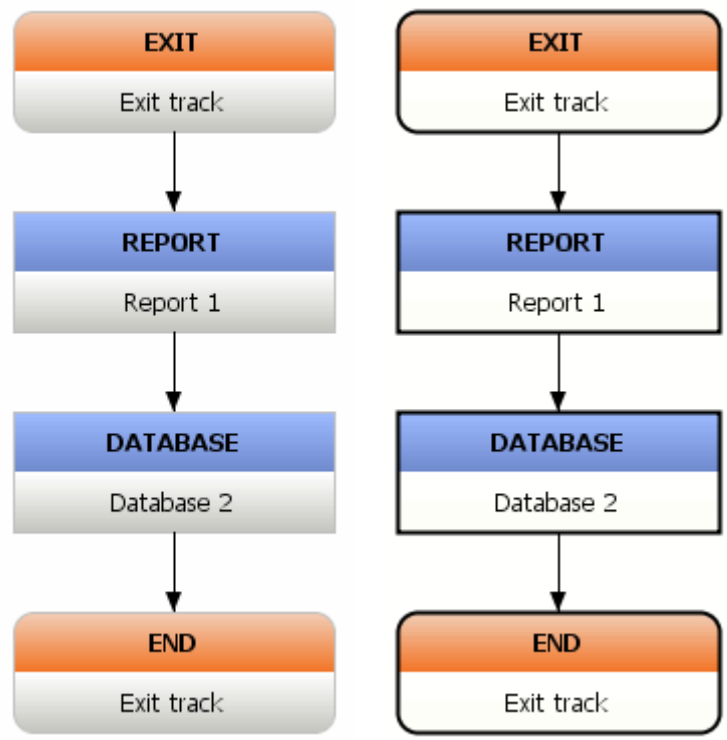
The new track is inserted to the right of the selected track after confirming the selection with **[OK]**.

5.2.4.1.2 Select track

Program part: **Method ► Method window**

A track is being selected with a left mouse-click onto the start command of the track. All commands of the track are selected, indicated by a black border.

Non-selected track **Selected track**



5.2.4.1.3 Move track

Program part: **Method** ▶ **Method window**

Move track with Drag&Drop

To move a track with Drag&Drop it has to be selected first. It can then be moved to the desired position with left mouse button pressed. A red vertical arrow indicates the possible positions.

Move track via the clipboard

To move a track via the clipboard it has to be cut first. It can then be inserted to the right of the selected track.

5.2.4.1.4 Copy track

Program part: **Method** ▶ **Method window**

Copy track with Drag&Drop

To copy a track with Drag&Drop it has to be selected first and can then be copied to the desired position with left mouse button and Ctrl key simultaneously pressed. A red vertical arrow indicates the possible positions.

Copy track to the clipboard

The selected track is copied to the clipboard with **Edit** ▶ **Copy**, the context-sensitive menu item **Copy** or with the icon .

5.2.4.1.5 Cut track

Menu item: **Method ▶ Edit ▶ Cut**

The selected track is moved to the clipboard with **Edit ▶ Cut**, the context-sensitive menu item **Cut** or with the icon .

5.2.4.1.6 Insert track

Menu item: **Method ▶ Edit ▶ Insert**

The track copied to the clipboard is inserted to the right of the selected track with **Edit ▶ Paste**, the context-sensitive menu item **Paste** or with the icon .

5.2.4.1.7 Delete track

Menu item: **Method ▶ Edit ▶ Delete**

The selected track is deleted with **Edit ▶ Delete**, the context-sensitive menu item **Delete**, with the icon or with the Delete key.

5.2.4.2 Editing commands

The following processing functions for commands are available for a method currently opened in the main window:

5.2.4.2.1 Insert a new command

Menu item: **Method ▶ Insert ▶ New command...**

With the icon or with the menu item **Insert ▶ New command...**, the window **New command** is opened, in which the desired command can be selected out of the following categories:

- **Titration**
  DET, *MET*, *SET*, *KFT*, *KFC*, *BRC*, *STAT*, *TET*
- **Measuring**
  MEAS, *STDADD*
- **Calibrating**
  CAL LOOP pH, *CAL MEAS pH*, *CAL LOOP Conc*, *CAL MEAS Conc*, *CAL Cond*, *CAL Spec*, *CAL LOOP Opt*, *CAL MEAS Opt*, *ELT LOOP*, *ELT MEAS*
- **Dosing**
  ADD, *DOS*, *LQH*, *PREP*, *EMPTY*, *RLS DOS*
- **Automation**
  MOVE, *SWING*, *LIFT*, *PUMP*, *STIR*, *RACK*, *HEATER*, *FLOW*, *RLS DEV*
- **Results**
  CALC, *DATABASE*, *REPORT*, *EXPORT*
- **Communication**
  CTRL, *SCAN*, *SEND*, *RECEIVE*, *TRANSFER*, *TRANSFER*
- **Miscellaneous**
  REQUEST, *CALL*, *LOOP*, *WAIT*, *SEQUENCE*

The new command is inserted above the selected command after confirming the selection with **[OK]**.

5.2.4.2.2 Selecting a command

Subwindow: **Method**

A command is being selected with a left mouse-click. The selected command is marked with a black border. Further commands within the same track can be selected by pressing-down the Ctrl key while clicking on the desired command with the left mouse button.

Non-selected command **Selected command**

5.2.4.2.3 Moving a command

Subwindow: **Method**

Moving commands with Drag&Drop

To move commands with Drag&Drop they have to be selected first. They can then be moved to the desired position between two commands with the left mouse button pressed. A red arrow indicates the possible positions.

Moving commands via the clipboard

To move commands via the clipboard they have to be cut first. They can then be inserted above a selected command in an existing track.

5.2.4.2.4 Copying a command

Subwindow: **Method**

Copying commands with Drag&Drop

To copy commands with Drag&Drop they have to be selected first. They can then be copied to the desired position with the left mouse button and Ctrl key simultaneously pressed. A red arrow indicates the possible positions.

Copying commands to the clipboard

The selected commands are copied to the clipboard with **Edit ► Copy**, the context-sensitive menu item **Copy** or with the icon .

5.2.4.2.5 Cutting a command

Menu item: **Method ▶ Edit ▶ Cut**

The selected commands are moved to the clipboard with **Edit ▶ Cut**, the context-sensitive menu item **Cut** or with the icon .

5.2.4.2.6 Inserting a command

Menu item: **Method ▶ Edit ▶ Insert**

The commands copied to the clipboard are inserted above the selected command with **Edit ▶ Insert**, the context-sensitive menu item **Insert** or with the icon .

5.2.4.2.7 Deleting a command

Menu item: **Method ▶ Edit ▶ Delete**

The selected commands are deleted with **Edit ▶ Delete**, the context-sensitive menu item **Delete**, with the icon or with the Delete key.

5.2.4.2.8 Command properties

Menu item: **Method ▶ Edit ▶ Properties**

With **Edit ▶ Properties**, the context-sensitive menu item **Properties**, with the icon or with a double-click on the command, the properties window is opened, in which the command parameters can be set.

NOTICE

For most of the command parameters with numerical input a **formula** can be entered instead of the parameter value. The formula can be entered with the **Formula editor** which is opened by a click with the right mouse button on the input field.

Example

Entry of the start volume proportional to the sample size: **Start volume = 'MV.Sample size' * 0.5**

5.2.4.2.9 Command comment

Menu item: **Method ▶ Edit ▶ Comment**

With **Edit ▶ Comment...**, the context-sensitive menu item **Comment** or with the icon the dialog window **Command comment** opens, in which a new comment on the selected command can be entered or edited.

Commands with a comment are marked with a red triangle in the right upper corner. If the cursor is near the triangle for more than 1 s, the comment is displayed as a tooltip.

Command without comment	Command with comment

5.2.5 Checking a method

Menu item: **Method ► File ► Method check**

With the icon or the **File ► Method check** menu item a method check for the method in focus is triggered. The following points are checked:

- Are the tracks defined in **CALL** commands available?
- Are the targets of loop commands defined?
- Are the variables used in formulas available?
- Does a track contain more than one command with conditioning activated?
- Does a special track (series start track, series end track, exit track and error track) contain a command with conditioning activated?

A respective error message is displayed for each error found. The check has to be started again afterwards. When the method check has been completed successfully, it is confirmed with a message.

5.2.6 Saving a method

Menu item: **Method ► File ► Save / Save As…**

The icon or the **File ► Save** menu item is used to save an existing focused method again under its own name without opening the **Save method** window.

When saving a **newly** created method with the **File ► Save** menu item or when saving an existing method with the **File ► Save As…** menu item, the **Save method** window is opened, in which the method group can be selected and a method name can be entered or selected.

Method group

Method group

Selection of the method group where the method is to be stored *(see chapter 5.4.1, page 424)*.

Selection	**Method groups** | **Main group**
Default value	**Main group**

Method table

The method table contains information about all methods of the selected method group. The table cannot be edited. The table can be sorted

according to the selected column (columns **Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) in either ascending or descending order by clicking on the column title.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who saved the method.

Version

Version number of the method.

Signed

Shows whether and at which level the method has been signed.

Selection	**no** | **Level 1** | **Level 2**

no
The method has not been signed yet. It can be opened for editing and can be deleted.

Level 1
The method has been signed electronically at level 1. It can be opened for editing and can be deleted. If the method is modified and saved again, a new version is created and all the signatures will be deleted.

Level 2
The method has been signed electronically at level 2. The method is locked now and it can neither be opened for editing nor deleted.

Method comment

Comment on the method entered as *(see chapter 5.2.4.2.9, page 408)* in the **START** command.

Saving a method

Method name

Entry of the name under which the method is to be saved.

Entry	**50 characters**

NOTICE

The method name must be unique in the entire client/server system.

[Save]

Save the focused method under the desired method name in the selected method group.

The **method check** is automatically carried out before saving the method; it can also be started manually at any time *(see chapter 5.2.5, page 409)*. The method is checked as thoroughly as possible. Checks for devices, sensors and titrants/solutions are not carried out until the start of the method in order to ensure that method commands can also be created for devices which are not yet configured in the system. If an error is detected during the method check, a message is displayed asking whether the method should be saved nevertheless. Faulty methods cannot be started.

A new method version with a new method identification is created each time a modified method is saved *(see chapter 5.3.11, page 423)*. If the **Comment on modification of methods** option is activated under **Security settings ► Audit Trail ► Modifications** in the **Configuration** program part *(see chapter 6.2.2.4, page 1320)*, then the **Modification comment method** window *(see chapter 5.2.7, page 411)* is displayed before the method is saved.

5.2.7 Modification comment on method

Menu item: **Method ► File ► Save / Save As...**

If the **Comment on modification of methods** option is activated in the **Security settings ► Audit Trail ► Modifications** in the **Configuration** program part *(see chapter 6.2.2.4, page 1320)* when saving a modified method or when deleting methods, the **Modification comment method** window is opened, in which a reason and a comment on the modification must be entered.

Reason

Selection from the **Default reasons** defined for the category **Modification of methods** in the **Security settings** dialog window *(see chapter 6.2.2.6, page 1322)*.

Selection	**Selection from the default reasons**

Comment

Entry of a comment for modifying the method.

Entry	**1,000 characters**

5.2.8 Print method report

Menu item: **Method ▶ File ▶ Print (PDF)…**

With menu item **File ▶ Print (PDF)…** or the symbol PDF the window **Print method reports (PDF)** is opened in which the desired report for the selected method can be selected and output as PDF file.

Report selection

Selection of the method report to be put out.

Selection	**Method sequence** | **Method parameters** | **Titration and measurement parameters**
Default value	**Method sequence**

Method sequence
Output of the method sequence in graphic format.

Method parameters
Output of the entire report of all the method parameters including signatures and method history.

Titration and measurement parameters
Output of the report of all parameters of the titration and measuring commands.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output in portrait format.

Landscape
Output in landscape format.

5.2.9 Closing a method

Menu item: **Method ▶ File ▶ Close / Close all**

Closing a single method

The icon or the **File ▶ Close** menu item can be used to close the focused method. If the method has been modified, a prompt for confirmation to save the method as a new version will appear.

Closing all methods

All opened methods are closed with the **File ▶ Close all** menu item. A prompt for confirmation to save the method as a new version will appear for each method that has been modified.

5.3 Managing methods

5.3.1 Managing methods

Dialog window **Method ▶ File ▶ Method manager… ▶ Method manager**

With the symbol or with **File ▶ Method manager...** the dialog window **Method manager** is opened where a user with the corresponding access right is allowed to manage the methods.

Method group

Method group

Selection of the method group for which the methods should be displayed in the table.

Selection	**Method groups** | **Main group**
Default value	**Main group**

[Method groups]

Opens the dialog window **Method groups** for managing the method groups *(see chapter 5.4.1, page 424)*.

Method table

The method table contains information about all methods of the selected method group. The table cannot be edited. With a click on the column title (columns **Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) the table can be sorted according to the selected column in increasing or decreasing order.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who has saved the method.

Version

Version number of the method.

Signed

Display indicating whether and at which level the method has been signed.

Selection	**no** | **Level 1** | **Level 2**

no
The method has not been signed. It can be opened for editing and can be deleted.

Level 1
The method has been signed electronically at level 1. It can be opened for editing and can be deleted. If the method is modified and saved again, a new version is created and all the signatures will be deleted.

Level 2
The method has been signed electronically at level 2. The method is locked now and it can neither be opened for editing nor deleted.

Method comment

Comment on the method entered as *(see chapter 5.2.4.2.9, page 408)* in the command **START**.

Window menus

The menu **[Edit]** below the method table contains the following menu items:

Rename…	Rename the selected method *(see chapter 5.3.2, page 415)*.
Copy	Copy the selected method(s) in the same method group *(see chapter 5.3.3, page 415)*.
Move…	Move the selected method(s) to a different method group *(see chapter 5.3.4, page 415)*.
Delete…	Delete the selected method(s) *(see chapter 5.3.5, page 416)*.
Send to…	Export the selected method(s) and attach it (them) to an e-mail *(see chapter 5.3.6, page 416)*.
Export…	Export the selected method(s) *(see chapter 5.3.7, page 417)*.
Import…	Import the selected method(s) *(see chapter 5.3.8, page 417)*.

The **[Sign]** menu below the method table contains the following menu items:

Signature 1…	Sign the selected method on level 1 *(see chapter 2.3.3, page 20)*.

Signature 2...	Sign the selected method on level 2 *(see chapter 2.3.4, page 21)*.
Show signatures...	Show all signatures of the selected method *(see chapter 5.3.10.4, page 421)*.
Delete signatures 2...	Delete all signatures at level 2 of the selected method *(see chapter 2.3.5, page 23)*.

[History]

Open the **Method history** dialog window of the selected method *(see chapter 5.3.11, page 423)*.

[Close]

Close the dialog window and save the entries.

5.3.2 Renaming a method

Dialog window: **Method ► File ► Manage method... ► Method manager ► [Edit] ► Rename... ► Rename method**

The **Rename method** dialog window for renaming the selected method is opened with the menu item **[Edit] ► Rename...**.

Rename method 'Method name' to

Entry of the new method name.

Entry	**50 characters**

NOTICE

The method name must be unique in the entire Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

5.3.3 Copying a method

Menu item: **Method ► File ► Manage method... ► Method manager ► [Edit] ► Copy**

With the menu item **[Edit] ► Copy**, the selected methods are saved in the same method group under the name **Copy of 'Method name'**.

5.3.4 Moving a method

Dialog window: **Method ► File ► Manage method... ► Method manager ► [Edit] ► Move... ► Move method(s)**

With the menu item **Edit ► Move...**, the selected methods are moved to the desired method group. The method group can be selected in the window **Move method(s)**.

Method group

Selection of the method group to which the selected methods should be moved.

Selection	**Method groups**

NOTICE

Locked methods (methods signed at **Level 2**) cannot be moved.

5.3.5 Deleting a method

Menu item: **Method ► File ► Method manager… ► Method manager ► [Edit] ► Delete**

With the menu item **[Edit] ► Delete**, the selected methods and all method versions are deleted.

If the option **Comment on modification of methods** is activated in the **Security settings** *(see chapter 6.2.2.4, page 1320)*, then the dialog window **Modification comment method** *(see chapter 5.2.7, page 411)* is displayed when methods are deleted.

NOTICE

Locked methods (methods signed at **Level 2**) cannot be deleted.

5.3.6 Sending a method to

Menu item: **Method ► File ► Method manager… ► Method manager ► [Edit] ► Send to…**

With the menu item **Edit ► Send to…**, the selected methods are each exported as a file named **'Method name'mmet**.

Afterwards, the Windows Standard E-mail Client will open with an empty message. The export files of the highlighted objects will automatically be added as an attachment. The user can complete the e-mail himself/herself and send it on. The exported methods are stored only temporarily on the computer and will be deleted automatically after the e-mail has been sent.

NOTICE

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is tampered with, then it cannot be imported again.

5.3.7 Exporting a method

Menu item: **Method ▶ File ▶ Method manager… ▶ Method manager ▶ [Edit] ▶ Export…**

With the menu item **Edit ▶ Export…**, the selected methods can each be exported as a file named **'Method name'.mmet** The window **Select directory for export** opens in which the directory for export must be selected.

NOTICE

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is tampered with, then it cannot be imported again.

5.3.8 Importing a method

Menu item: **Method ▶ File ▶ Method manager… ▶ Method manager ▶ [Edit] ▶ Import…**

With the menu item **Edit ▶ Import…** the dialog window **Select files for import** opens. Here you must select the methods to be imported and the method group into which the methods are to be imported. These methods are imported into the opened method table.

Sample methods

In the program directory under **…\tiamo\examples\methods\…** you will find examples of methods that can be imported into an opened method group.

5.3.9 Renaming an imported method

Menu item: **Method ▶ File ▶ Method manager… ▶ Method manager ▶ [Edit] ▶ Import…**

Methods with the same name as methods already imported can only be imported under a new name. The window **Import method** opens for renaming the method.

Rename imported method 'Method name' to

Entry of the new method name.

Entry	**50 characters**

NOTICE

The method name must be unique in the entire Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

5.3.10 Signing methods

5.3.10.1 Rules for electronic signatures

Program parts: **Method / Database**

In tiamo, methods and determination can be **electronically signed** at two levels. The following rules apply for this:

- **Signature levels**
  Methods and determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.
- **Multiple signing**
  Methods and determinations can be signed several times at each level. All signatures are saved and documented in the Audit Trail.
- **Signing at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.
- **Signing at Level 2**
  Level 2 can only be signed if signatures already exist at Level 1.
- **Different users**
  The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
  Each signature must be accompanied by a reason selected from predefined default reasons. Additionally, a further comment can be entered.
- **Saved data**
  For each signature, signature date, user name, full name, reason and comments are saved.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when creating a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Signing methods**
  Methods can only be signed individually.
- **Signature options**
  The options for electronic signatures are set in the **Signatures** tab in the **Security settings** dialog window.

5.3.10.2 Signature Level 1

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Signature 1... ▶ Signature Level 1**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Signature 1... ▶ Signature Level 1**

In the window **Signature Level 1**, methods or determinations can be signed at level 1.

NOTICE

Methods or determinations which have been signed at level 1 can be modified and deleted. If the modified method or determination is saved as a new version then all existing signatures will be deleted automatically, i.e. the method or determination must be signed again.

Info

Display of information for signing and deleting signatures. The following messages are possible:

Selection	**Signature possible** | **Signature 1 not possible (signature 2 exists)** | **Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)
The selected method or determination can no longer be signed at level 1 as it has already been signed at level 2.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 1**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 1 if the user belongs to a user group with the corresponding authorization.

5.3.10.3 Signature Level 2

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Signature 2... ▶ Signature Level 2**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Signature 2... ▶ Signature Level 2**

In the window **Signature Level 2**, methods or determinations can be signed at level 2.

NOTICE

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be modified nor deleted. In order to be able to edit such methods or determinations again, the signatures on level 2 must first be deleted.

Info

Information for signing and deleting signatures is displayed in this box. The following messages are possible:

Selection	**Signature possible** | **Signature 2 not possible (signature 1 missing)** | **Signature not possible (accessed by other client)**

Signature possible
The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)
The selected method or determination cannot be signed at level 2 as it has not yet been signed at level 1.

Signature not possible (accessed by other client)
The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Sign]

Sign the method or determination. The window remains open.

NOTICE

Methods or determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization.

5.3.10.4 Show method signatures

Dialog window: **Method ▶ File ▶ Method Manager... ▶ Method Manager ▶ [Sign] ▶ Show signatures...**

The dialog window **Signatures - Method 'Method name'** opens by means of the menu item **[Sign] ▶ Show signatures...** with a table in which the information for all of the signatures for the selected method is given.

Signature

Shows at which level the method has been signed (**Level 1** or **Level 2**).

Signature date

Date and time at which the method was signed.

User

Short name of the user who signed the method.

Full name

Full name of the user who signed the method.

Reason

Reason for signature.

Signature comment

Comment on the signature.

5.3.10.5 Delete signatures level 2

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

Dialog window: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Sign] ▶ Delete signatures 2... ▶ Delete Signatures Level 2**

In the window **Delete Signatures Level 2**, all signatures on level 2 for the selected method or determination can be deleted.

User

Entry of the user name (short name).

Entry	**24 characters**

Password

Password entry.

Entry	**24 characters**

Reason

Selection from the **Default reasons** defined in the dialog window **Security settings** for the category **Signature level 2**.

Selection	**'Selection from the default reasons'**

Comment

Entry of a comment on the signature.

Entry	**1,000 characters**

[Delete]

Delete signatures 2.

NOTICE

Signatures 2 can only be deleted if the user belongs to a user group with the corresponding authorization.

5.3.11 Showing the method history

Dialog window: **Method ► File ► Method manager… ► Method manager ► [History] ► Method history**

The dialog window **[Method history]** showing a table with all **versions** of the selected method is opened with the **History** button.

Name

Name of the method.

Version

Version number of the method.

Method ID

Unique method identification.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who has saved the method.

Modification reason

Reason entered when saving the modified method.

Modification comment

Comment entered when saving the modified method.

[Show method]

Open the dialog window **Method 'Method name' - Version #** in which the method for the selected method version is displayed.

[Make current]

Make the selected method version to the current method version. This creates a new method whose version number is increased by **+1** compared with the last version to have been saved.

5.4 Method groups

5.4.1 Manage method groups

Dialog window: **Method ► File ► Method groups… ► Method groups**

With the symbol or with the menu item **File ► Method groups...** the dialog window **Method groups** is opened in which the user can manage the method groups provided he has the necessary access rights. The information on the existing method groups is shown in a table. The table cannot be edited and is not automatically updated. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing order.

Name

Name of the method group.

Number

Number of methods in the method group.

Saved

Date and time when the method group was saved

User

Short name of the user who has saved the method group.

Full name

Full name of the user who saved the method group.

Comment

Comment on the method group.

[New]

Opens the dialog window **Properties - Method group - 'New Group'** opens for defining a new method group *(see chapter 5.4.2, page 425)*.

[Properties]

Opens the dialog window **Properties - Method group 'Name'**, in which the method group selected in the table can be edited *(see chapter 5.4.2, page 425)*.

[Delete]

Deleting the selected method group.

5.4.2 Edit method groups

5.4.2.1 Method groups - Properties

Dialog window: **Method ▶ File ▶ Method groups... ▶ Method groups ▶ Properties - Method group 'Name'**

The properties window **[Properties - Method group 'Name']** for the selected method group is opened with the button **Properties** or by double-clicking on the line in the table.

The parameters for the method groups are configured on the following tabs:

- *General*
  General parameters
- *Access rights*
  Access rights for method groups and their methods.

5.4.2.2 Method groups - General

Tab: **Method ▶ File ▶ Method groups... ▶ Method groups ▶ [Properties] ▶ Properties - Method group 'Name' ▶ General**

Name

Name of the method group. The name has to be entered when creating a new method group.

Entry	**50 characters**

Number

Number of methods in the method group.

Comment

Freely definable remarks about the user group.

Entry	**1000 characters**

5.4.2.3 Method groups - Access rights

Tab: **Method ▶ File ▶ Method groups... ▶ Method groups ▶ [Properties] ▶ Properties - Method group 'Name' ▶ Access rights**

Access rights for method groups and their methods can be assigned per user group.

NOTICE

The user group **Administrators** always has both access rights, i.e. they cannot be disabled.

User group

Names of the user groups

Execute

on | off (Default value: **on**)

Authorization to start methods from a method group. Methods in this group can only be opened and started but can not be edited or deleted.

Edit

on | off (Default value: **on**)

Authorization to edit methods from a method group. Methods in this group can be opened, started, edited and deleted. New methods can be added as well.

5.5 Tracks

5.5.1 Tracks - General

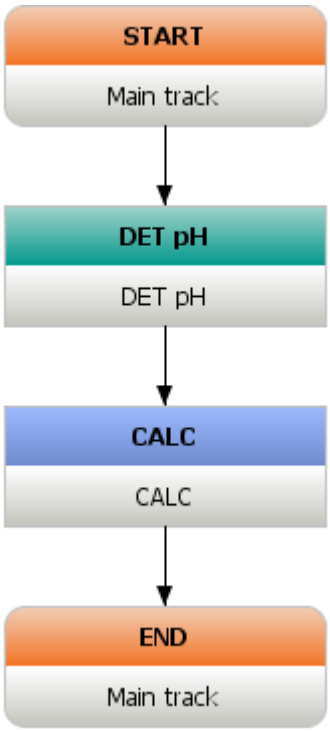
Subwindow: **Method**

Definition

A **track** is a partial run of a **method** consisting of **commands**. Apart from the **main track**, which is present in each method, there are: **normal tracks**, which can be created by the user and which are called with a **CALL** command; and **special tracks** (series start track, series end track, exit track and error track), which cannot be called but which are automatically started if certain events occur.

Structure

Each track contains a **START** or **TRACK** command and an **END** command; between these, any commands can be inserted.



Display

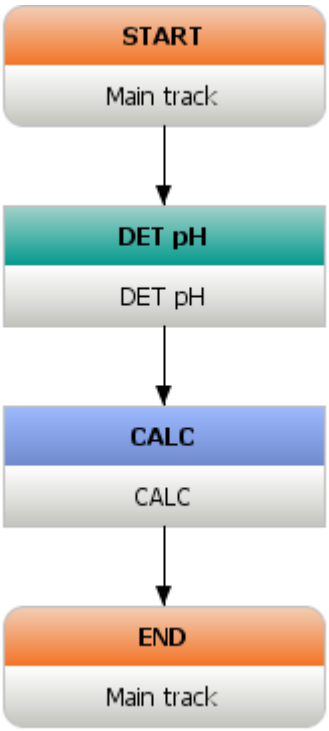
The individual tracks are arranged next to one another in the method window. The track name appears in the **START** or **TRACK** command and in the **END** command.

5.5.2 Track types

5.5.2.1 Main track

Subwindow: **Method**

The **main track** contains the main run of the method and is present in every method. It starts with a *START command (see Chapter 5.6.2.2, page 438)* and ends with an *END command (see Chapter 5.6.2.8, page 452)*. The **START** command provides the required variables. The **END** command marks the end of the method run. The main track cannot be deleted or moved.



5.5.2.2 Normal track

Subwindow: **Method**

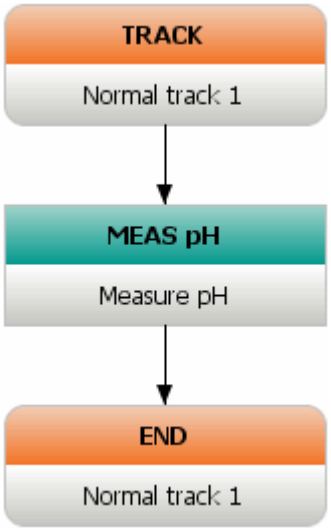
A **normal track** is a track that can be created manually by the user with **Insert ► New track... ► Normal track** or with the icon. It begins with a start command *TRACK (see Chapter 5.6.2.3, page 447)* and ends with an end command *END (see Chapter 5.6.2.8, page 452)*.

Normal tracks can be called via the **CALL** command and by entering the corresponding name. Branches and parallel processes can be realized in this way. The following two cases are distinguished when calling normal tracks:

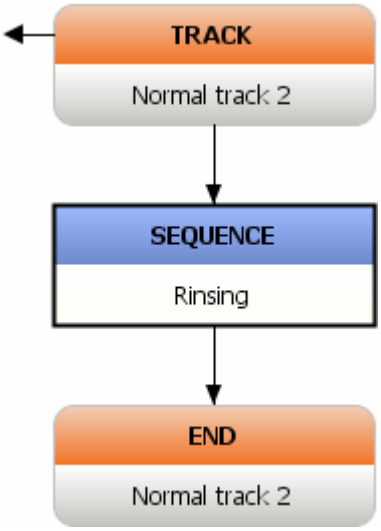
- **Sequentially running normal track**
  If the **Return immediately** check box is deactivated in the *TRACK (see Chapter 5.6.2.3, page 447)* command, then all commands of this track are processed one after the other when the normal track is called. Afterwards, the track gives a response to the *CALL (see Chapter 5.6.10.3, page 1287)* command that is calling and the run is continued from there.

- **Normal track run in parallel**
  If the **Return immediately** check box is activated in the *TRACK (see Chapter 5.6.2.3, page 447)* command, then the corresponding command is marked with an arrow (see below). When the normal track is called, then the commands in this track are processed, but the track responds immediately to the *CALL (see Chapter 5.6.10.3, page 1287)* command that is calling. In this way, the run in the calling track is also continued, i.e., the two tracks are processed in parallel.

Sequentially running normal track



Normal track run in parallel

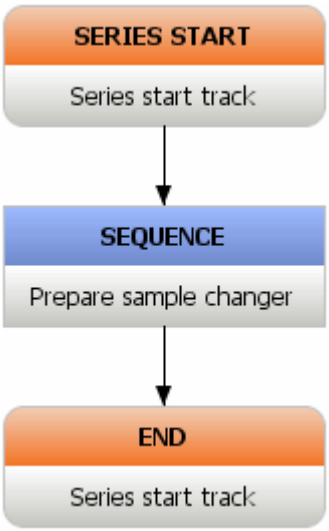


5.5.2.3 Series start track

Subwindow: **Method**

A **series start track** is a track that can be created manually by the user with **Insert ▶ New track... ▶ Series start track** or with the icon. It begins with the start command *SERIES START (see Chapter 5.6.2.4, page 448)* and ends with the end command *END (see Chapter 5.6.2.8, page 452)*. Only one series start track can be inserted in a given method.

The series start track is executed in the run only once at the beginning of the first determination of a series and before the *main track (see Chapter 5.5.2.1, page 427)*. This track can be used, e.g., to initialize sample changers at the beginning of a series.

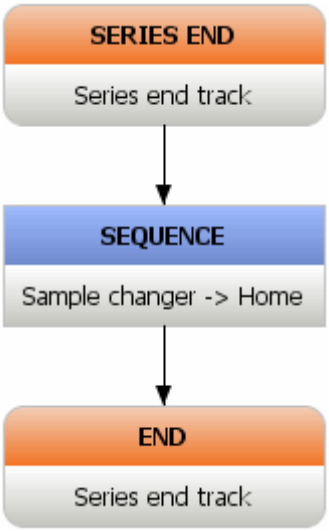


5.5.2.4 Series end track

Subwindow: **Method**

A **series end track** is a track that can be created manually by the user with **Insert ▶ New track... ▶ Series end track** or with the icon. It begins with a start command *SERIES END (see Chapter 5.6.2.5, page 449)* and ends with an end command *END (see Chapter 5.6.2.8, page 452)*. Only one series end track can be inserted in a given method.

The series end track is executed in the run only once at the end of the last determination of a series after the *main track (see Chapter 5.5.2.1, page 427)*. This track can be used, e.g., to set sample changers to the required state at the end of a series.



5.5.2.5 Exit track

Subwindow: **Method**

An **exit track** is a track that can be created manually by the user with **Insert ► New track... ► Error track** or with the icon. It begins with a start command *EXIT (see Chapter 5.6.2.6, page 450)* and ends with an end command *END (see Chapter 5.6.2.8, page 452)*. Only one exit track can be inserted in a given method.

The exit track is executed in the run when all **normal tracks** and the **main track** have been completed or when the determination is manually canceled. When creating a new **exit track**, a *REPORT (see Chapter 5.6.8.4, page 1258)* command and a *DATABASE (see Chapter 5.6.8.3, page 1256)* command are automatically inserted into this track. These commands ensure that a database entry and a report were created for each determination, even if the determination was canceled manually or due to an error.

NOTICE

If the option **Always execute DATABASE command after track has stopped** is enabled in the **EXIT** command, then commands of the **DATABASE**, **EXPORT**, **REPORT** and **CALC** type present in the track will be executed, even if the track was stopped before execution of this command.

5.5.2.6 Error track

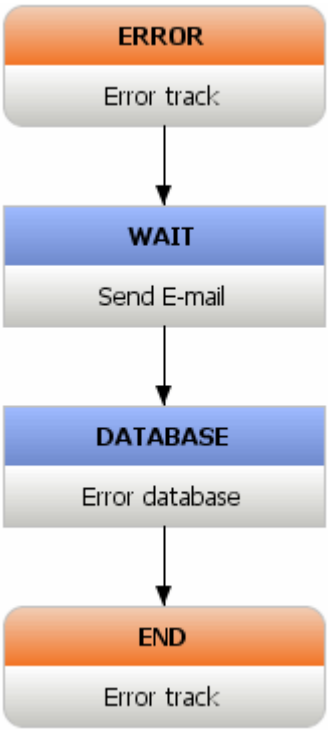
Subwindow: **Method**

An **error track** is a track that can be created manually by the user with **Insert ► New track... ► error track** or with the icon. It begins with a start command *ERROR (see Chapter 5.5.2.6, page 432)* and ends with an end command *END (see Chapter 5.6.2.8, page 452)*. Only one error track can be inserted in a given method.

The error track is executed in the run if the determination is canceled due to an error. In this case, the error track assumes the function of the main track. Normal tracks can also be called from it.

NOTICE

If the option **Always execute DATABASE command after track has stopped** is enabled in the **ERROR** command, then commands of the **DATABASE**, **EXPORT**, **REPORT** and **CALC** type present in the track will be executed, even if the track was stopped before execution of these commands.



5.5.3 Editing tracks

Subwindow: **Method**

The following processing functions for tracks are available for a method currently opened in the main window:

- *Insert new track*
- *Select track*
- *Move track*
- *Copy track*
- *Cut track*
- *Insert track*
- *Delete track*

5.6 Commands

5.6.1 Commands - General

5.6.1.1 Definition and Presentation

Subwindow: **Method**

Definition

A **command** is a part of a **track** with the following general properties:

- **Command type**
  Each Command type defines the function of the command. The designation of the command type (short description in capital letters) cannot be changed.
- **Command name**
  Each command has a freely selectable command name which must be unambiguous within the method.

NOTICE

In the event that a command has been renamed afterwards, the cross references to this command (e.g. command variables) are adjusted automatically within the method.

- **Command parameters**
  The number and type of command parameters depend on the command type and can be edited in the **Command properties** window.
- **Commands in the run**
  Commands within the same track are carried out in sequence, one after the other, in the method run.

Presentation

Commands are displayed double-spaced. The first row contains the name of the command type (e.g. **DET pH**, **CALC**) and the second row contains a freely selectable command name that is unique within the method. The default command name is composed of the command type and a consecutive number.

The command types are structured by the following colors:

- **Orange**
  Track commands
- **Green**
  Titration and measurement commands
- **Yellow**
  Sample Processor and dosing commands
- **Blue**
  All other commands

5.6.1.2 Edit commands

Subwindow: **Method**

The following processing functions for commands are available for a method currently opened in the main window:

- *Insert a new command*
- *Selecting a command*
- *Moving a command*
- *Copying a command*
- *Cutting a command*
- *Inserting a command*
- *Deleting a command*
- *Command properties*
- *Command comment*

5.6.1.3 Alphabetical command overview

Subwindow: **Method**

- *ADD*
  Adding a predefined volume.
- *BRC*
  Command for coulometric titration for determining the bromine consumption.
- *CAL Cond*
  Determination of cell constants of conductivity sensors.

- *CAL LOOP Conc*
  Calibration loop for calibrating ion-selective electrodes (ISE electrodes).
- *CAL LOOP Opt*
  Loop for the calibration of colorimetric sensors.
- *CAL LOOP pH*
  Loop for the calibration of pH electrodes.
- *CAL MEAS Conc*
  Measuring command for calibrating ion-selective electrodes (ISE electrodes).
- *CAL MEAS Opt*
  Command for measuring standard solutions for the calibration of colorimetric sensors.
- *CAL MEAS pH*
  Measuring command for calibrating pH electrodes.
- *CAL Spec*
  Execution of a wavelength calibration.
- *CALC*
  Calculation of intermediate and end results, titer values and common variables.
- *CALL*
  Calling tracks (subprograms).
- *CTRL*
  Setting remote output lines.
- *DATABASE*
  Storage of the determination data in data bases.
- *DET*
  Dynamic equivalence point titrations.
- *DOS pH*
  Controlled dosing with the measured quantity pH.
- *DOS U*
  Controlled dosing with the measured quantity voltage U.
- *ELT LOOP*
  Loop for the electrode test.
- *ELT MEAS*
  Command for measuring calibration buffers for the test of pH electrodes.
- *EMPTY*
  Emptying a dosing unit.
- *END*
  End command for all tracks.
- *ERROR*
  Start command for the error track.
- *EXIT*
  Start command for the exit track.
- *EXPORT*
  Export of determination data.

- *FLOW*
  Gas flow monitoring with 774 and 864 Sample Processor.
- *HEATER*
  Controlling the oven temperature with the 774 and 864 Sample Processors.
- *KFC*
  Coulometric Karl Fischer Titrations with voltametric measurement.
- *KFT*
  Volumetric Karl Fischer Titrations.
- *LIFT*
  Moving to a lift position.
- *LOOP*
  Multiple execution of a command sequence.
- *LQH*
  Extensive dosing possibilities with a Dosino.
- *MEAS*
  Measuring.
- *MET*
  Monotonic Equivalence Point Titrations.
- *MOVE*
  Moving to a rack position or an external position.
- *PREP*
  Preparing a exchange or dosing unit.
- *PUMP*
  Switching on/off the connected or built-in pumps.
- *RACK*
  Initialization of the rack attached.
- *RECEIVE*
  Waiting for event messages or status messages.
- *REPORT*
  Output of a report defined by a report template.
- *REQUEST*
  Requesting sample data.
- *RLS DEV*
  Release of a device for using it in other parallel running methods.
- *RLS DOS*
  Release of a dosing device for using it in other parallel running methods.
- *SCAN*
  Scanning remote input lines.
- *SEND*
  Sending event messages
- *SERIES END*
  Start command for the series end track.
- *SERIES START*
  Start command for the series start track.

- *SEQUENCE*
  Combines several commands to one command.
- *SET*
  Endpoint titrations.
- *START*
  Start command for the main track.
- *STAT*
  STAT Titration.
- *STDADD auto*
  Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.
- *STDADD dos*
  Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD man*
  Standard addition with manual addition of the standard addition solution.
- *STIR*
  Controlling a connected stirrer.
- *SWING*
  Swinging of the robotic arm (with Swing Head only).
- *TET*
  Thermometric titrations.
- *TRACK*
  Start command for the normal track.
- *TRANSFER*
  Data transfer via RS-232 to external devices or programs.
- *WAIT*
  Interrupts the method run.
- *WEIGH*
  Interrupts the method run.

5.6.2 Track commands

5.6.2.1 Track commands - Overview

Menu item: **Method ► Insert ► New track...**

The following track commands exist for the various tracks:

- *START*
  Start command for the *main track (see Chapter 5.5.2.1, page 427)*.
- *TRACK*
  Start command for the *normal track (see Chapter 5.5.2.2, page 428)*.
- *SERIES START*
  Start command for the *series start track (see Chapter 5.5.2.3, page 429)*.

- *SERIES END*
  Start command for the *series end track (see Chapter 5.5.2.4, page 430)*.
- *EXIT*
  Start command for the *exit track (see Chapter 5.5.2.5, page 431)*.
- *ERROR*
  Start command for the *error track (see Chapter 5.5.2.6, page 432)*.
- *END*
  End command for all tracks.

5.6.2.2 START

5.6.2.2.1 START - Overview

Dialog window: **Method ► START ► Properties.. ► START 'Command name'**

Start command for main track.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **START** are configured on the following 3 tabs:

- *General*
  General settings for the method run.
- *Application note*
  Writing an application note which is displayed when starting a determination.
- *Method variables*
  Configuring method and sample variables which are to be available for the method.

Command variables

No command variables are generated in the method run by the **START** command.

Method variables

The following method variables are defined in the **START** command and can be used in formulas under the designation **'MV.Variable name.Variable designation'**:

Identification	Description
.VAL	Result value (optional, i.e. **'MV.Factor'** =**MV.Factor.VAL'**) (**Text**, **Number** or **Date/Time**)
.OVF	Exceeding limits for method variable (**Number**: **1 = limit exceeded**, **0 = limit not exceeded**)
In the following lines you will find the method variables (sample data) present in the default settings which appear in the **Run** subwindow and which can be edited and deleted in the **START** command of the corresponding method.	
Sample size.VAL	Value of 'Sample size' (**Number**)
Sample size.OVF	Exceeding limit for 'sample size' (**Number**)
Unit.VAL	Value of 'Unit'. (**Text**)
Unit.OVF	Exceeding limit for 'unit' (**Number**)
Sample position.VAL	Value of 'Sample position' (**Number**)
Sample position.OVF	Exceeding limit for 'sample position' (**Number**)
ID1 (...3).VAL	Value of 'ID1…3' (**Text**)
ID1 (...3).OVF	Exceeding limit for 'ID…3' (**Number**)

5.6.2.2.2 START - General

Tab: **Method ▶ START ▶ Properties... ▶ START 'Command name' ▶ General**

Command name

Name of the command.

Entry	**25 characters**

Workplace view

Workplace view

Selection	**Current view** | **View**
Default value	**Current view**

Current view
If this option is enabled, the current view of the workplace remains opened when starting a determination.

View
If this option is enabled, the selected workplace view is automatically opened when starting a determination.

If the option **View** is selected, then a workplace view can be selected from those available in the list box.

Selection	**'Workplace view'**

NOTICE

The selected workplace view will only be opened when starting a single determination or starting the first determination of a series. It will not be opened when a new method within a determination series is being loaded .

Track display for live window

Live display 1

Selection of the track to be displayed in the subwindow **Live display 1**.

Selection	**Main track** | **Selection of available tracks**
Default value	**Main track**

Live display 2

Selection of the track to be displayed in the subwindow **Live display 2**.

Selection	**Main track** | **Selection of available tracks**
Default value	**Main track**

Statistics

on | off (Default value: **off**)

If this parameter is switched on, then the statistic functions defined in the **CALC** command will be calculated.

NOTICE

In order to make sure that the statistics will really be calculated, the feature must also be enabled in the **Workplace** program part on the **Single determination** tab.

Number of single determinations

The number of single determinations defined here is valid for all **CALC** commands in the method.

Input range	**1 to 99**
Selection	**not defined**
Default value	**not defined**

not defined
With **not defined** the number of single determinations must be specified on the tab **Determination series** in the subwindow **Run** of the program part **Workplace**.

Conditioning

Automatic conditioning

on | off (Default value: **on**)

If this option is **enabled**, the conditioning will be started automatically at the start of a determination for all commands with activated conditioning (**SET**, **KFT**, **KFC** and **BRC**). After the track with the conditioning command has been finished, conditioning is started again automatically and will be continued even after the end of the determination.

If this parameter is **disabled**, then conditioning will not be started until the start of the command. Conditioning is not started again after the end of the track with the conditioning command. This parameter must be switched off for **automation applications**.

5.6.2.2.3 START - Application note

Tab: **Method ▶ START ▶ Properties... ▶ START 'Command name' ▶ Application note**

Command name

Name of the command.

Entry	**25 characters**

The application note defined in the text window is displayed in the tab **Application note** in the subwindow **Live display** of the program part **Workplace**. The tab is opened automatically when the method is loaded.

The text editor with which the application note can be entered or changed is opened with or by double-clicking into the text field *(see chapter 2.5.2, page 85)*.

5.6.2.2.4 START - Method variables (Table)

Tab: **Method ▶ START ▶ Properties... ▶ START 'Command name' ▶ Method variable**

Command name

Name of the command.

Entry	**25 characters**

The variables that are to be available within the method in other commands (e.g. **CALC** command) under the designation **MV.'Variable name'** must be declared here. Either a sample data variable (entry in field **Assignment**) or a direct value (entry in field **Value**) can be assigned to a method variable.

The overview table shows all of the declared method variables and can itself not be edited directly. With a click on the column title (columns **Name**, **Type**, **Assignment** or **Value**) the table can be sorted according to the selected column in either ascending or descending sequence.

The meaning of the columns *see Method variables (Details), page 442*.

[New]

Opens the dialog window **Method variable - New** in which a new method variable can be entered *(see chapter 5.6.2.2.5, page 442)*.

[Properties]

Opens the dialog window **Method variable - 'Name'** in which the method variable selected in the table can be edited *(see chapter 5.6.2.2.5, page 442)*.

[Delete]

Deletes the method variable selected in the table.

5.6.2.2.5 START - Method variables (Properties)

Dialog window: **Method ► START ► Properties... ► START 'Command name' ► Method variable ► [Properties] ► Method variable - 'Name'**

Definition of the method variable

Name

Freely selectable name of the method variable which must be unique within the method.

Entry	**50 characters**

Type

Selection of the variable type. This field cannot be edited with variables with a unique type (**Sample size**, **Unit**, **Sample position**).

Selection	**Text** | **Number** | **Date/Time**
Default value	**Text**

Assignment

on | off (Default value: **on**)

If this option is enabled, a sample variable can be selected which is to be assigned to this method variable. Only those variables which are not yet

assigned can be selected. Sample data variables that have not been assigned to a method variable are not included in the list boxes for other commands and are not stored in the determination. No formulas can be entered in this field.

Selection	**ID1 … ID16 | Sample size | Unit | Sample position**

NOTICE

The name of the assigned method variables is displayed automatically for the sample data variables **ID1 … ID16, Sample size, Unit, Sample position** in the subwindow **Run** on the tab **Single determination** and in the subwindow **Information** on the tab **Sample**.

Fixed value

on | off (Default value: **off**)

If this option is enabled, then the method variables can be assigned a fixed value. For variables of the type **Date/Time**, the date must be entered in the dialog window *2.5.1Select date* . No formulas can be entered in this field.

Type = Number	
Input range	**-1.0E-99 to 1.0E99**

Type = Text	
Entry	**100 characters**

Type = Date/Time	
Selection	**'Date'**

Check at start

on | off (Default value: **on**)

If this option is enabled, the start test will check if the method variable is valid and if the limit values are maintained when monitoring is switched on.

NOTICE

Switching off this option can be useful if the method variables are still invalid at the start of the method and will not be defined until there is a **REQUEST** command during the run.

Comment

Freely selectable comment on the method variable.

Entry	**1000 characters**

Variable monitoring

NOTICE

Is displayed only for method variables of the types **Number** or **Date/Time**.

on | off (Default value: **off**)

The limits for the variable will be monitored while the determination is running if this option is enabled.

Lower limit

Lower limit for the variable.

Type = Number

Entry	**10 digits**

Type = Date/Time

Selection	**'Date'**

Upper limit

Upper limit for the variable.

Type = Number

Entry	**10 digits**

Type = Date/Time

Selection	**'Date'**

Message

NOTICE

Is displayed only for method variables of the types **Number** or **Date/Time**.

The message defined here can be output to different targets if the upper limit is exceeded or if the lower limit is not reached. The text editor for entering or changing the message is opened with or by double-click-

ing into the text field *(see chapter 2.5.2, page 85)*. The formula editor can also be called up inside the text field *(see chapter 2.4, page 24)*.

Entry	**Text (unlimited)**

Display message

on | off (Default value: **on**)

If this option is enabled, all active tracks are stopped and the message defined in the text box will be displayed in the event that the limits are exceeded.

Record message

on | off (Default value: **on**)

If this option is enabled, the message defined in the text box will be documented in the determination if the limits are exceeded.

Message by E-mail

on | off (Default value: **off**)

If this option is enabled, the message defined in the text box will be sent to the address defined under **<E-Mail>** if the result limits are exceeded.

[E-mail]

Opens the window **Send E-mail** for defining the E-mail parameters *(see chapter 5.6.2.2.6, page 446)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above when a limit is exceeded.

Action

NOTICE

Is displayed only for method variables of the types **Number** or **Date/Time**.

Action

on | off (Default value: **off**)

If this option is enabled, one of the two following actions will be carried out automatically in the event that the result limits are exceeded.

Selection	**Stop determination** | **Stop determination and series**
Default value	**Stop determination**

Stop determination
If this option is selected, then the current determination (or conditioning) will be stopped. The next determination of the series will be started afterwards.

Stop determination and series
If this option is selected, then the current determination (or conditioning) will be stopped. The next determination of the series will not be started afterwards.

5.6.2.2.6 Send E-mail

Dialog window: **Send E-mail**

Use E-mail template

on | off (Default value: **off**)

If this option is enabled, then the E-mail parameters are loaded from an E-mail template; if not, then these parameters must be entered.

Parameter for "Use E-mail template = on"

Subject

Subject to describe the message.

Entry	**150 characters**
Default value	**Message from tiamo – Method 'Method name' – Command 'Command name'**

E-mail template

Selection of the template for sending E-mails.

Parameter for "Use E-mail template = off"

Mail to

E-mail address of the recipient.

Entry	**200 characters**

Subject

Subject to describe the message.

Entry	**150 characters**
Default value	**Message from tiamo – Method 'Method name' – Command 'Command name'**

User

Name of the user for access to mail server. The name need not agree with the Windows user name.

Entry	**200 characters**

Password

Password for the access to the mail server. This password does not necessarily have to be identical to the Windows password.

Entry	**200 characters**

Mail from

E-Mail address of the sender.

Entry	**200 characters**

SMTP server

Address of SMTP mail server.

Entry	**200 characters**

POP3 server

Address of POP3 mail server.

Entry	**200 characters**

5.6.2.3 TRACK

Dialog window: **Method ► TRACK ► Properties... ► TRACK - 'Command name'**

Start command for the normal track.

Appearance

The command has the following appearance:

Command name

Name of the command.

Entry	**25 characters**

Live display

on | off (Default value: **on**)

If this option is enabled, then the track will be displayed in the live display.

Return immediately

on | off (Default value: **off**)

If this option is enabled, then the program does not wait for this track to be completed, but rather responds immediately to the track with the **CALL** command. From now on, both tracks will be running simultaneously.

Delete old data

on | off (Default value: **off**)

If this option is enabled, then the data previously generated by a track will be deleted each time this track is started.

Command variables

The following command variables are generated in the method run by the **TRACK** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.2.4 SERIES START

Dialog window: **Method ► SERIES START ► Properties... ► SERIES START - 'Command name'**

Start command for the series start track.

Appearance

The command has the following appearance:

Parameters

Command name

Name of the command.

Entry	**25 characters**

Live display

on | off (Default value: **on**)

If this option is enabled, then the track will be displayed in the live display.

Command variables

The following command variables are generated in the method run by the **SERIES START** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.2.5 SERIES END

Dialog window: **Method ► SERIES END ► Properties... ► SERIES END - 'Command name'**

Start command for the series end track.

Appearance

The command has the following appearance:

Parameters

Command name

Name of the command.

Entry	**25 characters**

Live display

on | off (Default value: **on**)

If this option is enabled, then the track will be displayed in the live display.

Command variables

The following command variables are generated in the method run by the **SERIES END** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.2.6 EXIT

Dialog window: **Method ▶ EXIT ▶ Properties... ▶ EXIT - 'Command name'**

Start command for the exit track.

Appearance

The command has the following appearance:

Parameters

Command name

Name of the command.

Entry	**25 characters**

Live display

on | off (Default value: **on**)

If this option is enabled, then the track will be displayed in the live display.

Always execute DATABASE command after track has stopped

on | off (Default value: **off**)

If this option is enabled, then a **DATABASE**, **EXPORT**, **REPORT** or **CALC** command present in the track will be executed, even if the track was stopped before execution of these commands.

Command variables

The following command variables are generated in the method run by the **EXIT** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.2.7 ERROR

Dialog window: **Method ► ERROR ► Properties... ► ERROR - 'Command name'**

Start command for the error track.

Appearance

The command has the following appearance:

Parameters

Command name

Name of the command.

Entry	**25 characters**

Live display

on | off (Default value: **on**)

If this option is enabled, then the track will be displayed in the live display.

Always execute DATABASE command after track has stopped

on | off (Default value: **off**)

If this option is enabled, then a **DATABASE**, **EXPORT**, **REPORT** or **CALC** command present in the track will be executed, even if the track was stopped before execution of these commands.

Command variables

The following command variables are generated by the **START** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.2.8 END

Dialog window: **Method ▶ END ▶ END - 'Command name'**

End command for all tracks.

Appearance

The command has the following appearance:

Parameters

The **END** command has no parameters. It is generated automatically at the end of the track when a track is inserted.

Command variables

No command variables are generated in the method run by the **END** command.

5.6.3 Titration commands

5.6.3.1 Titration commands - Overview

Menu item: **Method ▶ Insert ▶ New command... ▶ Titration**

Commands for titrations.

Modes

The following titration commands can be selected:

- *DET*
  Command for dynamic equivalence point titrations.

- *MET*
  Command for monotonic equivalence point titrations.
- *SET*
  Command for endpoint titrations.
- *KFT*
  Command for volumetric Karl Fischer titrations.
- *KFC*
  Command for coulometric Karl Fischer titrations with voltametric measurement.
- *BRC*
  Command for coulometric titration for determining the bromine consumption.
- *STAT*
  Command for STAT titrations.
- *TET*
  Command for thermometric titrations.

5.6.3.2 DET

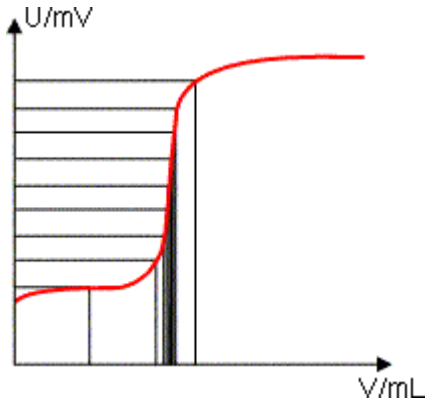
5.6.3.2.1 DET - Overview

Menu item: **Method ► Insert ► New command...**

Command for **Dynamic equivalence point titrations**.

Principle

With this command titrations with dynamic incremental reagent addition are carried out. The volume increments vary as a function of the slope of the curve. An attempt is made to reach constant measured value changes with each dosing. The optimal volume for dosing is determined from the measured value changes of the previous dosings. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting time.

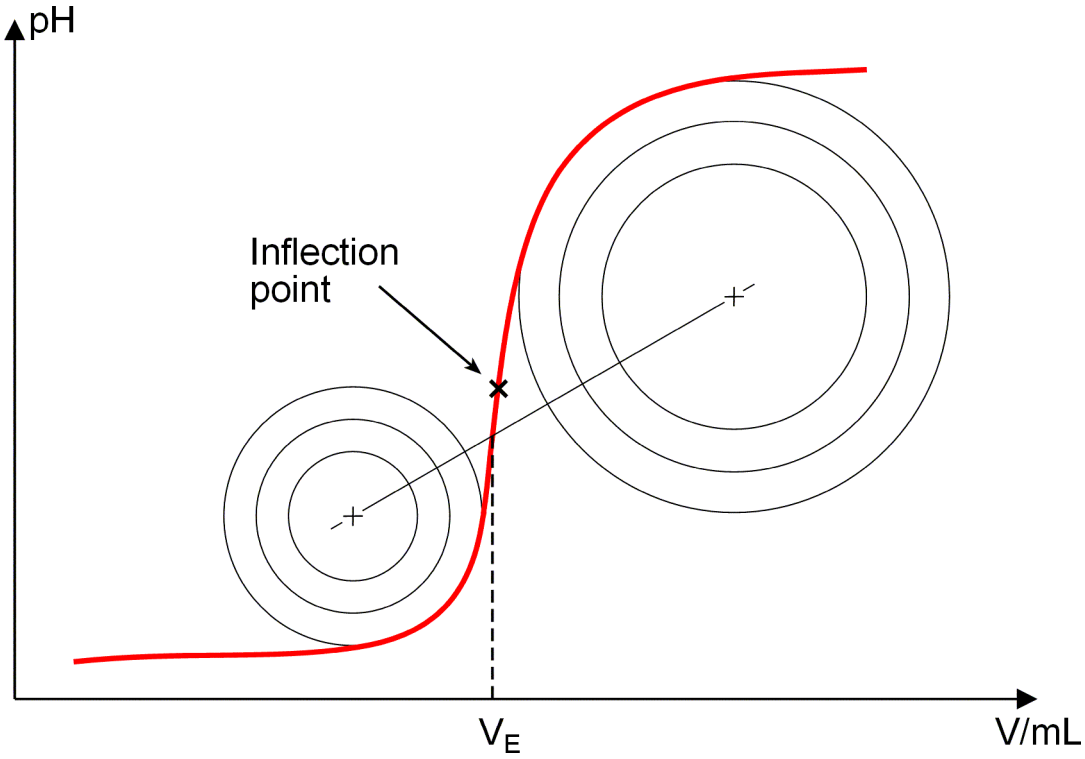


NOTICE

As the reagent dosing in **DET** depends on the measured data, the titration curve should not deviate too much from an s-shaped curve.

Evaluation

Equivalence points **EP** are determined automatically in a similar manner to that described in the Tubbs method (C.F. Tubbs; Anal. Chem 26 (1954) 1670–1671, quoted in Ullman 5 (1980) 659). The volume value of the equivalence point **VE** is shifted from the inflection point towards the smaller circle of curvature for real asymmetric titration curves.



The figure shows that the evaluation still requires measured values from the measuring point list also after the equivalence point.

For the recognition of the EPs found, the set **EP criterion** is compared with the **ERC** (**E**quivalence point **R**ecognition **C**riterion) found. The ERC is the first derivative of the titration curve combined with a mathematical function which is more sensitive for flat jumps than for steeper ones. EPs whose ERC is smaller than the set EP criterion will not be recognized.

Commands

Depending on the measured value one of the following four **DET** commands can be selected:

- *DET pH*
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *DET U*
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *DET Ipol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *DET Upol*
  Amperometric measurement with selectable polarization voltage (measured quantity current I).

5.6.3.2.2 DET pH

5.6.3.2.2.1 DET pH - Overview

Dialog window: **Method ► DET pH ► Properties... ► DET pH - 'Command name'**

Command for **Dynamic equivalence point titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **DET pH** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.

- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **DET pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.ERC	ERC for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value

Identification	Description
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.ERC	ERC for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

Identification	Description
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)

Identification	Description
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.2.2 DET pH - General/Hardware

Tab: **Method ► DET pH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.2.3 DET pH - Start conditions

Tab: **Method ▶ DET pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value pH

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-20.000 to 20.000**

Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 9.999 pH/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.2.2.4 DET pH - Titration parameters

Tab: **Method ▶ DET pH ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the **user** option is selected in the selection list **Titration rate**.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller signal drift and a higher EP criterion at the same time.

Input range	**0 to 9**
Default value	**2 (slow), 4 (optimal), 6 (fast)**

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Input range	**0.1 to 999.9 µL**
Default value	**10.0 (slow), 10.0 (optimal), 30.0 (fast) µL**

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrando, 855

Input range	**0.1 to 9999.9 µL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.2.2.5 DET pH - Stop conditions

Tab: **Method ▶ DET pH ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**

Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value pH

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

Titrino

Input range	**-20.00 to 20.00**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.2.2.6 DET pH - Potentiometric evaluation

Tab: **Method ► DET pH ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (pH)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (pH)
With this option set up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (pH)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrino	
Input range	**0 to 200**
Default value	**5**

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.2.9, page 479)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.2.9, page 479)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered.

[Properties]

Opens the dialog window in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.2.10, page 480)*.

[Delete]

Deletes the window selected in the table.

5.6.3.2.2.7 DET pH - Additional evaluations

Tab: **Method ▶ DET pH ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.2.2.11, page 481)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.2.2.11, page 481)*.

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

on | off (Default value: **off**)

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point *(see chapter 5.6.3.10.1, page 929)*.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-20.000 to 20.000 pH**
Default value	**-20.000 pH**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value pH

Input range	**-20.0 to 20.0 pH**
Default value	**20.0 pH**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Procedure

Selection of the Gran procedure.

Selection	**Normalized** | **Standard**
Default value	**Normalized**

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.0 mL**

Lower limit pH

Value for the lower limit of the Gran evaluation range.

Input range	**-20.000 to 20.000**
Default value	**-20.000**

Upper limit pH

Value for the upper limit of the Gran evaluation range.

Input range	**-20.000 to 20.000**
Default value	**20.000**

5.6.3.2.2.8 DET pH - Additional measured values

Tab: **Method ▶ DET pH ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.2.9 DET pH - Measured value window

Dialog window: **Method ► DET pH ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (pH) ► [New/[Properties] ► Measured value window**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit pH

Lower limit for the measured value window.

Input range	**-20.000 to 20.000**
Default value	**-20.000**

Upper limit pH

Upper limit for the measured value window.

Input range	**-20.000 to 20.000**
Default value	**20.000**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.2.10 DET pH - Volume window

Dialog window: **Method ► DET pH ► Properties... ► Potentiometric evaluation ► Evaluation with volume window (mL) ► [New/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.2.11 DET pH - Fixed endpoint evaluation

Dialog window: **Method ▶ DET pH ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-20.000 to 20.000 pH**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.2.3 DET U

5.6.3.2.3.1 DET U - Overview

Dialog window: **Method ► DET U ► Properties... ► DET U - 'Command name'**

Command for **Dynamic equivalence point titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **DET U** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **DET U** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.ERC	ERC or first derivative for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.EP{x}.ERC	ERC for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached

Identification	Description
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.ERC	ERC for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list

Identification	Description
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

Identification	Description
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command
.WVL	Wavelength of the Optrode in nm

5.6.3.2.3.2 DET U - General/Hardware

Tab: **Method ► DET U ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode**, **ISE electrode**, **Optrode type 1** or **Optrode type 2** from the sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Sensor (wavelength)

If an Optrode is selected as sensor, then the wavelength can also specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.3.3 DET U - Start conditions

Tab: **Method ▶ DET U ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-2000.0 to 2000.0 mV**

Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 999 mV/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.2.3.4 DET U - Titration parameters

Tab: **Method ▶ DET U ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the **user** option is selected in the selection list **Titration rate**.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller signal drift and a higher EP criterion at the same time.

Input range	**0 to 9**
Default value	**2 (slow), 4 (optimal), 6 (fast)**

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Input range	**0.1 to 999.9 µL**
Default value	**10.0 (slow), 10.0 (optimal), 30.0 (fast) µL**

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrando, 855

Input range	**0.1 to 9999.9 µL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.2.3.5 DET U - Stop conditions

Tab: **Method ► DET U ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**

Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000 mV**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.2.3.6 DET U - Potentiometric evaluation

Tab: **Method ► DET U ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (U)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (U)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (U)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrino	
Input range	**0 to 200**
Default value	**5**

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.3.9, page 506)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.3.9, page 506)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.3.10, page 507)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.3.10, page 507)*.

[Delete]

Deletes the window selected in the table.

5.6.3.2.3.7 DET U - Additional evaluations

Tab: **Method ► DET U ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.2.3.11, page 508)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.2.3.11, page 508)*.

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

on | off (Default value: **off**)

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point *(see chapter 5.6.3.10.1, page 929)*.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

5.6.3.2.3.8 DET U - Additional measured values

Tab: **Method ► DET U ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.3.9 DET U - Measured value window

Dialog window: **Method ► DET U ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (U) ► [New/[Properties] ► Measured value window #**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**-2000 mV**

Upper limit

Upper limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**2000 mV**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.3.10 DET U - Volume window

Dialog window: **Method ▶ DET U ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (mL) ▶ [New/[Properties] ▶ Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.3.11 DET U - Fixed endpoint evaluation

Dialog window: **Method ► DET U ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time	
Input range	**0.0 to 999999.9 s**

Volume	
Input range	**0.00000 to 9999.99 mL**

5.6.3.2.4 DET Ipol

5.6.3.2.4.1 DET Ipol - Overview

Dialog window: **Method ▶ DET Ipol ▶ Properties... ▶ DET Ipol - 'Command name'**

Command for **Dynamic equivalence point titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **DET Ipol** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.

- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **DET Ipol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C

Identification	Description
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.ERC	ERC for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list

Identification	Description
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL

Identification	Description
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.4.2 DET Ipol - General/Hardware

Tab: **Method ► DET Ipol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

The polarization current is the current applied to the polarizable electrode during a voltametric measurement.

Titrando, 855

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**–127 to 127 µA** (Increment: **1**)
Default value	**5 µA**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the

end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.4.3 DET Ipol - Start conditions

Tab: **Method ► DET Ipol ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is

started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 999 mV/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.2.4.4 DET Ipol - Titration parameters

Tab: **Method ► DET Ipol ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the **user** option is selected in the selection list **Titration rate**.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller signal drift and a higher EP criterion at the same time.

Input range	**0 to 9**
Default value	**2 (slow), 4 (optimal), 6 (fast)**

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Input range	**0.1 to 999.9 µL**
Default value	**10.0 (slow), 10.0 (optimal), 30.0 (fast) µL**

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrando, 855

Input range	**0.1 to 9999.9 µL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.2.4.5 DET Ipol - Stop conditions

Tab: **Method ► DET Ipol ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the titration are defined on this tab. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000 mV**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855	
Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.2.4.6 DET Ipol - Potentiometric evaluation

Tab: **Method ► DET Ipol ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (Upol)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (Ipol)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrino

Input range	**0 to 200**
Default value	**5**

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.4.9, page 533)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.4.10, page 534)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.4.10, page 534)*.

[Delete]

Deletes the window selected in the table.

5.6.3.2.4.7 DET Ipol - Additional evaluations

Tab: **Method ▶ DET Ipol ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.2.4.11, page 535)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.2.4.11, page 535)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

5.6.3.2.4.8 DET Ipol - Additional measured values

Tab: **Method ► DET Ipol ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.4.9 DET Ipol - Measured value window

Dialog window: **Method ► DET Ipol ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (Ipol) ► [New/[Properties] ► Measured value window**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**-2000 mV**

Upper limit

Upper limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**2000 mV**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.4.10 DET Ipol - Volume window

Dialog window: **Method ► DET Ipol ► Properties... ► Potentiometric evaluation ► Evaluation with volume window (mL) ► [New/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.4.11 DET Ipol - Fixed endpoint evaluation

Dialog window: **Method ► DET Ipol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value	
Input range	**-2000.0 to 2000.0 mV**

Time	
Input range	**0.0 to 999999.9 s**

Volume	
Input range	**0.00000 to 9999.99 mL**

5.6.3.2.5 DET Upol

5.6.3.2.5.1 DET Upol - Overview

Dialog window: **Method ► DET Upol ► Properties... ► DET Upol - 'Command name'**

Command for **Dynamic equivalence point titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **DET Upol** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.

- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **DET Upol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**

.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.ERC	ERC for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list

.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value in the measuring point list
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL

.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.5.2 DET Upol - General/Hardware

Tab: **Method ► DET Upol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando, 855

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.5.3 DET Upol - Start conditions

Tab: **Method ▶ DET Upol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.01 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.05 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting

time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 99 µA/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.2.5.4 DET Upol - Titration parameters

Tab: **Method ▶ DET Upol ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.01 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.05 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting

time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the **user** option is selected in the selection list **Titration rate**.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller signal drift and a higher EP criterion at the same time.

Input range	**0 to 9**
Default value	**2 (slow), 4 (optimal), 6 (fast)**

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Input range	**0.1 to 999.9 µL**
Default value	**10.0 (slow), 10.0 (optimal), 30.0 (fast) µL**

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as

otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrando, 855	
Input range	**0.1 to 9999.9 µL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.2.5.5 DET Upol - Stop conditions

Tab: **Method ► DET Upol ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Input range	**-200.0 to 200.0 µA**
Selection	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855	
Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.2.5.6 DET Upol - Potentiometric evaluation

Tab: **Method ► DET Upol ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (Upol)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrino	
Input range	**0 to 200**
Default value	**5**

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.5.9, page 560)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.5.9, page 560)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.2.5.10, page 561)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.2.5.10, page 561)*.

[Delete]

Deletes the window selected in the table.

5.6.3.2.5.7 DET Upol - Additional evaluations

Tab: **Method ▶ DET Upol ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.2.5.11, page 562)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.2.5.11, page 562)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which is present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

5.6.3.2.5.8 DET Upol - Additional measured values

Tab: **Method ► DET Upol ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.5.9 DET Upol - Measured value window

Dialog window: **Method ► DET Upol ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (Upol) ► [New/[Properties] ► Measured value window #**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Upper limit

Upper limit for the measured value window.

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.5.10 DET Upol - Volume window

Dialog window: **Method ► DET Upol ► Properties... ► Potentiometric evaluation ► Evaluation with volume window (mL) ► [New/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855	
Input range	**0 to 200**
Default value	**5**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855	
Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.5.11 DET Upol - Fixed endpoint evaluation

Dialog window: **Method ► DET Upol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**–200.0 to 200.0 µA**

Time

Input range	**0.0 to 999,999.9 s**

Volume

Input range	**0.00000 to 9,999.99 mL**

5.6.3.3 MET

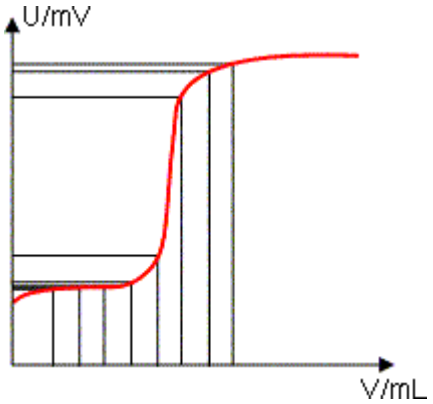
5.6.3.3.1 MET - Overview

Menu item: **Method ► Insert ► New command...**

Command for **Monotonic equivalence point titrations**.

Principle

With this command titrations with reagent addition at constant volume increments are carried out. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting time.



NOTICE

This command is suited for titrations with relatively high signal fluctuations or suddenly occurring potential jumps and for slow titrations or slowly responding electrodes.

Evaluation

The equivalence points (EPs) are automatically localized by a method based on the Fortuin method, which has been adapted by Metrohm for numerical methods. A search is made for the largest measured value change (Δ_n). The exact EP is determined by using an interpolation factor ρ which depends on the Δ values before and after Δ_n.

$$V_{EP} = V_0 + \rho\ \Delta V$$

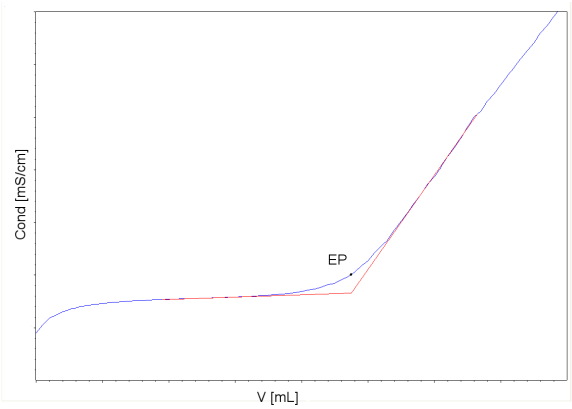
V_{EP} = EP volume, V_0 = total volume dosed before Δ_n, ΔV = volume increment, ρ = interpolation factor according to Fortuin

For the recognition of the EPs found, the set **EP criterion** is compared with the **ERC** (**E**quivalence point **R**ecognition **C**riterion) found. The ERC is the sum of the measured value changes before and after the jump:

$$|\Delta_{n-2}|+|\Delta_{n-1}|+|\Delta_n|+|\Delta_{n+1}|+|\Delta_{n+2}|$$

(In certain cases, only three or only one summand is taken into account.) EPs whose ERC is smaller than the set EP criterion will not be recognized.

Conductivity evaluation (MET Cond)



The first step to evaluation is a rough localization of the equivalence point. A line will then be approximated at each of the two curve branches (to the left and right of the equivalence point), in each case at the longest straight curve section. The volume of the intersection point is output as the equivalence point volume, while the equivalence measured value is interpolated on the basis of the volume from the measuring point list.

If more than one equivalence point is expected, then windows must be defined for the evaluation (for the consumed volume of the titrand around the equivalence point). The window limits may not, however, be set too narrowly for the window evaluation, because both the rough localization of the equivalent point and the equivalence point that is determined must lie within the range defined by the two limits. The adjustment of the lines of intersection, even on the longest straight curve section, can, however, extend beyond the window limits.

The algorithm recognizes only left-hand sharp bends and no right-hand sharp bends (the terms left and right are in this connection in reference to the movement along the curve with increasing volume).

Commands

Depending on the measured value one of the following **MET** commands can be selected:

- *MET pH*
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *MET U*
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *MET Ipol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).

- *MET Upol*
  Amperometric measurement with selectable polarization voltage (measured quantity current I).
- *MET Cond*
  Conductometric measurement (measured quantity conductivity γ).

5.6.3.3.2 MET pH

5.6.3.3.2.1 MET pH - Overview

Dialog window: **Method ► MET pH ► Properties... ► MET pH - 'Command name'**

Command for **Monotonic equivalence point titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

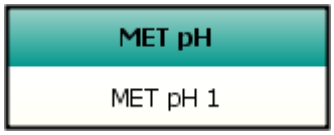
Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MET pH** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET pH** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BP{x}.DME	Measured value differential for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C

Identification	Description
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C

Identification	Description
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value

Identification	Description
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.2.2 MET pH - General/Hardware

Tab: **Method ► MET pH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.2.3 MET pH - Start conditions

Tab: **Method ▶ MET pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value pH

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**

Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 9.999 pH/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.3.2.4 MET pH - Titration parameters

Tab: **Method ▶ MET pH ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino	
Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855	
Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855	
Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino	
Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the option **User** is selected in the selection list **Titration rate**.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrando, 855

Input range	**0.0001 to 9.9999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Titrino

Input range	**0.001 to 9.999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.3.2.5 MET pH - Stop conditions

Tab: **Method ► MET pH ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino	
Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value pH

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855	
Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

Titrino	
Input range	**-20.00 to 20.00**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.3.2.6 MET pH - Potentiometric evaluation

Tab: **Method ▶ MET pH ▶ Properties... ▶ Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (pH)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (pH)
With this option set up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion pH

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0.10 to 9.99**
Default value	**0.50**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (pH)

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.2.9, page 588)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.2.9, page 588)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.2.10, page 589)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.2.10, page 589)*.

[Delete]

Deletes the window selected in the table.

5.6.3.3.2.7 MET pH - Additional evaluations

Tab: **Method ► MET pH ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.3.2.11, page 591)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.3.2.11, page 591)*.

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

on | off (Default value: **off**)

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point *(see chapter 5.6.3.10.1, page 929)*.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-20.000 to 20.000 pH**
Default value	**-20.000 pH**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value pH

Input range	**-20.0 to 20.0 pH**
Default value	**20.0 pH**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Procedure

Selection of the Gran procedure.

Selection	**Normalized** | **Standard**
Default value	**Normalized**

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.0 mL**

Lower limit pH

Value for the lower limit of the Gran evaluation range.

Input range	**-20.000 to 20.000**
Default value	**-20.000**

Upper limit pH

Value for the upper limit of the Gran evaluation range.

Input range	**-20.000 to 20.000**
Default value	**20.000**

5.6.3.3.2.8 MET pH - Additional measured values

Tab: **Method ► MET pH ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.2.9 MET pH - Measured value window

Dialog window: **Method ► MET pH ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (pH) ► [New]/[Properties] ► Measured value window#**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit pH

Lower limit for the measured value window.

Input range	**-20.000 to 20.000**
Default value	**-20.000**

Upper limit pH

Upper limit for the measured value window.

Input range	**-20.000 to 20.000**
Default value	**20.000**

EP criterion pH

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**0.1 to 9.99**
Default value	**0.50**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.2.10 MET pH - Volume window

Dialog window: **Method ► MET pH ► Properties... ► Potentiometric evaluation ► Evaluation with volume window (mL) ► [New]/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion pH

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855	
Input range	**0.1 to 9.99**
Default value	**0.50**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855	
Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.2.11 MET pH - Fixed endpoint evaluation

Dialog window: **Method ► MET pH ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-20.000 to 20.000 pH**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.3 MET U

5.6.3.3.1 MET U - Overview

Dialog window: **Dialog window ► MET U ► Properties... ► MET U - 'Command name'**

Command for **Monotonic equivalence point titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

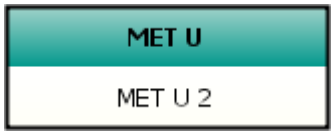
Titrando: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MET U** command are set in the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET U** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.DME	Measured value differential for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started

.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value

.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL

.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command
.WVL	Wavelength of the Optrode in nm

5.6.3.3.3.2 MET U - General/Hardware

Tab: **Method ▶ MET U ▶ Properties... ▶ General/Hardware**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode**, **ISE electrode**, **Optrode type 1** or **Optrode type 2** from the sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Sensor (wavelength)

If an Optrode is selected as sensor, then the wavelength can also specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855	
Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.3.3 MET U - Start conditions

Tab: **Method ▶ MET U ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 999 mV/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.3.3.4 MET U - Titration parameters

Tab: **Method ▶ MET U ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the option **User** is selected in the selection list **Titration rate**.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrando, 855

Input range	**0.0001 to 9.9999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Titrino

Input range	**0.001 to 9.999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.3.3.5 MET U - Stop conditions

Tab: **Method ▶ MET U ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000 mV**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855	
Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.3.3.6 MET U - Potentiometric evaluation

Tab: **Method ▶ MET U ▶ Properties... ▶ Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (U)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (U)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**1 to 999 mV**
Default value	**30 mV**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (U)

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.3.9, page 615)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.3.9, page 615)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.3.10, page 616)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.3.10, page 616)*.

[Delete]

Deletes the window selected in the table.

5.6.3.3.3.7 MET U - Additional evaluations

Tab: **Method ▶ MET U ▶ Properties... ▶ Additional evaluations**

Figure and parameters: *see DET U - Additional evaluations*

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.3.3.11, page 617)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.3.3.11, page 617)*.

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

on | off (Default value: **off**)

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point *(see chapter 5.6.3.10.1, page 929)*.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value

related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

5.6.3.3.3.8 MET U - Additional measured values

Tab: **Method ▶ MET U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.3.9 MET U - Measured value window

Dialog window: **Method ► MET U ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window ► [New]/[Properties] ► Measured value window#**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**-2000 mV**

Upper limit

Upper limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**2000 mV**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Input range	**1 to 999 mV**
Default value	**30 mV**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.3.10 MET U - Volume window

Dialog window: **Method ► MET U ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window ► [New]/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855

Input range	**1 to 999 mV**
Default value	**30 mV**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.3.11 MET U - Fixed endpoint evaluation

Dialog window: **Method ► MET U ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value	
Input range	**-2000.0 to 2000.0 mV**

Time	
Input range	**0.0 to 999999.9 s**

Volume	
Input range	**0.00000 to 9999.99 mL**

5.6.3.3.4 MET Ipol

5.6.3.3.4.1 MET Ipol - Overview

Dialog window: **Method ► MET Ipol ► Properties... ► MET Ipol - 'Command name'**

Command for **Monotonic equivalence point titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices:

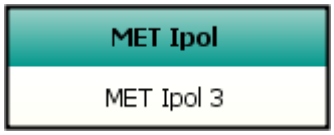
Titrando: 808, 809, 835, 836, 852, 857, 888, 904, 905, 906, 907

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MET Ipol** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.

- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MET Ipol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.DME	Measured value differential for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value

Identification	Description
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min

Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list

Identification	Description
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.4.2 MET Ipol - General/Hardware

Tab: **Method ► MET Ipol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

The polarization current is the current applied to the polarizable electrode during a voltametric measurement.

Titrando, 855

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**–127 to 127 µA** (Increment: **1**)
Default value	**5 µA**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.4.3 MET Ipol - Start conditions

Tab: **Method ► MET Ipol ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 999 mV/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.3.4.4 MET Ipol - Titration parameters

Tab: **Method ▶ MET Ipol ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.1 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting

time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrando, 855

Input range	**0.0001 to 9.9999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Titrino

Input range	**0.001 to 9.999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.3.4.5 MET Ipol - Stop conditions

Tab: **Method ► MET Ipol ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000 mV**
Selection	**off**
Default value	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.3.4.6 MET Ipol - Potentiometric evaluation

Tab: **Method ► MET Ipol ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (Upol)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**1 to 999 mV**
Default value	**30 mV**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (Ipol)

[New]

Open the dialog window in which the parameters for a new window can be entered *(see chapter 5.6.3.3.4.9, page 642)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.4.9, page 642)*.

[Delete]

Delete the window selected in the table.

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**1 to 999**
Default value	**30**

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.4.10, page 643)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.4.10, page 643)*.

[Delete]

Deletes the window selected in the table.

5.6.3.3.4.7 MET Ipol - Additional evaluations

Tab: **Method ► MET Ipol ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.3.4.11, page 644)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.3.4.11, page 644)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

5.6.3.3.4.8 MET Ipol - Additional measured values

Tab: **Method ► MET Ipol ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.4.9 MET Ipol - Measured value window

Dialog window: **Method ► MET Ipol ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window (Ipol) ► [New]/[Properties] ► Measured value window#**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**-2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**-2000 mV**

Upper limit

Upper limit for the measured value window.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Default value	**2000.0 mV**

Titrino

Input range	**-2000 to 2000 mV**
Default value	**2000 mV**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Input range	**1 to 999 mV**
Default value	**30 mV**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.4.10 MET Ipol - Volume window

Dialog window: **Method ► MET Ipol ► Properties... ► Potentiometric evaluation ► Evaluation with volume window (mL) ► [New]/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion mV

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Input range	**1 to 999**
Default value	**30**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.4.11 MET Ipol - Fixed endpoint evaluation

Dialog window: **Method ► MET Ipol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.3.5 MET Upol

5.6.3.3.5.1 MET Upol - Overview

Dialog window: **Method ► MET Upol ► Properties... ► MET Upol - 'Command name'**

Command for **Monotonic equivalence point titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

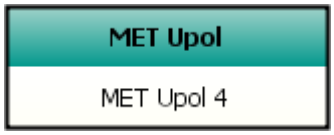
Titrando: 808, 809, 835, 836, 852, 857, 888, 904, 905, 906, 907

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MET Upol** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Potentiometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MET Upol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.DME	Measured value differential for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1 - 9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1 - 9) in °C
.HP{x}.TIM	Time in s until the HNP x (1 - 9) is reached
.HP{x}.VOL	Volume for the HNP x (1 - 9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL

Identification	Description
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.5.2 MET Upol - General/Hardware

Tab: **Method ► MET Upol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando, 855

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the

end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.5.3 MET Upol - Start conditions

Tab: **Method ► MET Upol ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.01 to 99.90 µA/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Start measured value

NOTICE

Only displayed for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is

started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Input range	**-200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Start slope

NOTICE

Only displayed for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Input range	**0 to 99 µA/mL**
Selection	**off**
Default value	**off**

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Default value	**5.00 mL/min**
Selection	**maximum**

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.3.5.4 MET Upol - Titration parameters

Tab: **Method** ▶ **MET Upol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrando, 855

Input range	**0.01 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrino

Input range	**0.05 to 99.90 µA/min**
Default value	**20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Input range	**0 (slow, optimal, fast) to 999999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Titrino

Input range	**0.1 to 9999 s**
Default value	**38.0 (slow), 26.0 (optimal), 21.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the option **User** is selected in the selection list **Titration rate**.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrando, 855

Input range	**0.0001 to 9.9999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Titrino

Input range	**0.001 to 9.999 mL**
Default value	**0.05 (slow), 0.10 (optimal), 0.20 (fast) mL**

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

5.6.3.3.5.5 MET Upol - Stop conditions

Tab: **Method ► MET Upol ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino	
Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Input range	**-200.0 to 200.0 µA**
Selection	**off**

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Input range	**1 to 9**
Default value	**9**
Selection	**off**

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrando, 855

Input range	**0.01000 to 9999.99 mL**
Selection	**off**
Default value	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.3.5.6 MET Upol - Potentiometric evaluation

Tab: **Method ► MET Upol ► Properties... ► Potentiometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	**Evaluation without window** | **Evaluation with measured value window (Upol)** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)
With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)
This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Input range	**0.1 to 99.9 µA**
Default value	**2.0 µA**

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	**all** | **greatest** | **last** | **off**
Default value	**all**

Titrando, 855

Selection	**all** | **greatest** | **last** | **ascending** | **descending** | **off**
Default value	**all**

all
All equivalence points will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last equivalence point to be found will be recognized.

ascending
Only equivalence points with a positive slope of the titration curve will be recognized.

descending
Only equivalence points with a negative slope of the titration curve will be recognized.

off
Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrino

Input range	**0.1 to 99.9 µA**
Default value	**2.0 µA**

[New]

Opens the **Measured value window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.5.9, page 668)*.

[Properties]

Opens the **Measured value window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.5.9, page 668)*.

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered *(see chapter 5.6.3.3.5.10, page 669)*.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.5.10, page 669)*.

[Delete]

Deletes the window selected in the table.

5.6.3.3.5.7 MET Upol - Additional evaluations

Tab: **Method ► MET Upol ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.3.5.11, page 670)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.3.5.11, page 670)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

on | off (Default value: **off**)

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

Window = Volume

Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time

Input range	**0 to 999999 s**
Default value	**999999 s**

Gran evaluation

NOTICE

This evaluation method is possible only with Titrando and 855.

Gran evaluation

on | off (Default value: **off**)

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure*(see chapter 5.6.3.10.4, page 932)*.

Initial volume

Volume which is present in the measuring vessel before the command is started.

Input range	**0.01 to 9999.99 mL**
Default value	**50.00 mL**

Lower limit

Value for the lower limit of the Gran evaluation range.

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Upper limit

Value for the upper limit of the Gran evaluation range.

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

5.6.3.3.5.8 MET Upol - Additional measured values

Tab: **Method ▶ MET Upol ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.5.9 MET Upol - Measured value window

Dialog window: **Method ► MET Upol ► Properties... ► Potentiometric evaluation ► Evaluation with measured value window ► [New]/[Properties] ► Measured value window#**

Measured value windows are regions (windows) on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Input range	**-200.0 to 200.0 µA**
Default value	**-200.0 µA**

Upper limit

Upper limit for the measured value window.

Input range	**-200.0 to 200.0 µA**
Default value	**200.0 µA**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Input range	**0.1 to 99.9 µA**
Default value	**2.0 µA**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855

Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.5.10 MET Upol - Volume window

Dialog window: **Method ► MET Upol ► Properties... ► Potentiometric evaluation ► Evaluation with volume window ► [New]/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Titrando, 855	
Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrando, 855	
Input range	**0.1 to 99.9 µA**
Default value	**2.0 µA**

EP recognition

Filter for the recognition of equivalence points:

Titrando, 855	
Selection	**first** | **greatest** | **last** | **ascending** | **descending**
Default value	**first**

first
Only the first endpoint to be found will be recognized.

greatest
Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last
Only the last endpoint to be found will be recognized.

ascending
Only endpoints with a positive slope of the titration curve will be recognized.

descending
Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.5.11 MET Upol - Fixed endpoint evaluation

Dialog window: **Method ► MET Upol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Properties] ► Fixed endpoint evaluation #**

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Fixed value

Value of the fixed endpoint.

Measured value	
Input range	**-200.0 to 200.0 µA**

Time	
Input range	**0.0 to 999999.9 s**

Volume	
Input range	**0.00000 to 9999.99 mL**

5.6.3.3.6 MET Cond

5.6.3.3.6.1 MET Cond - Overview

Dialog window: **Method ▶ MET Cond ▶ Properties... ▶ MET Cond - 'Command name'**

Command for **Monotonic equivalence point titrations** with conductometric measurement.

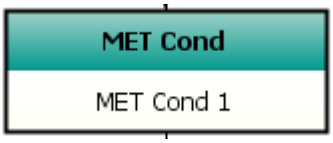
Devices

This command can be executed with the following device:

Conductivity Module: 856

Appearance

The command has the following appearance:



Parameters

The parameters for the **MET Cond** command are set on the following seven tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.

- *Conductometric evaluation*
  Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MET Cond** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.DME	Measured value differential for the break point x (1 - 9)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BP{x}.VOL	Volume at the break point x (1 - 9) in mL
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CLC	Cell constant of the sensor used in the command for conductivity measurement cells
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value

Identification	Description
.EP{x}.DME	Measured value differential for the endpoint x (1 - 9)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DME	Measured value differential for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mS/cm
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.DME	Measured value differential for the last measuring point in the measuring point list in the unit of the measured value
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.RTE	Reference temperature in °C
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C

Identification	Description
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume that was added according to the start condition "start measured value") in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TC.TC	Temperature coefficient in %/°C
.TC.C0	Coefficient c0 of the Chebyshev polynomial of the solution used
.TC.C1	Coefficient c1 of the Chebyshev polynomial of the solution used
.TC.C2	Coefficient c2 of the Chebyshev polynomial of the solution used
.TC.C3	Coefficient c3 of the Chebyshev polynomial of the solution used
.TC.C4	Coefficient c4 of the Chebyshev polynomial of the solution used
.TC.MAX	Maximum temperature coefficient in %/°C
.TC.MIN	Minimum temperature coefficient in %/°C
.TC.TSTART	Start temperature in °C
.TC.TSTOP	Stop temperature in °C

5.6.3.3.6.2 MET Cond - General/Hardware

Tab: **Method ► MET Cond ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected in the **Device name** field, the **Device type** field can no longer be edited and the device type belonging to the device is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Only editable for **Device name** = **not defined**, otherwise inactive.

Selection	**856 Conductivity Module**
Default value	**856 Conductivity Module**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Selection	**1** | **2** | **3** | **4**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**

Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Conductivity sensor** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Conductivity sensor** | **not defined**
Default value	**Conductivity sensor**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.3.3.6.3 MET Cond - Start conditions

Tab: **Method ► MET Cond ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the conductivity measurement is started.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

The measured value is only accepted if the signal drift is lower than the value entered here.

Input range	**0.001 to 999.0 (mS/cm)/min**
Selection	**off**
Default value	**off**

off
The measured values will be accepted when the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Start volume

Start volume

Volume to be dosed with the indicated dosing rate before the start of the titration.

Input range	**0.00000 to 9,999.99 mL**
Default value	**0.00000 mL**

Dosing rate

Rate (volume/time unit) at which the start volume is to be dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.3.6.4 MET Cond - Titration parameters

Tab: **Method ▶ MET Cond ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical rapid titrations.

User
Editing the individual titration parameters which affect the titration rate.

Measured value acceptance

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Signal drift

Drift for the measured value acceptance during the titration.

Input range	**0.001 to 999.000 (mS/cm)/min**
Default value	**0.05 (slow), 0.1 (optimal), 0.5 (fast) (mS/cm)/min**
Selection	**off**

off
Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting time is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 (slow, optimal, fast) s**

Max. waiting time

If the signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 7.5 / \sqrt{\text{Drift} + 0.001} + 5$$

Input range	**0.1 to 999,999 s**
Default value	**38.0 (slow), 28.0 (optimal), 15.0 (fast) s**

Dosing of increments

NOTICE

The following parameters will be displayed only if the **user** option is selected in the selection list **Titration rate**.

Volume increment

Small volume increments are used for determining blank values or with very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. The volume increment should be closer to 1/100 of the EP volume for steep jumps and closer to 1/10 for flat jumps. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value changes between two measuring points are then of the same order of magnitude as the noise.

Input range	**0.0001 to 9.9999 mL**
Default value	**0.05 (slow), 0.1 (optimal), 0.2 (fast) mL**

Dosing rate

Rate (volume/time unit) at which the volume increments are dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Reference temperature

The electrical conductivity depends greatly on the temperature. The conductivity measured at a particular temperature is thus automatically converted to this reference temperature (usually 20 °C or 25 °C).

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**
Selection	**off**

off
The conductivity at the measuring temperature is displayed.

Temperature compensation

Definition of the type how the temperature compensation is to be carried out.

Selection	**Temperature coefficient** | **Sample solution**
Default value	**Temperature coefficient**

Temperature coefficient
Manual entry of a constant temperature coefficient.

Sample solution
Selection of a function for the temperature coefficient from the table **Sample solution (TC conductivity) - %1**.

Temperature coefficient

The temperature compensation is calculated on the basis of the value entered (constant).

Input range	**0.00 to 9.99 %/°C**
Default value	**2.00 %/°C**

Sample solution

The temperature compensation is carried out on the basis of temperature-dependent coefficients and should be used for determinations where the sample temperature is not constant. There are two possibilities:

- It is possible to use a sample solution whose temperature coefficient has been determined by a previous measurement (MEAS TC Cond).
- For ground water, spring water and surface water, the temperature coefficients according to standard ISO 7888:1985 (German version: DIN EN 27888:1993) are stored in the system.

Selection	**DIN** | **Table entries**
Default value	**DIN**

The conductivity κ_T measured at a particular temperature T is thus automatically converted to the conductivity κ_R of a freely selectable reference temperature T_R (usually 20 C or 25 C). The conversion takes place with the aid of the temperature coefficient a_R with respect to the reference temperature T_R.

Conductivity at reference temperature

$$\kappa_R = \frac{\kappa_T}{1 + \frac{\alpha_R}{100}(T - T_R)}$$

Temperature coefficient

$$\alpha_R = \frac{100}{\kappa_R} \times \frac{\kappa_T - \kappa_R}{T - T_R}$$

κ_R Conductivity at reference temperature T_R

κ_T Conductivity at measuring temperature T

T Measuring temperature

T_R Reference temperature

a_R Temperature coefficients with respect to the reference temperature T_R (unit: %/°C).

5.6.3.3.6.5 MET Cond - Stop conditions

Tab: **Method ▶ MET Cond ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stop when the entered volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample size or the titration vessel size.

Input range	**0.00000 to 9,999.99 mL**
Default value	**100.000 mL**
Selection	**off**

Stop measured value

Stop when the entered measured value for a measuring point has been exceeded or not reached since the start of the titration.

Input range	**0.00000 to 2,000.00**
Selection	**off**
Default value	**off**

Stop time

Stop when the entered time has elapsed after the start of the titration (including start conditions).

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

Filling rate

Rate (volume / time unit) at which the buret is to be filled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.3.6.6 MET Cond - Conductometric evaluation

Tab: **Method ▶ MET Cond ▶ Properties... ▶ Conductometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the conductometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following evaluation methods can be chosen:

Conductometric evaluation

Selection	**Evaluation without window** | **Evaluation with volume window (mL)**
Default value	**Evaluation without window**

Evaluation without window
The measurement curve is smoothed with the value specified for the **Smoothing** parameter with this option. Only the endpoint with the highest value will be evaluated. If you wish to evaluate several endpoints, then you must work with **Evaluation with volume window (mL)**.

Evaluation with volume window (mL)
An area (window) can be defined on the volume axis with this option. The equivalence point is recognized only if it lies within this window and in addition fulfills the parameters defined in the window.

Evaluation without window

Smoothing

Measure for the curve smoothing used for the data processing. The higher the smoothing that is selected, the more the measurement curve will be smoothed.

Input range	**0 to 150**
Default value	**0**

Evaluation with volume window (mL)

With this option up to 9 areas (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one equivalence point will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Table of the volume windows

The parameters for the defined volume window are displayed in the window table, which cannot be edited. The columns **Lower limit mL**, **Upper limit mL** and **Smoothing** appear.

[New]

Opens the **Volume window #** dialog window, in which the parameters for a new window can be entered.

[Properties]

Opens the **Volume window #** dialog window, in which the parameters for the selected window can be edited *(see chapter 5.6.3.3.6.9, page 690)*.

[Delete]

Deletes the window selected in the table.

5.6.3.3.6.7 MET Cond - Additional evaluations

Tab: **Method ► MET Cond ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.3.6.10, page 691)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.3.6.10, page 691)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Only editable for **Minimum evaluation** = **on**, otherwise disabled.

Input range	**0.01 to 2,000.0 (mS/cm)/mL**
Default value	**25.0 (mS/cm)/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Only editable for **Maximum evaluation** = **on**, otherwise disabled.

Input range	**0.01 to 2,000.0 (mS/cm)/mL**
Default value	**25.0 (mS/cm)/mL**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

A break point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer break points will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Volume** | **Time** | **off**
Default value	**off**

Lower limit

Value for the lower limit of the window.

Window = Measured value

Input range	**-2000.0 to 2000.0 mS/cm**
Default value	**-2000.0 mS/cm**

Window = Volume	
Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Window = Time	
Input range	**0 to 999999 s**
Default value	**0 s**

Upper limit

Value for the upper limit of the window.

Window = Measured value	
Input range	**-2000.0 to 2000.0 mS/cm**
Default value	**2000 mS/cm**

Window = Volume	
Input range	**0.00000 to 9999.99 mL**
Default value	**9999.99 mL**

Window = Time	
Input range	**0 to 999999 s**
Default value	**999999 s**

5.6.3.3.6.8 MET Cond - Additional measured values

Tab: **Method ► MET Cond ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.6.9 MET Cond - Volume window

Dialog window: **Method ► MET Cond ► Properties... ► Conductometric evaluation ► Evaluation with volume window (mL) ► [New/[Properties] ► Volume window #**

Volume windows are defined regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Input range	**0.00000 to 9,999.99 mL**
Default value	**0.00000 mL**

Upper limit

Upper limit for the volume window.

Input range	**0.00000 to 9,999.99 mL**
Default value	**9,999.99 mL**

Smoothing

Measure for the curve smoothing used for the data processing. The higher the smoothing that is selected, the more the measurement curves will be smoothed.

Input range	**0 to 150**
Default value	**0**

5.6.3.3.6.10 MET Cond - Fixed endpoint evaluation

Dialog window: **Method ▶ MET Cond ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation ▶ [New/[Properties] ▶ Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mS/cm**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.4 SET

5.6.3.4.1 SET - Overview

Menu item: **Method ► Insert ► New command...**

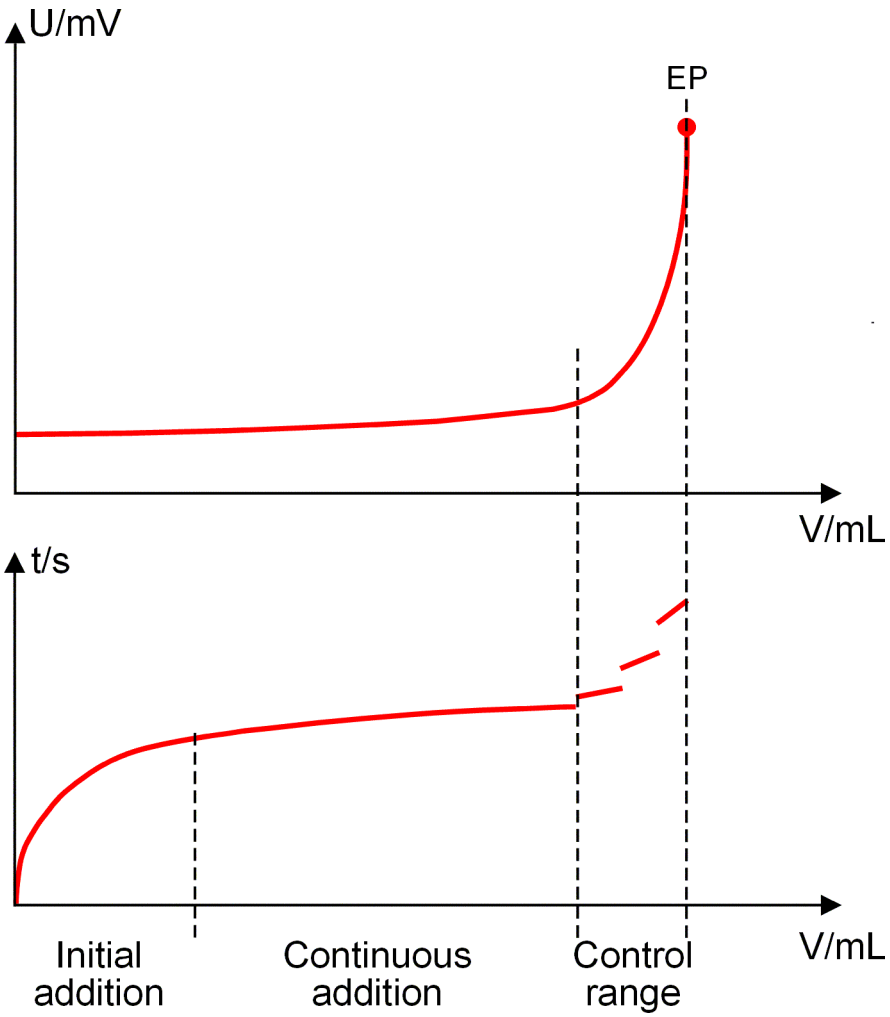
Command for **endpoint titrations**.

Principle

With this command titrations to one or two preset endpoints are carried out. The termination of the titration at the endpoint is either drift-controlled or after a waiting period. The volume that has been dosed up to the endpoint gives the calculable reagent consumption.

Reagent dosing takes place in three phases during the titration:

- **Initial dosing**
  The dosing rate increases continuously during this phase. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
  The dosing continues to be carried out at the **Max. rate** until the **Control range** is reached.
- **Control range**
  Dosing is finely controlled in this range. Shortly before the endpoint is reached, dosing is carried out only at the **Min. rate** (*Control range*).



NOTICE

This command can be used for rapid routine determinations when the endpoint does not change throughout a series or when an excess of reagent must be avoided.

Commands

Depending on the measured value one of the following four **SET** commands can be selected:

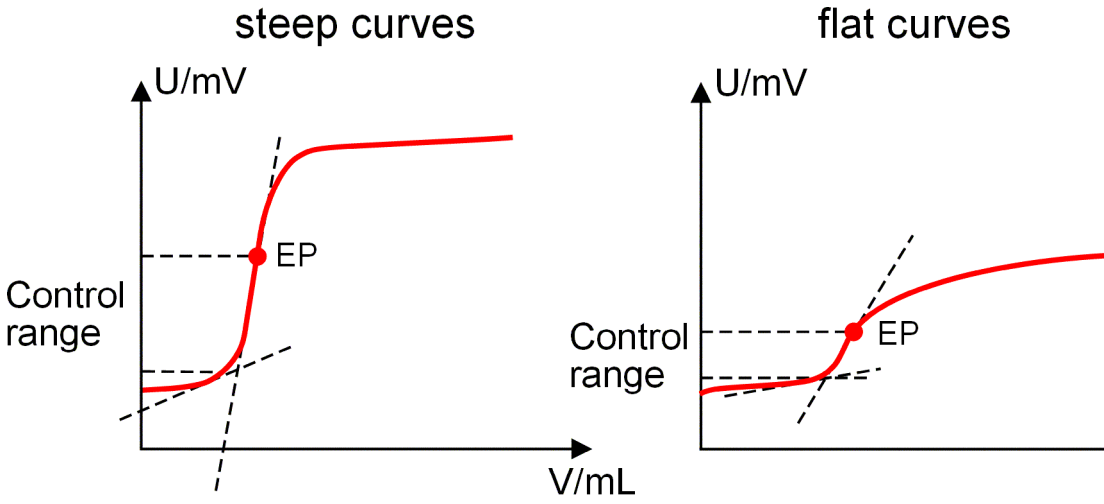
- *SET pH*
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *SET U*
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).

- *SET Upol*
  Amperometric measurement with selectable polarization voltage (measured quantity current I).
- *SET Ipol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).

5.6.3.4.2 SET - Control range

Menu item: **Method ▶ SET ▶ Properties... ▶ Control parameters**

Set a large control range for steep curves and a small control range for flat ones. A good approximation for the start of the control range is given by the point where the tangents intersect.



5.6.3.4.3 SET pH

5.6.3.4.3.1 SET pH - Overview

Dialog window: **Method ▶ SET pH ▶ Properties... ▶ SET pH - 'Command name'**

Command for **endpoint titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

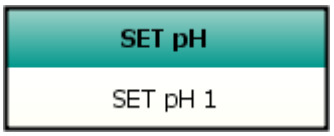
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrosampler: 855

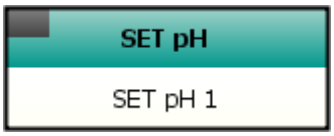
Appearance

The command has the following appearance:

without conditioning



with conditioning



Parameters

The parameters for the **SET pH** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **SET pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started

Identification	Description
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C

Identification	Description
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL

Identification	Description
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.3.2 SET pH - General/Hardware

Tab: **Method ► SET pH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855	
Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855	
Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.3.3 SET pH - Start conditions

Tab: **Method ▶ SET pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.4.3.4 SET pH - Control parameters

Tab: **Method ▶ SET pH ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 at pH

Measured value for the first endpoint.

Titrando, 855

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

Titrino

Input range	**-20.00 to 20.00**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics pH

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate** *(see chapter 5.6.3.4.2, page 694)*.

Titrando, 855

Input range	**0.001 to 20.000**
Default value	**5.000 (slow), 2.000 (optimal), 0.500 (fast)**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Titrino

Input range	**0.01 to 20.00**
Default value	**5.00 (slow), 2.00 (optimal), 0.50 (fast)**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min**
Selection	**maximum**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Input range	**0.01 to 9999.00 µL/min**
Default value	**5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min**

Stop criterion

Stop criterion

The titration us stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

NOTICE

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	**drift** | **time** | **off**
Default value	**drift**

drift
The switch-off point will always have the same curve slope dV/dt.

time
The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off
The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Titrino

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Endpoint 2

NOTICE

Is active only for **EP1 at ≠ off**.

on | off (Default value: **off**)

Enable/disable endpoint 2. If this is disabled all following parameters are not visible.

EP2 at pH

Measured value for the second endpoint.

Titrando, 855

Input range	**-20.0 to 20.0**
Selection	**off**
Default value	**off**

Titrino

Input range	**-20.00 to 20.00**
Selection	**off**
Default value	**off**

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.3.5 SET pH - Titration parameters

Tab: **Method ▶ SET pH ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s**
Default value	**2.00 s**

5.6.3.4.3.6 SET pH - Stop conditions

Tab: **Method ► SET pH ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the titration are defined on this tab. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.4.3.7 SET pH - Conditioning

Tab: **Method ► SET pH ► Properties... ► Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **off**)

Enable/disable conditioning. If conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrando, 855

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrando, 855

Input range	**0.000000 to 9999.99 mL**
Default value	**20.00 mL**
Selection	**off**
Default value	**off**

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrando, 855

Input range	**1 to 999999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.3.8 SET pH - Additional evaluations

Tab: **Method ► SET pH ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.4.3.10, page 716)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.4.3.10, page 716)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

5.6.3.4.3.9 SET pH - Additional measured values

Tab: **Method ► SET pH ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.3.10 SET pH - Fixed endpoint evaluation

Dialog window: **Method ► SET pH ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-20.000 to 20.000 pH**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.4.4 SET U

5.6.3.4.4.1 SET U - Overview

Dialog window: **Method ► SET U ► Properties... ► SET U - 'Command name'**

Command for **endpoint titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

without conditioning

with conditioning

Parameters

The parameters for the **SET U** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **SET U** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL

Identification	Description
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached

Identification	Description
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.4.2 SET U - General/Hardware

Tab: **Method ▶ SET U ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.4.3 SET U - Start conditions

Tab: **Method ▶ SET U ▶ Properties... ▶ Start conditions**

The start conditions are processed in the sequence shown before the titration is started.

Command name

Name of the command.

Entry	**25 characters**

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.4.4.4 SET U - Control parameters

Tab: **Method ▶ SET U ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not dis-

played. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate** *(see chapter 5.6.3.4.2, page 694)*.

Titrando, 855

Input range	**0.1 to 2,000.0 mV**
Default value	**300.0 (slow), 100.0 (optimal), 30.0 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Titrino

Input range	**1.00 to 2,000 mV**
Default value	**300.0 (slow), 100.0 (optimal), 30.00 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min**
Selection	**maximum**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Input range	**0.01 to 9999.00 µL/min**
Default value	**5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min**

Stop criterion

Stop criterion

The titration us stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

NOTICE

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	**drift** | **time** | **off**
Default value	**drift**

drift
The switch-off point will always have the same curve slope dV/dt.

time
The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off
The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Titrino

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Endpoint 2

NOTICE

Is active only for **EP1 at ≠ off**.

on | off (Default value: **off**)

Enable/disable endpoint 2. If this is disabled all following parameters are not visible.

EP2 at pH

Measured value for the second endpoint.

Titrando, 855

Input range	**-20.0 to 20.0**
Selection	**off**
Default value	**off**

Titrino

Input range	**-20.00 to 20.00**
Selection	**off**
Default value	**off**

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.4.5 SET U - Titration parameters

Tab: **Method ▶ SET U ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s**
Default value	**2.00 s**

5.6.3.4.4.6 SET U - Stop conditions

Tab: **Method ▶ SET U ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**

Selection	**maximum**
Default value	**maximum**

5.6.3.4.4.7 SET U - Conditioning

Tab: **Method ▶ SET U ▶ Properties... ▶ Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **off**)

Enable/disable conditioning. If conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrando, 855

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrando, 855

Input range	**0.000000 to 9999.99 mL**
Default value	**20.00 mL**
Selection	**off**
Default value	**off**

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrando, 855

Input range	**1 to 999999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.4.8 SET U - Additional evaluations

Tab: **Method ► SET U ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.4.4.10, page 738)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.4.4.10, page 738)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

5.6.3.4.4.9 SET U - Additional measured values

Tab: **Method ► SET U ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.4.10 SET U - Fixed endpoint evaluation

Dialog window: **Method ▶ SET U ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation ▶ [New/[Properties] ▶ Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.4.5 SET Ipol

5.6.3.4.5.1 SET Ipol - Overview

Dialog window: **Method ▶ SET Ipol ▶ Properties... ▶ SET Ipol - 'Command name'**

Command for **endpoint titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 852, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

without conditioning

with conditioning

Parameters

The parameters for the **SET Ipol** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **SET Ipol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL

Identification	Description
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value

Identification	Description
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.5.2 SET Ipol - General/Hardware

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange

or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

The polarization current is the current applied to the polarizable electrode during a voltametric measurement.

Titrando, 855

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**–127 to 127 µA** (Increment: **1**)
Default value	**5 µA**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.5.3 SET Ipol - Start conditions

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.4.5.4 SET Ipol - Control parameters

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Titrando, 855

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**-2000 to 2000**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not dis-

played. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate** *(see chapter 5.6.3.4.2, page 694)*.

Titrando, 855

Input range	**0.1 to 2,000.0 mV**
Default value	**300.0 (slow), 100.0 (optimal), 30.0 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Titrino

Input range	**1.00 to 2,000 mV**
Default value	**300.0 (slow), 100.0 (optimal), 30.00 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min**
Selection	**maximum**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Input range	**0.01 to 9999.00 µL/min**
Default value	**5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min**

Stop criterion

Stop criterion

The titration us stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

NOTICE

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	**drift** | **time** | **off**
Default value	**drift**

drift
The switch-off point will always have the same curve slope dV/dt.

time
The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off
The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Titrino	
Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Endpoint 2

NOTICE

Is active only for **EP1 at ≠ off**.

on | off (Default value: **off**)

Enable/disable endpoint 2. If this is disabled all following parameters are not visible.

EP2 at

Measured value for the second endpoint.

Titrando, 855	
Input range	**–2,000.0 to 2,000.0 mV**
Selection	**off**
Default value	**off**

Titrino	
Input range	**–2,000 to 2,000**
Selection	**off**
Default value	**off**

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.5.5 SET Ipol - Titration parameters

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s**
Default value	**2.00 s**

5.6.3.4.5.6 SET Ipol - Stop conditions

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the titration are defined on this tab. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.4.5.7 SET Ipol - Conditioning

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrando, 855

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrando, 855

Input range	**0.000000 to 9999.99 mL**
Default value	**20.00 mL**
Selection	**off**
Default value	**off**

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrando, 855

Input range	**1 to 999999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.5.8 SET Ipol - Additional evaluations

Tab: **Method ► SET Ipol ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.4.5.10, page 760)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.4.5.10, page 760)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

5.6.3.4.5.9 SET Ipol - Additional measured values

Tab: **Method ▶ SET Ipol ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.5.10 SET Ipol - Fixed endpoint evaluation

Dialog window: **Method ► SET Ipol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.4.6 SET Upol

5.6.3.4.6.1 SET Upol - Overview

Dialog window: **Method ► SET Upol ► Properties... ► SET Upol - 'Command name'**

Command for **endpoint titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 852, 857, 888, 901, 902, 904, 905, 906, 907

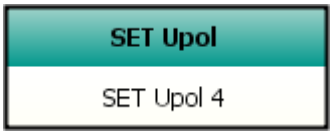
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrosampler: 855

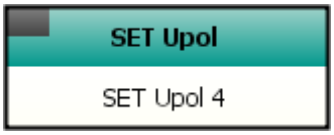
Appearance

The command has the following appearance:

without conditioning



with conditioning



Parameters

The parameters for the **SET Upol** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **SET Upol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint x (1 - 9) in the unit of the measured value
.EP{x}.MEP	Number of endpoints in the window x (1 - 9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift**
.EP{x}.TEM	Temperature for the endpoint x (1 - 9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1 - 9) is reached
.EP{x}.VOL	Volume for the endpoint x (1 - 9) in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL

Identification	Description
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL

Identification	Description
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.6.2 SET Upol - General/Hardware

Tab: **Method ► SET Upol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange

or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888)

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando, 855

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.6.3 SET Upol - Start conditions

Tab: **Method ► SET Upol ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.01 to 99.90 µA/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.4.6.4 SET Upol - Control parameters

Tab: **Method ► SET Upol ► Properties... ► Control parameters**

Command name

Name of the command.

Entry	**25 characters**

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Input range	**-200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate** *(see chapter 5.6.3.4.2, page 694)*.

Titrando, 855

Input range	**0.01 to 200.00 µA**
Default value	**40.0 (slow), 10.0 (optimal), 5.0 (fast) µA**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Titrino

Input range	**0.1 to 200.0 µA**
Default value	**40.0 (slow), 10.0 (optimal), 5.0 (fast) µA**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min**
Selection	**maximum**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Input range	**0.01 to 9999.00 µL/min**
Default value	**5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min**

Stop criterion

Stop criterion

The titration us stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

NOTICE

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	**drift** | **time** | **off**
Default value	**drift**

drift
The switch-off point will always have the same curve slope dV/dt.

time
The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off
The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Titrino

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Endpoint 2

NOTICE

Is active only for **EP1 at ≠ off**.

on | off (Default value: **off**)

Check box for enabling/disabling endpoint 2. If this is disabled, then the associated parameters will not be displayed.

EP2 at

Measured value for the second endpoint.

Input range	**–200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.6.5 SET Upol - Titration parameters

Tab: **Method ► SET Upol ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrando, 719, 720, 736, 751, 758, 785, 794, 798, 799

Input range	**0 to 999999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Input range	**0.1 to 999999 s**
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s**
Default value	**2.00 s**

5.6.3.4.6.6 SET Upol - Stop conditions

Tab: **Method ▶ SET Upol ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrando, 855

Input range	**0 to 999999 s**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.4.6.7 SET Upol - Conditioning

Tab: **Method ► SET Upol ► Properties... ► Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrando, 855

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrando, 855	
Input range	**0.000000 to 9999.99 mL**
Default value	**20.00 mL**
Selection	**off**
Default value	**off**

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrando, 855	
Input range	**1 to 999999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.6.8 SET Upol - Additional evaluations

Tab: **Method ► SET Upol ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.4.6.10, page 782)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.4.6.10, page 782)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

5.6.3.4.6.9 SET Upol - Additional measured values

Tab: **Method ► SET Upol ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.6.10 SET Upol - Fixed endpoint evaluation

Dialog window: **Method ► SET Upol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-200.0 to 200.0 µA**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.5 KFT

5.6.3.5.1 KFT - Overview

Menu item: **Method ► Insert ► New command...**

Command for volumetric **Karl Fischer titrations**.

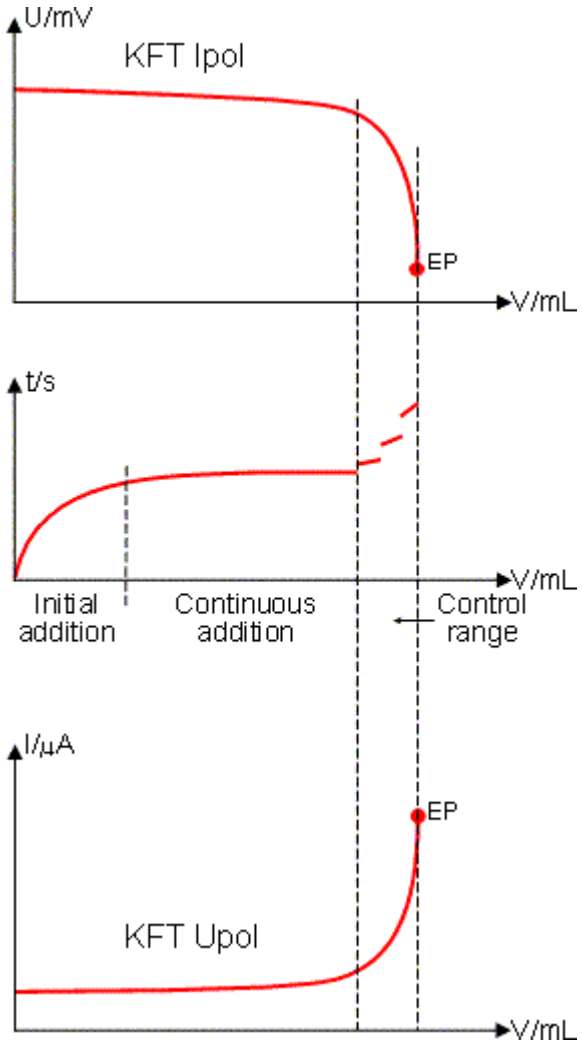
Principle

Volumetric titrations for determining the water content according to Karl Fischer with automatic conditioning are carried out with this command. A typical feature of the Karl Fischer titration is the controlled reagent dosing, which depends on the control difference (current measured value – endpoint), with the aim of reaching the measured value given as being the predefined target endpoint as quickly and accurately as possible. Overtitrating is avoided to a great extent. The titration termination at the end-

point takes place either drift-controlled or after a waiting time. The volume added up to the endpoint gives the calculable reagent consumption.

Reagent dosing takes place in three phases during the titration:

- **Initial dosing**
  The dosing rate increases continuously during this phase. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
  The dosing continues to be carried out at the **Max. rate** until the **Control range** is reached.
- **Control range**
  Dosing is finely controlled in this range. Shortly before the endpoint is reached, dosing is carried out only at the **Min. rate**.



Commands

Depending on the measured value one of the following two **KFT** commands can be selected:

- *KFT Ipol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *KFT Upol*
  Amperometric measurement with selectable polarization voltage (measured quantity current I).

5.6.3.5.2 KFT Ipol

5.6.3.5.2.1 KFT Ipol - Overview

Dialog window: **Method ► KFT Ipol ► Properties... ► KFT Ipol - 'Command name'**

Command for **Karl Fischer titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices:

Titrando: 835, 836, 841, 852, 857, 888, 890, 901, 906, 907

Titrino: 720, 736, 751, 758, 784, 795, 799

Appearance

The command has the following appearance:

without conditioning

with conditioning

Parameters

The parameters for the **KFT Ipol** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.

- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **KFT Ipol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Number of endpoints **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Auto-drift, 4 = EP corrected with manual drift**

Identification	Description
.EP.TEM	Temperature for the endpoint in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.VOL	Volume for the endpoint in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL

Identification	Description
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.5.2.2 KFT Ipol - General/Hardware

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888, 890)

Selection	**1** | **2**
Default value	**1**

888, 890

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

The polarization current is the current applied to the polarizable electrode during a voltametric measurement.

Titrando, 855

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**–127 to 127 µA** (Increment: **1**)
Default value	**5 µA**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando	
Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos.

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 784, 795 and 799.

5.6.3.5.2.3 KFT Ipol - Start conditions

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrandos.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. for the electrode to settle down, before a start volume is added.

Input range	**0 to 999,999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be dosed with the indicated dosing rate before the start of the titration.

Titrando

Input range	**0.00000 to 9,999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Rate at which the start volume is to be dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.5.2.4 KFT Ipol - Control parameters

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

End point

EP at

Measured value for the endpoint.

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**250.0 mV**
Selection	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. volume increment**. The closer the endpoint, the slower the dosing until the **Min. volume increment** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate**.

Titrando

Input range	**0.1 to 2,000.0 mV**
Default value	**300.0 (slow), 100.0 (optimal), 30.0 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum volume increment is applied throughout the entire titration.

Titrino

Input range	**1 to 2,000 mV**
Default value	**300 (slow), 100 (optimal), 30 (fast) mV**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum volume increment is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), maximum (optimal), maximum (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), maximum (optimal), maximum (fast) mL/min**
Selection	**maximum**

Min. volume increment

This parameter determines the addition rate with which dosing is carried out at the very beginning and at the end of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Input range	**0.1 to 9.9 µL**
Default value	**minimum (slow), minimum (optimal), 5.0 (fast) µL**

Stop criterion

Stop criterion

The titration is canceled after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be canceled when a particular **Drift** has been reached or after a preset **Time**.

Titrino

Selection	**Drift** | **Time**
Default value	**Drift**

Titrando

Selection	**Drift** | **rel. drift** | **off** | **Time**
Default value	**Drift**

Drift
The titration is canceled when the **Stop drift** has been reached.

rel. drift
The titration is canceled when the relative stop drift (drift value at the start + **Relative stop drift**) has been reached.

off
The titration is not canceled.

Time
The endpoint must be exceeded during a certain period of time: the delay time. The same delay time with different smallest possible volume increments (depending on the volume of the exchange or dosing unit) equals different switch-off points.

NOTICE

The stop conditions always lead to a stop, even if the stop criterion has not been reached or has been switched off.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Relative stop drift

The titration is canceled when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift value at the titration start and the relative stop drift defined here. This parameter is displayed only if **Stop criterion** = **rel. drift**.

Titrando

Input range	**1 to 999 µL/min**
Default value	**10 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is canceled when the absolute stop time defined here has elapsed since the start of the titration. This parameter is displayed only if **Stop criterion** = **Time** and if **Delay time** = **inf.**.

Titrino

Input range	**1 to 999,999 s**

5.6.3.5.2.5 KFT Ipol - Titration parameters

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration direction

Selection of the titration direction.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value change

-
negative measured value change

auto
The titration direction is determined automatically from the initial measured value and the set endpoint.

Extraction time

The titration is not canceled until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, for instance, for the titration of sparingly soluble samples.

Input range	**0 to 999,999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando

Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16,200 s**
Default value	**2.00 s**

5.6.3.5.2.6 KFT Ipol - Stop conditions

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stop when the entered volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample size or the titration vessel size.

Titrando

Input range	**0.00000 to 9,999.99 mL**
Default value	**100.000 mL**
Selection	**off**

Titrino

Input range	**0.00 to 9,999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stop when the entered time has elapsed after the start of the titration (including start conditions).

Titrando

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

Filling rate

Rate at which the dosing cylinder is to be filled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.5.2.7 KFT Ipol - Conditioning

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is lower than the **Start drift** entered here. In such cases, the **Status** displayed in the **Run** subwindow on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Titrando

Input range	**1 to 999 µg/min**
Default value	**20 µg/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stop of the determination when the specified volume has been dosed since the start of the conditioning. The stop volume should be adjusted to the size of the titration cell in order to prevent any overflow.

Titrando	
Input range	**0.000000 to 9,999.99 mL**
Default value	**20.000 mL**
Selection	**off**
Default value	**off**

Stop time

Stop of the determination when the specified time has elapsed since the start of the conditioning.

Titrando	
Input range	**1 to 999,999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.5.2.8 KFT Ipol - Additional evaluations

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.5.2.10, page 805)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.5.2.10, page 805)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

5.6.3.5.2.9 KFT Ipol - Additional measured values

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.5.2.10 KFT Ipol - Fixed endpoint evaluation

Dialog window: **Method ► KFT Ipol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.5.3 KFT Upol

5.6.3.5.3.1 KFT Upol - Overview

Dialog window: **Method ► KFT Upol ► Properties... ► KFT Upol - 'Command name'**

Command for **Karl Fischer titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

Titrando: 835, 836, 841, 852, 857, 888, 890, 901, 906, 907

Titrino: 720, 736, 751, 758, 784, 795, 799

Appearance

The command has the following appearance:

without conditioning

with conditioning

Parameters

The parameters for the **KFT Upol** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **KFT Upol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions in s
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Number of endpoints **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Auto-drift, 4 = EP corrected with manual drift**
.EP.TEM	Temperature for the endpoint in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.VOL	Volume for the endpoint in mL
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C

Identification	Description
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)

Identification	Description
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.5.3.2 KFT Upol - General/Hardware

Tab: **Method ► KFT Upol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando (without 888)

Selection	**1** | **2** | **3** | **4**
Default value	**1**

888

Selection	**1** | **2**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888, 890)

Selection	**1** | **2**
Default value	**1**

888, 890

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status

to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos.

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 784, 795 and 799.

5.6.3.5.3.3 KFT Upol - Start conditions

Tab: **Method ▶ KFT Upol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Is displayed only for Titrando.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.01 to 99.90 µA/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. for the electrode to settle down, before a start volume is added.

Input range	**0 to 999,999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be dosed with the indicated dosing rate before the start of the titration.

Titrando

Input range	**0.00000 to 9,999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Rate at which the start volume is to be dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.5.3.4 KFT Upol - Control parameters

Tab: **Method ▶ KFT Upol ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

End point

EP at

Measured value for the endpoint.

Input range	**–200.0 to 200.0 µA**
Default value	**25.0 µA**
Selection	**off**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
Editing the individual titration parameters which affect the titration rate.

Control

NOTICE

Is displayed only if the **user** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. Within the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing is carried out continuously at **Max. rate**.

Titrando

Input range	**0.01 to 200.0 µA**
Default value	**40.0 (slow), 10.0 (optimal), 5.0 (fast) µA**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Titrino

Input range	**0.1 to 200.0 µA**
Default value	**40.0 (slow), 10.0 (optimal), 5.0 (fast) µA**
Selection	**off**

off
The entire measured value range is defined as control range. The minimum titration rate is applied throughout the entire titration.

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando

Input range	**0.01 to 166.00 mL/min**
Default value	**1.00 (slow), maximum (optimal), maximum (fast) mL/min**
Selection	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**1.00 (slow), maximum (optimal), maximum (fast) mL/min**
Selection	**maximum**

Min. volume increment

This parameter determines the addition rate with which dosing is carried out at the very beginning and at the end of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Input range	**0.1 to 9.9 µL**
Default value	**minimum (slow), minimum (optimal), 5.0 (fast) µL**

Stop criterion

Stop criterion

The titration is canceled after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be canceled when a particular **Drift** has been reached or after a preset **Time**.

Titrino

Selection	**Drift** | **Time**
Default value	**Drift**

Titrando

Selection	**Drift** | **rel. drift** | **off** | **Time**
Default value	**Drift**

Drift
The titration is canceled when the **Stop drift** has been reached.

rel. drift
The titration is canceled when the relative stop drift (drift value at the start + **Relative stop drift**) has been reached.

off
The titration is not canceled.

Time
The endpoint must be exceeded during a certain period of time: the delay time. The same delay time with different smallest possible volume increments (depending on the volume of the exchange or dosing unit) equals different switch-off points.

NOTICE

The stop conditions always lead to a stop, even if the stop criterion has not been reached or has been switched off.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µL/min**
Default value	**20 µL/min**

Relative stop drift

The titration is canceled when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift value at the titration start and the relative stop drift defined here. This parameter is displayed only if **Stop criterion** = **rel. drift**.

Titrando

Input range	**1 to 999 µL/min**
Default value	**10 µL/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. The selection **inf.** stands for infinite.

Titrando, 855

Input range	**0 to 999 s**
Default value	**10 s**

Titrino

Input range	**0 to 999 s**
Default value	**10 s**
Selection	**inf.**

Stop time

The titration is canceled when the absolute stop time defined here has elapsed since the start of the titration. This parameter is displayed only if **Stop criterion** = **Time** and if **Delay time** = **inf.**.

Titrino	
Input range	**1 to 999,999 s**

5.6.3.5.3.5 KFT Upol - Titration parameters

Tab: **Method ► KFT Upol ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Titration direction

Selection of the titration direction.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value change

-
negative measured value change

auto
The titration direction is determined automatically from the initial measured value and the set endpoint.

Extraction time

The titration is not canceled until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, for instance, for the titration of sparingly soluble samples.

Input range	**0 to 999,999 s**

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando	
Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Titrino	
Input range	**0.08 to 16,200 s**
Default value	**2.00 s**

5.6.3.5.3.6 KFT Upol - Stop conditions

Tab: **Method ► KFT Upol ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stop when the entered volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample size or the titration vessel size.

Titrando	
Input range	**0.00000 to 9,999.99 mL**
Default value	**100.000 mL**
Selection	**off**

Titrino	
Input range	**0.00 to 9,999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Titrando	
Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

off
Stop when the entered time has elapsed after the start of the titration (including start conditions).

Filling rate

Rate at which the dosing cylinder is to be filled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando	
Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.5.3.7 KFT Upol - Conditioning

Tab: **Method ▶ KFT Upol ▶ Properties... ▶ Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is lower than the **Start drift** entered here. In such cases, the **Status** displayed in the **Run** subwindow on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Titrando

Input range	**1 to 999 µg/min**
Default value	**20 µg/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µL/min**
Default value	**0.0 µL/min**

Stop volume

Stop of the determination when the specified volume has been dosed since the start of the conditioning. The stop volume should be adjusted to the size of the titration cell in order to prevent any overflow.

Titrando

Input range	**0.000000 to 9,999.99 mL**
Default value	**20.00 mL**
Selection	**off**
Default value	**off**

Stop time

Stop of the determination when the specified time has elapsed since the start of the conditioning.

Titrando

Input range	**1 to 999,999 s**

Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.5.3.8 KFT Upol - Additional evaluations

Tab: **Method ► KFT Upol ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.5.3.10, page 827)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.5.3.10, page 827)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/mL**
Default value	**5.0 µA/mL**

5.6.3.5.3.9 KFT Upol - Additional measured values

Tab: **Method ▶ KFT Upol ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.5.3.10 KFT Upol - Fixed endpoint evaluation

Dialog window: **Method ▶ KFT Upol ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation ▶ [New/[Properties] ▶ Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-200.0 to 200.0 µA**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.6 KFC

5.6.3.6.1 KFC - Overview

Dialog window: **Method ▶ KFC ▶ Properties... ▶ KFC - 'Command name'**

Command for coulometric **Karl Fischer titrations** with voltametric measurement.

NOTICE

The coulometric water content determination is mainly used to determine small amounts of water.

Devices

This command can be executed with the following devices:

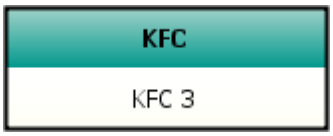
Coulometer: 756, 831

Titrandos: 851, 852

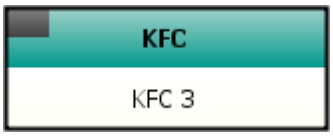
Appearance

The command has the following appearance:

without conditioning



with conditioning



Parameters

The parameters for the **KFC** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, indicator and generator electrode and stirrers.
- *Start conditions*
  Entry of a waiting period before the start of the titration.
- *Control parameters*
  Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Entry of the stop time which causes the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and drift value.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the **KFC** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**

Identification	Description
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.CHA	Charge for endpoint in mA·s
.EP.DVT	Drift for the endpoint in µg/min
.EP.MEA	Measured value for the endpoint in mV
.EP.QTY	Measured value (water) for the endpoint in µg
.EP.TEM	Temperature for the endpoint 1 in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.TIM	Time in s until the endpoint is reached
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.CHA	Charge for the fixed endpoint x (1 - 9) in mA·s
.FP{x}.DVT	Drift for the fixed endpoint x (1 - 9) in µg/min
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.QTY	Measured value (water) for the fixed endpoint x (1 - 9) in µg
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.CHA	Charge for the last measuring point of the measuring point list in mA s
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list in V; in case of measurements with 756, 831: **0 = not defined**, **1 = < 14 V**, **2 = 14 - 28 V**, **3 = > 28 V**
.MTE	Temperature measurement with sensor; **1 = on, 0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C

5.6.3.6.2 KFC - General/Hardware

Tab: **Method ▶ KFC ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**'Device types'** | **Titrando**
Default value	**Titrando**

Sensor

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

Polarization current at the indicator electrode.

Selection	**2 µA** | **5 µA** | **10 µA** | **20 µA** | **30 µA**
Default value	**10 µA**

NOTICE

When changing this parameter, make sure that the polarization current of the indicator electrode, the endpoint and the control range are linked closely with one another *(see chapter 5.6.3.6.4, page 834)*.

Electrode check

on | off (Default value: **on**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

851, 852

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Cell

Generator type

Selection of the generator type.

Selection	**without diaphragm** | **with diaphragm**
Default value	**without diaphragm**

Generator current

Polarization current at the generator electrode.

for generator type = without diaphragm

Selection	**100 mA** | **200 mA** | **400 mA** | **auto**
Default value	**400 mA**

auto
Means that the current is automatically adapted to the conductivity of the reagent and that near the endpoint the current will be controlled at smaller values.

for generator type = with diaphragm

Selection	**100 mA** | **200 mA** | **400 mA** | **auto**
Default value	**auto**

auto
Means that the current is automatically adapted to the conductivity of the reagent and that near the endpoint the current will be controlled at smaller values.

NOTICE

For generator electrodes of the type **with diaphragm**, it is recommended to set the **Generator current** to **auto**.

For generator electrodes **without diaphragm** it is recommended to set the **Generator current** to **400 mA**.

Stirrer

Stirrer

Selection of the stirrer.

851, 852

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

851, 852

Input range	**–15 to 15**
Default value	**8**

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command.

5.6.3.6.3 KFC - Start conditions

Tab: **Method ► KFC ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

Pause

Pause

Waiting time before the start of the titration.

Input range	**0 to 999,999 s**
Default value	**0 s**

5.6.3.6.4 KFC - Control parameters

Tab: **Method ► KFC ► Properties... ► Control parameters**

Command name

Name of the command.

Entry	**25 characters**

Endpoint

EP at

Measured value for the endpoint.

756, 831

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**50.0 mV**

851, 852

Input range	**–1,250.0 to 1,250.0 mV**
Default value	**50.0 mV**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
User-defined settings of the individual titration parameters which affect the titration rate.

Control

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Control range

The control range is entered as distance to the endpoint. Within the control range, iodine will be generated in steps which are controlled by the **minimum rate**. The larger the control range, the slower the titration. Outside the control range, iodine will be generated continuously with **Maximum rate**.

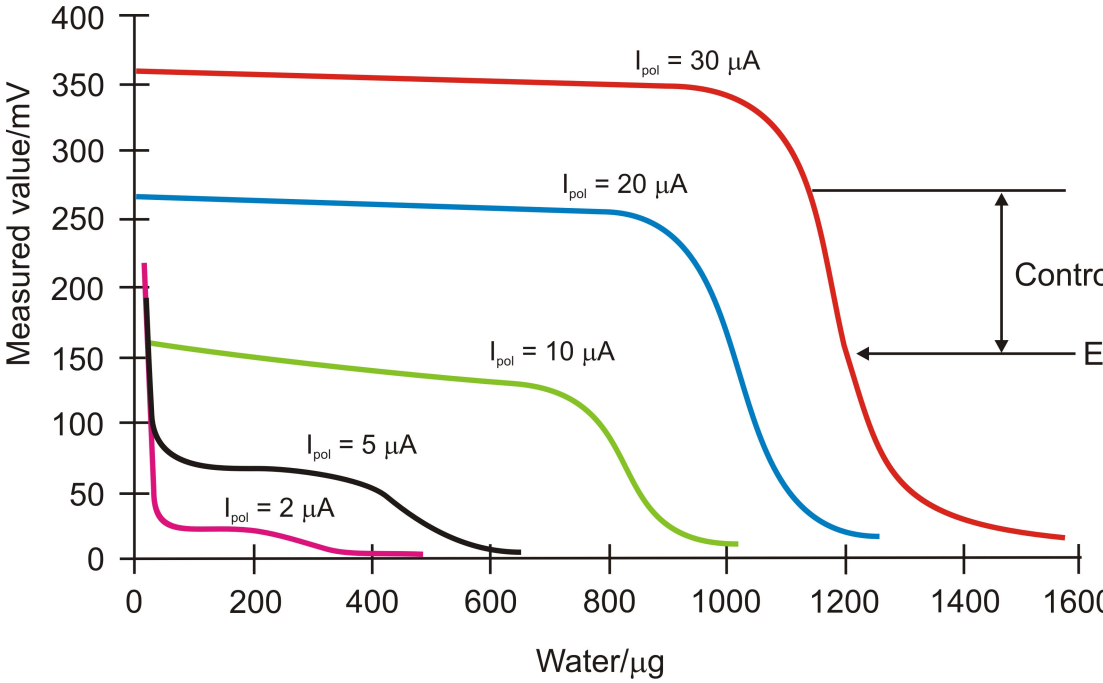
The standard control parameters are optimal for most applications and should not be modified. If you nevertheless need to modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

756, 831

Input range	**1.0 to 2,000 mV**
Default value	**120.0 (slow), 70.0 (optimal), 30.0 (fast) mV**

851, 852

Input range	**0.1 to 1,250.0 mV**
Default value	**120.0 (slow), 70.0 (optimal), 30.0 (fast) mV**



The diagram shows KF titration curves at different polarization currents. It is clear to see that the position of the endpoint varies with the polarization current. The curves have different slopes, i.e. the dynamics must also be adapted. Polarization currents smaller than 10 µA are not suitable for this application. The following table gives an idea of the optimal control parameters for various polarization currents.

Ipol	**10 µA**	**20 µA**	**30 µA**
EP	50 mV	100 mV	150 mV
Control range	70 mV	100 mV	120 mV

Max. rate

Maximum rate with which iodine is generated outside the **Control range**.

Input range	**1.5 to 2,240.0 µg/min**
Default value	**1,000.0 (slow), maximum (optimal), maximum (fast) µg/min**

Selection	**maximum**

Min. rate

This parameter defines the minimum rate with which iodine is generated inside the **Control range**. The smaller the rate the slower the titration and the higher the accuracy.

756, 831

Input range	**0.3 to 999.9 µg/min**
Default value	**0.3 (slow), 15.0 (optimal), 30.0 (fast) µg/min**
Selection	**minimum**

851, 852

Input range	**0.3 to 999.0 µg/min**
Default value	**0.3 (slow), 15.0 (optimal), 30.0 (fast) µg/min**
Selection	**minimum**

Stop criterion

Stop criterion

The titration is canceled when the endpoint has been reached and the stop criterion has been fulfilled.

756, 831

Selection	**Drift** | **rel. drift**
Default value	**rel. drift**

851, 852

Selection	**Drift** | **rel. drift** | **Time** | **off**
Default value	**rel. drift**

Stop drift

The titration is canceled when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

Input range	**1 to 999 µg/min**
Default value	**5 µg/min**

Relative stop drift

The titration is canceled when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift value at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

Input range	**0 to 999 µg/min**
Default value	**5 µg/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**.

Input range	**0 to 999 s**
Default value	**10 s**

5.6.3.6.5 KFC - Titration parameters

Tab: **Method ► KFC ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Extraction time

The titration is not canceled until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, for instance, for the titration of sparingly soluble samples.

Input range	**0 to 999,999 s**
Default value	**0 s**

Temperature

Manually entered titration temperature.

756, 831

Input range	**–170.0 to 500.0 °C**
Default value	**25.0 °C**

851, 852

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

756, 831

Input range	**1 to 999,999 s**
Default value	**2 s**

851, 852

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

5.6.3.6.6 KFC - Stop conditions

Tab: **Method ▶ KFC ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the titration are defined on this tab.

Stop time

Stop when the entered time has elapsed since the start of the titration. **off** means no stop.

Input range	**1 to 999,999 s**
Selection	**off**
Default value	**off**

5.6.3.6.7 KFC - Conditioning

Tab: **Method ▶ KFC ▶ Properties... ▶ Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **on**)

Enable/disable conditioning. If conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is lower than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Input range	**1 to 999 µg/min**
Default value	**20 µg/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption

during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**automatic**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 99.9 µg/min**
Default value	**0.0 µg/min**

Stop time

Stop of the determination when the specified time has elapsed since the start of the conditioning.

Input range	**1 to 999,999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Automatic start after sample addition

on | off (Default value: **off**)

If this option is enabled, the titration starts automatically when the command is in status **COND OK** and the **Threshold value** set is exceeded. In this case the system assumes that the sample has been injected. This parameter is displayed only for 851 and 852.

Threshold value

Value the automatic start after the sample addition is carried out automatically when it is exceeded.

851, 852

Input range	**0 to 999 mV**
Default value	**50 mV**

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND** command is received, otherwise the command to start the titration will be ignored.

If this command is already started (e.g. via **Automatic start after sample addition**), the **SEND** command will not have any effect.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.6.8 KFC - Additional evaluations

Tab: **Method ► KFC ► Properties... ► Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **water**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.6.10, page 844)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.6.10, page 844)*.

[Delete]

Deletes the selected line.

5.6.3.6.9 KFC - Additional measured values

Tab: **Method ► KFC ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.6.10 KFC - Fixed endpoint evaluation

Dialog window: **Method ► KFC ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Water**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**–2,000.0 to 2,000.0 mV**

Time

Input range	**0.0 to 999,999.9 s**

Water

Input range	**0.0 to 999,999.9 µg**

5.6.3.7 BRC

5.6.3.7.1 BRC - Overview

Dialog window: **Method ► BRC ► Properties... ► BRC - 'Command name'**

Command for coulometric titration for determining the bromine consumption. Out of the amount of bromine consumed the **bromine index** (amount of bromine consumed (in mg) per 100 g sample) and the **bromine number** (amount of bromine (in g) per 100 g sample) can be calculated.

Devices

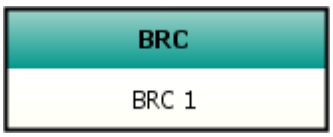
This command can be executed with the following devices:

Titrando: 851, 852

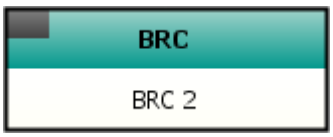
Appearance

The command has the following appearance:

without conditioning



with conditioning



Parameters

The parameters for the **BRC** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, indicator and generator electrode and stirrers.
- *Start conditions*
  Entry of a waiting period before the start of the titration.
- *Control parameters*
  Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Entry of the stop time which causes the titration to stop.
- *Conditioning*
  Enable/disable conditioning. Definition of start drift, drift correction and drift value.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the **BRC** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CBY	Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated**
.COK	Command status; **1 = Conditioning condition fulfilled**, **0** = **Conditioning condition not fulfilled**
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µg/min
.DTI	Time in s for drift correction (time from the start of the titration to the end of the command)

Identification	Description
.EME	End measured value (measured value after processing of the command) in mV
.EP.CHA	Charge for endpoint in mA·s
.EP.DVT	Drift for the endpoint in µg/min
.EP.MEA	Measured value for the endpoint in mV
.EP.QTY	Measured value (water) for the endpoint in µg
.EP.TEM	Temperature for the endpoint 1 in °C
.EP.TIM	Time in s until the endpoint is reached
.EQT	End quantity after processing of the command) in µg
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.DVT	Drift for the fixed endpoint x (1 - 9) in µg/min
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.QTY	Amount of bromine for the fixed endpoint x (1 - 9) in µg
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in mV
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.CHA	Charge for the last measuring point of the measuring point list in mA s
.LP.DVT	Drift for the last measuring point of the measuring point list in µg/min
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA
.LP.MEA	Measured value for the last measuring point in the measuring point list in mV
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list in V
.MTE	Temperature measurement with sensor; **1 = on, 0 = off**)
.NMP	Number of measuring points in measuring point list
.SME	Start measured value (measured value after processing the start conditions) in mV
.STE	Start temperature (temperature after processing the start conditions) in °C

5.6.3.7.2 BRC - General/Hardware

Tab: **Method ▶ BRC ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

Polarization current at the indicator electrode.

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**1.0 µA**

NOTICE

When changing this parameter, make sure that the polarization current of the indicator electrode, the endpoint and the control range are linked closely with one another *(see chapter 5.6.3.7.4, page 851)*.

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Cell

Generator type

Selection of the generator type.

Selection	**without diaphragm** | **with diaphragm**
Default value	**with diaphragm**

Generator current

Polarization current at the generator electrode.

Selection	**100 mA** | **200 mA** | **400 mA** | **auto**
Default value	**auto**

auto
Means that the current is automatically adapted to the conductivity of the reagent and that near the endpoint the current will be controlled at smaller values.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch on/off automatically

on | **off** (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command.

5.6.3.7.3 BRC - Start conditions

Tab: **Method ► BRC ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999,999 s**
Default value	**15 s**

Pause

Pause

Waiting time before the start of the titration.

Input range	**0 to 999,999 s**
Default value	**0 s**

5.6.3.7.4 BRC - Control parameters

Tab: **Method ▶ BRC ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

Endpoint

EP at

Measured value for the endpoint.

Input range	**–1,250.0 to 1,250.0 mV**
Default value	**200.0 mV**

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	**slow** | **optimal** | **fast** | **User**
Default value	**optimal**

slow
For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal
Parameter set for all standard titrations; optimized for the most frequent applications.

fast
For less critical, fast titrations.

User
User-defined settings of the individual titration parameters which affect the titration rate.

Control

NOTICE

Will be displayed only if the **User** option is selected in the selection list **Titration rate**.

Dynamics

The control range is entered as distance to the endpoint. Within the control range, bromine will be generated in steps which are controlled by the **Minimum rate**. The larger the control range, the slower the titration. Outside the control range, bromine will be generated continuously with **Maximum rate**.

The standard control parameters are optimal for most applications and should not be modified. If you nevertheless need to modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

Input range	**0.1 to 1,250.0 mV**
Default value	**400.0 mV**

Max. rate

Maximum rate with which bromine is generated outside the **Control range**.

Input range	**10.0 to 19,876.0 µg/min**
Default value	**500.0 (slow), 1,000.0 (optimal), 2,000.0 (fast) µg/min**

Selection	**maximum**

Min. rate

This parameter defines the minimum rate with which bromine is generated inside the **Control range**. The smaller the rate the slower the titration and the higher the accuracy.

Input range	**1.0 to 999.0 µg/min**
Default value	**15.0 (slow), 25.0 (optimal), 50.0 (fast) µg/min**
Selection	**minimum**

Stop criterion

Stop criterion

The titration is canceled when the endpoint has been reached and the stop criterion has been fulfilled.

Selection	**Drift** | **rel. drift** | **Time** | **drift & time** | **off**
Default value	**drift & time**

Stop drift

The titration is canceled when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift** or **drift & time**.

Input range	**1 to 999 µg/min**
Default value	**15 µg/min**

Relative stop drift

The titration is canceled when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift value at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

Input range	**0 to 999 µg/min**
Default value	**5 µg/min**

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time** or **drift & time**.

Input range	**0 to 999 s**
Default value	**40 s**

5.6.3.7.5 BRC - Titration parameters

Tab: **Method ▶ BRC ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Extraction time

The titration is not canceled until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, for instance, for the titration of sparingly soluble samples.

Input range	**0 to 999,999 s**
Default value	**0 s**

Temperature

Manually entered titration temperature.

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

5.6.3.7.6 BRC - Stop conditions

Tab: **Method ▶ BRC ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the titration are defined on this tab.

Stop time

Stop when the entered time has elapsed since the start of the titration. **off** means no stop.

Input range	**1 to 999,999 s**
Selection	**off**
Default value	**off**

5.6.3.7.7 BRC - Conditioning

Tab: **Method ▶ BRC ▶ Properties... ▶ Conditioning**

Command name

Name of the command.

Entry	**25 characters**

Conditioning

on | off (Default value: **on**)

Enable/disable conditioning. If conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is lower than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Input range	**1 to 999 µg/min**
Default value	**20 µg/min**

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	**automatic** | **manual** | **off**
Default value	**off**

automatic
The drift lastly determined during conditioning will be used as drift value.

manual
The drift value defined under **Drift value** will be used.

off
No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Input range	**0.0 to 999.9 µg/min**
Default value	**0.0 µg/min**

Stop time

Stop of the determination when the specified time has elapsed since the start of the conditioning.

Input range	**1 to 999,999 s**
Selection	**off**
Default value	**off**

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Input range	**0 to 999 s**
Default value	**0 s**

Automatic start after sample addition time

on | off (Default value: **on**)

If this option is activated, then the titration will be started automatically after the sample addition time.

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Input range	**0 to 99 s**
Default value	**0 s**

Manual start after sample addition with [Continue]

on | off (Default value: **off**)

If this option is activated, then the titration will be started manually after the sample addition by pressing the **[Continue]** button in the message window.

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

NOTICE

Conditioning must already be completed (= **Condok**) at the time the **SEND** command is received, otherwise the command to start the titration will be ignored.

If this command is already started (e.g. via **Automatic start after sample addition**), the **SEND** command will not have any effect.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the subwindow **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.7.8 BRC - Additional evaluations

Tab: **Method ▶ BRC ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **bromine**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.7.10, page 859)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.7.10, page 859)*.

[Delete]

Deletes the selected line.

5.6.3.7.9 BRC - Additional measured values

Tab: **Method ▶ BRC ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**)

which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.7.10 BRC - Fixed endpoint evaluation

Dialog window: **Method ► BRC ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Bromine**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**–2,000.0 to 2,000.0 mV**

Time

Input range	**0.0 to 999,999.9 s**

Bromine

Input range	**0.0 to 999,999.9 µg**

5.6.3.8 STAT

5.6.3.8.1 STAT - Overview

Menu item: **Method ► Insert ► New command...**

Command for **STAT titrations**.

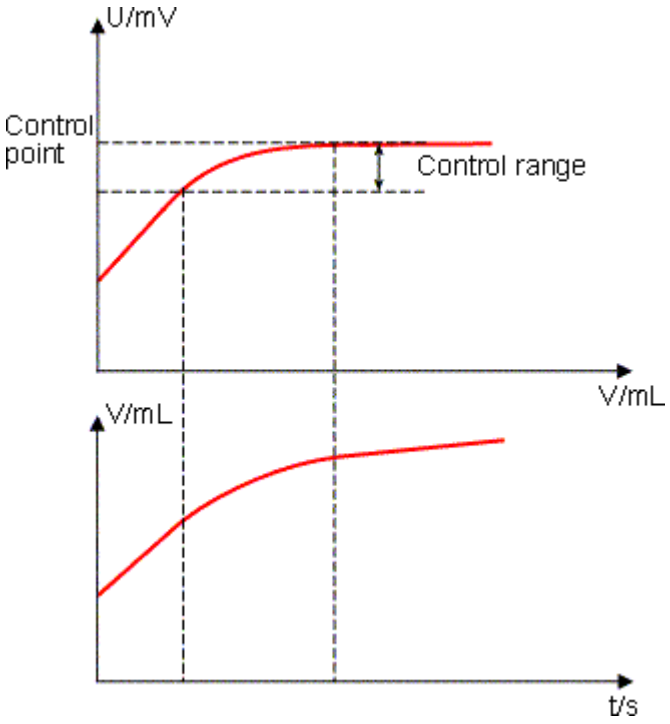
Principle

In **STAT** titrations, reagent is added until a preset measured value (control point) has been reached, which is then maintained at a constant level. Because the substance that is released as a result of the reaction is immediately titrated off with the titrant, the STAT controller has to be able to maintain a preset control point at a constant level until the preset stop condition has been reached, i.e. without oscillating around the control point.

STAT titrations are used, for example, in enzyme analysis, where the enzyme activity can be determined from the resulting dosing rate (in mL/min).

Reagent dosing takes place in two phases during the titration:

- **Dosing outside the control range**
  The dosing rate increases continuously during this phase. It starts with the **Min. rate** and increases to the **Max. rate**. The dosing continues to be carried out at the **Max. rate** until the control range *(see chapter 5.6.3.8.2, page 862)* is reached. In this range, the controlling of the **STAT** is the same as that of the **SET**.
- **Dosing inside the control range**
  The **STAT** controller compensates minimal measured value deviations from the control point quickly by dosing in the control range faster than for the **SET** controller.



Troubleshooting

Problem	Remedy
The control point is not maintained well. The measured value is at times too high and at times too low. The controller "oscillates".	▪ Reduce the **Max. rate** and possibly also the **Min. rate**. ▪ Set the **Dynamics** higher. ▪ Check if stirring is effective. ▪ Arrange the electrode and buret tip to an optimum. ▪ Possibly use an exchange/ dosing unit with a smaller cylinder volume (smaller volume increment per pulse).
The control point is not reached for too long.	▪ Set the **Dynamics** lower. ▪ Increase the **Min. rate**. ▪ Increase the **Max. rate**.
The control range is not reached quickly enough.	Set the setpoint value with a **SET** pretitration in such a way that the control range is reached more quickly.

Commands

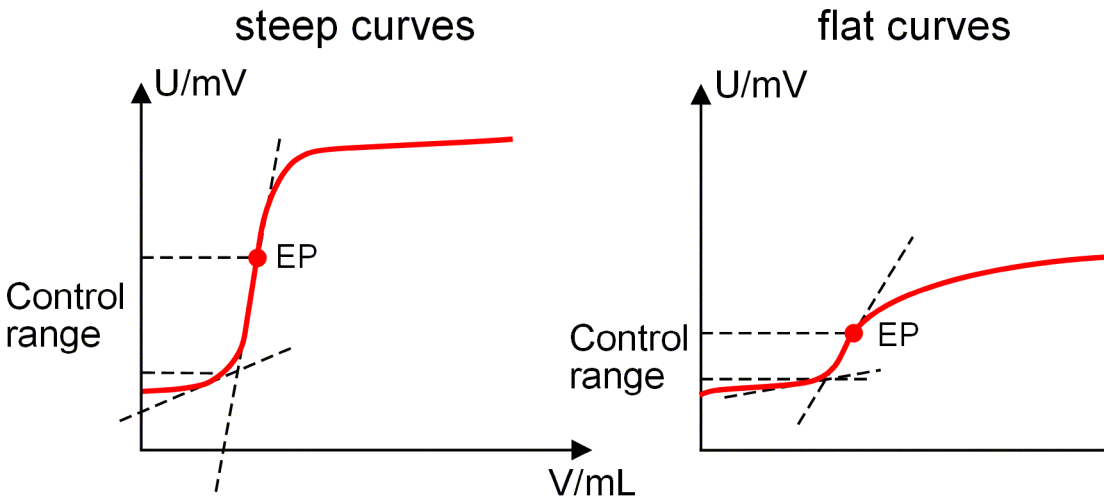
Depending on the measured value one of the following two **STAT** commands can be selected:

- *STAT pH*
  STAT titration with pH electrodes (measured quantity pH).
- *STAT U*
  STAT titration with metal electrodes (measured quantity voltage U).

5.6.3.8.2 STAT - Control range

Tab: **Method ▶ STAT ▶ Properties... ▶ Control parameters**

Set a large control range for steep curves and a small control range for flat ones. A good approximation for the start of the control range is given by the point where the tangents intersect.



5.6.3.8.3 STAT - Evaluation window

Dialog window: **Method ▶ STAT ▶ Properties... ▶ Evaluations ▶ Rate evaluation ▶ [New]/[Properties] ▶ Evaluation window #**

Evaluation windows are defined time segments in which the dosing rate is determined by linear regression.

Lower limit

Lower limit for the evaluation window.

Input range	**0.0 to 99,999.9 s**
Default value	**0.0 s**

Upper limit

Upper limit for the evaluation window.

Input range	**0.0 to 999,999.9 s**
Default value	**999,999.9 s**

5.6.3.8.4 STAT - Track call

Dialog window: **Method ► STAT/STAT pH/STAT U ► Properties... ► Monitoring ► [New]/[Properties] ► Track call #**

Monitoring

Selection of the quantity to be monitored. When its limit values are violated a track is started.

Selection	**Measured value** | **Dosing rate** | **Temperature** | **Any**
Default value	**Measured value**

Any
Means any of the three quantities.

Limit exceeding

Selection of the exceeded limit for which a track is to be started.

Selection	**Lower limit** | **Upper limit** | **Any** | **OK**
Default value	**Any**

Any
The track will be started if either the upper or the lower limit is violated.

OK
The track will be started when the monitored quantities are once again within the limit values (including hysteresis).

Track name

Selection of the track that is to be started automatically.

Selection	**'Track name'**

NOTICE

If a track is called for that is already running then it will be allowed to finish and then restarted when it is free again.

5.6.3.8.5 Tandem dosing

Menu item: **Method ► STAT/ADD/DOS ► General/Hardware**

If the **Tandem dosing** check box is enabled for the commands **STAT**, **ADD** or **DOS**, then a second dosing device can be defined in order to enable uninterrupted dosing. Dosing is carried out with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice versa.

However, in order to ensure uninterrupted dosing, the following points must be taken into account:

- **Keeping filling times short**
  Use the highest possible filling rate in order to keep the filling times as short as possible. Take the viscosity and density of the liquid into account.
- **Filling rate with different cylinders**
  When you use two dosing devices with different cylinder volumes (dosing cylinder 2 > dosing cylinder 1), then the minimum filling rate of the larger cylinder 2 must be:
  Filling rate 2 ≧ dosing rate 1 • ($V_{dosing\ cylinder\ 2}$ / $V_{dosing\ cylinder\ 1}$)
- **Rule for dosing rate**
  The dosing rate must not exceed 75% of the filling rate of the smaller cylinder. This corresponds to the following values (at maximum filling rate):

Cylinder volume	maximum dosing rate		max. flow rate	
	Exchange unit	Dosing unit	Exchange unit	Dosing unit
1 mL	2.25 mL/min	---	approx. 130 mL/h	---
2 mL	---	5.00 mL/min	---	approx. 300 mL/h
5 mL	11.25 mL/min	12.50 mL/min	approx. 670 mL/h	approx. 750 mL/h
10 mL	22.50 mL/min	25.00 mL/min	approx. 1.3 L/h	approx. 1.5 L/h
20 mL	45.00 mL/min	50.00 mL/min	approx. 2.7 L/h	approx. 3.0 L/h
50 mL	112.50 mL/min	124.50 mL/min	approx. 6.7 L/h	approx. 7.5 L/h

5.6.3.8.6 STAT pH

5.6.3.8.6.1 STAT pH - Overview

Dialog window: **Method ► STAT pH ► Properties... ► STAT pH - 'Command name'**

Command for **STAT titrations** with measured value pH.

Devices

This command can be executed with the following devices:

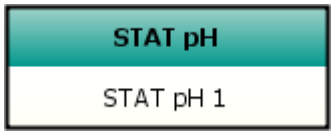
Titrando: 835, 836, 842, 857, 902, 906, 907

Titrino: 718, 736, 751, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **STAT pH** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Parameters for the control point.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Monitoring*
  Definition of the monitoring of measured value, dosing rate and temperature.
- *Evaluations*
  Definition of methods for evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **STAT pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)

Identification	Description
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window x (1 - 9)
.RE{x}.DRS	Standard deviation for mean dosing rate in window x (1 - 9) in mL/min
.RE{x}.DRT	Mean dosing rate in window x (1 - 9) in mL/min

Identification	Description
.RE{x}.RWL	Lower limit of the evaluation window x (1 - 9) in s
.RE{x}.RWH	Upper limit of the evaluation window x (1 - 9) in s
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.8.6.2 STAT pH - General/Hardware

Tab: **Method ► STAT pH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, the dosing is carried out without interruption with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa *(see chapter 5.6.3.8.5, page 863)*. This parameter is displayed only for Titrandos and 855.

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**2**

855

Selection	**1** | **2** | **3**
Default value	**2**

Solution

Entry of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device and whether the dosing device type is correct. With nonintelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 855

Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Filling rate

Rate at which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value *(see chapter 5.6.3.8.5, page 863)*.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.8.6.3 STAT pH - Start conditions

Tab: **Method ▶ STAT pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. for the electrode to settle down, before a start volume is added.

Titrando, 855

Input range	**0 to 999,999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.8.6.4 STAT pH - Control parameters

Tab: **Method ▶ STAT pH ▶ Properties... ▶ Control parameters**

Command name

Name of the command.

Entry	**25 characters**

Control point

Control point at pH

Definition of the pH value to be controlled.

Titrando, 855

Input range	**–20.000 to 20.000**
Selection	**off**
Default value	**off**

Titrino

Input range	**–20.00 to 20.00**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

Three predefined rates, for which the parameters for **Control** are not displayed, can be selected for the titration rate. The **Users** setting must be selected in order to be able to edit these parameters.

Selection	**50 µL/min** | **100 µL/min** | **500 µL/min** | **Users**
Default value	**100 µL/min**

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics pH

The control range defines the measured value range before the specified control point. It has a decisive influence on the titration rate and thus also on the accuracy *(see chapter 5.6.3.8.1, page 860)*.

Titrando, 855	
Input range	**0.001 to 20.000**
Default value	**1.000**
Selection	**off**

Titrino	
Input range	**0.01 to 20.00**
Default value	**1.00**
Selection	**off**

Max. rate

The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. The following rule of thumb should be used as a starting point for parameterization: **Max. rate** in mL/min = 5 • Expected rate of reaction in mL/min.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Default value	**0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Default value	**0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **Control range** at the end of the titration. The smaller the selected minimum rate, the longer it takes until the control point is reached for the first time. The following rule of thumb should be observed for maintaining the **Min. rate** in order to achieve as constant (regular) a

dosing at the control point as possible: **Min. rate** in µL/min = Expected rate of reaction in µL/min/ 10.

Input range	**0.01 to 9,999.00 µL/min**
Default value	**10.00 (50 µL/min), 20.00 (100 µL/min), 40.00 (500 µL/min) µL/min**

NOTICE

The parameters **Max. rate** and **Dynamics pH** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The Dynamics should be selected in such a way that the measured value remains within the control range as much as possible while the control point is maintained. A slightly larger control range should be defined for slow reactions (e.g. pH = 3). The setpoint value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started already with a small deviation from the control point.

5.6.3.8.6.5 STAT pH - Titration parameters

Tab: **Method ► STAT pH ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Measuring point recording

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855	
Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Titrino	
Input range	**1 to 999,999 s**
Default value	**2 s**

Start time

The measuring points are not entered in the measuring point list until this time has elapsed since the start of the titration.

Input range	**0 to 999,999 s**
Default value	**0 s**

Start measured value pH

The measuring points are not entered in the measuring point list until the start measured value has been reached.

Titrando, 855	
Input range	**–20.000 to 20.000**
Selection	**off**
Default value	**off**

Titrino	
Input range	**–20.00 to 20.00**

Selection	**off**
Default value	**off**

Start rate

The measured values are not entered in the measuring point list until the dosing rate has fallen below this value. This parameter is not checked until 10 s after the start.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**off**
Default value	**off**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**off**
Default value	**off**

5.6.3.8.6.6 STAT pH - Stop conditions

Tab: **Method ► STAT pH ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stop when the entered time has elapsed after the start conditions have been fulfilled.

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

since

Specifies when the stop time begins to count (will not be displayed if the **Stop time** is disabled):

Selection	**Start** | **Control point first reached** | **Last dosing**
Default value	**Start**

Start
The stop time starts after the start volume has been dosed and after the following pause time.

Control point first reached
The stop time starts as soon as the control point has been reached for the first time.

Last dosing
The stop time starts after the last increment has been dosed, i.e., the stop time is reset to zero again after each dosing step.

Stop rate

Stop when the current dosing rate is lower than the defined stop rate. This criterion is not checked until 10 s after the start. The maximum stop rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**off**
Default value	**off**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.8.6.7 STAT pH - Monitoring

Tab: **Method ► STAT pH ► Properties... ► Monitoring**

Command name

Name of the command.

Entry	**25 characters**

The following monitoring processes can be activated and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is enabled, then the measured value will be monitored and any violated limits will be entered in the measuring point list.

Lower limit pH

Lower limit of the measured value. If the measured value falls below this limit, the event **Measured value lower limit violated** is triggered.

Titrando, 855	
Input range	**–20.000 to 20.000**
Default value	**–20.000**

Titrino	
Input range	**–20.00 to 20.00**
Default value	**–20.00**

Lower hysteresis pH

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value again, then the event **Measured value lower limit OK** is triggered.

Titrando, 855	
Input range	**0.000 to 20.000**
Default value	**0.020**

Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit violated** is triggered.

Titrando, 855	
Input range	**–20.000 to 20.000**
Default value	**20.000**

Titrino	
Input range	**–20.00 to 20.00**
Default value	**20.00**

Upper hysteresis pH

Upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit OK** is triggered.

Titrando, 855	
Input range	**0.000 to 20.000**
Default value	**0.020**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT pH** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **STAT pH** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT pH** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT pH** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Monitoring Dosing rate

Monitoring Dosing rate

on | off (Default value: **off**)

If this option is enabled, then the averaged dosing rate will be monitored and any violated limits will be entered in the measuring point list. The monitoring of the dosing rate is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. If the dosing rate falls below this limit, the event **Dosing rate lower limit violated** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**0.00 mL/min**

Titrino

Input range	**0.00 to 150.00 mL/min**
Default value	**0.00 mL/min**

Lower hysteresis

Lower hysteresis of the dosing rate. If the dosing rate exceeds the lower limit by this hysteresis value again, then the event **Dosing rate lower limit OK** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**0.20 mL/min**

Upper limit

Upper limit of the dosing rate. If the dosing rate exceeds this limit, then the event **Dosing rate upper limit violated** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**166.00 mL/min**

Titrino

Input range	**0.00 to 150.00 mL/min**
Default value	**150.00 mL/min**

Upper hysteresis

Upper hysteresis of the dosing rate. If the dosing rate once again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit OK** is triggered.

Titrando, 855	
Input range	**0.00 to 166.00 mL/min**
Default value	**0.20 mL/min**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT pH** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **STAT pH** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT pH** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT pH** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

NOTICE

If the **Lower limit** is violated while monitoring the dosing rate, the actions **Wait for [Continue]** and **Wait for limit ok** do not make sense because the average dosing rate becomes smaller and smaller during the waiting time. The valid range can never be reached again.

Monitoring Temperature

Monitoring Temperature

on | off (Default value: **off**)

If this option is enabled, then the temperature will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. If the temperature falls below this limit, the event **Lower temperature limit violated** is triggered.

Titrando, 855

Input range	**–20.0 to 150.0 °C**
Default value	**–20.0 °C**

Titrino

Input range	**–170.0 to 500.0 °C**
Default value	**–170.0 °C**

Lower hysteresis

Lower hysteresis of the temperature. If the temperature exceeds the lower limit by this hysteresis value again, then the event **Lower temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Upper limit

Upper limit of the temperature. If the temperature exceeds this limit, then the event **Upper temperature limit violated** is triggered.

Titrando, 855

Input range	**–20.0 to 150.0 °C**
Default value	**150.0 °C**

Titrino

Input range	**–170.0 to 500.0 °C**
Default value	**500.0 °C**

Upper hysteresis

Upper hysteresis of the temperature. If the temperature once again falls below the upper limit by this hysteresis value, then the event **Upper temperature limit OK** is triggered.

Titrando, 855	
Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT pH** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **STAT pH** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT pH** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT pH** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is violated.

[New]

Opens the **Track call #** dialog window, in which the parameters for the track call can be entered.

[Properties]

Opens the **Track call #** dialog window, in which the parameters for the track call can be edited *(see chapter 5.6.3.8.4, page 863)*.

[Delete]

Deletes the track call selected in the table.

5.6.3.8.6.8 STAT pH - Evaluations

Tab: **Method ► STAT pH ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following methods for the evaluation of titration curves can be activated and defined on this tab:

Rate evaluation

Rate evaluation

on | off (Default value: **off**)

If this check box is activated, a maximum of nine time slots can be defined, in which the mean dosing rate can be determined by linear regression. The defined time slots are shown in the window table and can be edited with the following buttons:

[New]

Opens the **Evaluation window #** dialog window, in which the parameters for a new time slot can be entered *(see chapter 5.6.3.8.3, page 862)*.

[Properties]

Opens the **Evaluation window #** dialog window, in which the parameters for the selected time slot can be edited *(see chapter 5.6.3.8.3, page 862)*.

[Delete]

Deletes the time slot selected in the table.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.4.3.10, page 716)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/mL**
Default value	**1.0 pH/mL**

5.6.3.8.6.9 STAT pH - Additional measured values

Tab: **Method ► STAT pH ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.8.6.10 STAT pH - Fixed endpoint evaluation

Dialog window: **Method ► STAT pH ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New/[Properties] ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-20.000 to 20.000 pH**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.8.7 STAT U

5.6.3.8.7.1 STAT U - Overview

Dialog window: **Method ► STAT U ► Properties... ► STAT U - 'Command name'**

Command for **STAT titrations** with measured value U.

Devices

This command can be executed with the following devices:

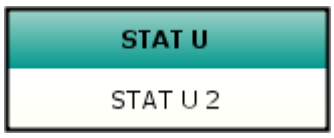
Titrando: 835, 836, 842, 857, 902, 906, 907

Titrino: 718, 736, 751, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **STAT U** command are set on the following eight tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
  Parameters for the control point.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Definition of conditions which cause the titration to stop.
- *Monitoring*
  Definition of the monitoring of measured value, dosing rate and temperature.
- *Evaluations*
  Definition of methods for evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **STAT U** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started

Identification	Description
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1 - 9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value in the measuring point list

Identification	Description
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume at maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume at minimum measured value in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window x (1 - 9)
.RE{x}.DRS	Standard deviation for mean dosing rate in window x (1 - 9) in mL/min
.RE{x}.DRT	Mean dosing rate in window x (1 - 9) in mL/min
.RE{x}.RWL	Lower limit of the evaluation window x (1 - 9) in s
.RE{x}.RWH	Upper limit of the evaluation window x (1 - 9) in s

Identification	Description
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing the start conditions) in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added according to all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.8.7.2 STAT U - General/Hardware

Tab: **Method ► STAT U ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected in the **Device name** field, the **Device type** field can no longer be edited and the device type belonging to the device is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**756 KF Coulometer** | **831 KC Coulometer**
Default value	**831 KC Coulometer**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, the dosing is carried out without interruption with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa *(see chapter 5.6.3.8.5, page 863)*. This parameter is displayed only for Titrandos and 855.

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the solution is to be dosed. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**2**

855

Selection	**1** | **2** | **3**
Default value	**2**

Solution

Entry of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device and whether the dosing device type is correct. With nonintelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 855

Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Filling rate

Rate at which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value *(see chapter 5.6.3.8.5, page 863)*.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**

Selection	**maximum**
Default value	**maximum**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751 and 799.

5.6.3.8.7.3 STAT U - Start conditions

Tab: **Method ▶ STAT U ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the sequence shown before the titration is started.

Initial measured value

NOTICE

Only displayed for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Input range	**0.1 to 999.0 mV/min**
Selection	**off**
Default value	**off**

off
The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Input range	**0 to 999999 s**
Default value	**1 s**

Pause 1

Pause 1

Waiting time, e.g. for the electrode to settle down, before a start volume is added.

Titrando, 855

Input range	**0 to 999,999 s**
Default value	**0 s**

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**0.00000 mL**

Titrino

Input range	**0.00 to 999.99 mL**
Default value	**0.00 mL**

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 999999 s**
Default value	**0 s**

5.6.3.8.7.4 STAT U - Control parameters

Tab: **Method ► STAT U ► Properties... ► Control parameters**

Command name

Name of the command.

Entry	**25 characters**

Control point

Control point at

Definition of the voltage value to be controlled.

Titrando, 855

Input range	**–2,000.0 to 2,000.0 mV**
Selection	**off**
Default value	**off**

Titrino

Input range	**–2,000 to 2,000 mV**
Selection	**off**
Default value	**off**

Titration rate

Titration rate

Three predefined rates, for which the parameters for **Control** are not displayed, can be selected for the titration rate. The **Users** setting must be selected in order to be able to edit these parameters.

Selection	**50 µL/min** | **100 µL/min** | **500 µL/min** | **Users**
Default value	**100 µL/min**

Control

NOTICE

Is displayed only if the **Users** option is selected in the **Titration rate** selection list.

Dynamics

The control range defines the measured value range before the specified control point. It has a decisive influence on the titration rate and thus also on the accuracy *(see chapter 5.6.3.8.1, page 860)*.

Titrando, 855	
Input range	**0.1 to 2,000.0 mV**
Default value	**60.0 mV**
Selection	**off**

Titrino	
Input range	**1.00 to 2,000 mV**
Default value	**60.0 mV**
Selection	**off**

Max. rate

The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. The following rule of thumb should be used as a starting point for parameterization: **Max. rate** in mL/min = 5 • Expected rate of reaction in mL/min.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Default value	**0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Default value	**0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min**

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **Control range** at the end of the titration. The smaller the selected minimum rate, the longer it takes until the control point is reached for the first time. The following rule of thumb should be observed for maintaining the **Min. rate** in order to achieve as constant (regular) a

dosing at the control point as possible: **Min. rate** in µL/min = Expected rate of reaction in µL/min/ 10.

Input range	**0.01 to 9,999.00 µL/min**
Default value	**10.00 (50 µL/min), 20.00 (100 µL/min), 40.00 (500 µL/min) µL/min**

NOTICE

The parameters **Max. rate** and **Dynamics** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The **Dynamics** should be selected in such a way that the measured value remains within the control range as much as possible while the control point is maintained. A slightly larger control range should be defined for slow reactions (e.g. U = 180 mV). The setpoint value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started already with a small deviation from the control point.

5.6.3.8.7.5 STAT U - Titration parameters

Tab: **Method ► STAT U ► Properties... ► Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	**+** | **-** | **auto**
Default value	**auto**

+
positive measured value alteration

-
negative measured value alteration

auto
The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/ Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Measuring point recording

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855	
Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Titrino	
Input range	**1 to 999,999 s**
Default value	**2 s**

Start time

The measuring points are not entered in the measuring point list until this time has elapsed since the start of the titration.

Input range	**0 to 999,999 s**
Default value	**0 s**

Start measured value

The measuring points are not entered in the measuring point list until the start measured value has been reached.

Titrando, 855	
Input range	**–2,000.0 to 2,000.0 mV**
Selection	**off**
Default value	**off**

Titrino	
Input range	**–2,000 to 2,000 mV**

Selection	**off**
Default value	**off**

Start rate

The measured values are not entered in the measuring point list until the dosing rate has fallen below this value. This parameter is not checked until 10 s after the start.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**off**
Default value	**off**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**off**
Default value	**off**

5.6.3.8.7.6 STAT U - Stop conditions

Tab: **Method ► STAT U ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If several stop conditions are set, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrando, 855

Input range	**0.00000 to 9999.99 mL**
Default value	**100,000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Stop when the entered time has elapsed after the start conditions have been fulfilled.

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

since

Specifies when the stop time begins to count (will not be displayed if the **Stop time** is disabled):

Selection	**Start** | **Control point first reached** | **Last dosing**
Default value	**Start**

Start
The stop time starts after the start volume has been dosed and after the following pause time.

Control point first reached
The stop time starts as soon as the control point has been reached for the first time.

Last dosing
The stop time starts after the last increment has been dosed, i.e., the stop time is reset to zero again after each dosing step.

Stop rate

Rate at which the dosing cylinder is to be filled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**off**
Default value	**off**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**off**
Default value	**off**

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Titrino

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.8.7.7 STAT U - Monitoring

Tab: **Method ► STAT U ► Properties... ► Monitoring**

Command name

Name of the command.

Entry	**25 characters**

The following monitoring processes can be activated and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is enabled, then the measured value will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the measured value. If the measured value falls below this limit, the event **Measured value lower limit violated** is triggered.

Titrando, 855

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**–2,000.0 mV**

Titrino

Input range	**–2,000 to 2,000 mV**
Default value	**–2,000 mV**

Lower hysteresis

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value again, then the event **Measured value lower limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 2,000.0 mV**
Default value	**0.2 mV**

Upper limit

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit violated** is triggered.

Titrando, 855	
Input range	**–2,000.0 to 2,000.0 mV**
Default value	**2,000.0 mV**

Titrino	
Input range	**–2,000 to 2,000**
Default value	**2,000**

Upper hysteresis

Upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit OK** is triggered.

Titrando, 855	
Input range	**0.0 to 2,000.0 mV**
Default value	**0.2 mV**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando, 855)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT U** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando, 855)
The running **STAT U** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT U** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT U** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Monitoring Dosing rate

Monitoring Dosing rate

on | off (Default value: **off**)

If this option is enabled, then the averaged dosing rate will be monitored and any violated limits will be entered in the measuring point list. The monitoring of the dosing rate is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. If the dosing rate falls below this limit, the event **Dosing rate lower limit violated** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**0.00 mL/min**

Titrino

Input range	**0.00 to 150.00 mL/min**
Default value	**0.00 mL/min**

Lower hysteresis

Lower hysteresis of the dosing rate. If the dosing rate exceeds the lower limit by this hysteresis value again, then the event **Dosing rate lower limit OK** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**0.20 mL/min**

Upper limit

Upper limit of the dosing rate. If the dosing rate exceeds this limit, then the event **Dosing rate upper limit violated** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**166.00 mL/min**

Titrino

Input range	**0.00 to 150.00 mL/min**
Default value	**150.00 mL/min**

Upper hysteresis

Upper hysteresis of the dosing rate. If the dosing rate once again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit OK** is triggered.

Titrando, 855

Input range	**0.00 to 166.00 mL/min**
Default value	**0.20 mL/min**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando, 855)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT U** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando, 855)
The running **STAT U** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT U** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT U** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Monitoring Temperature

Monitoring Temperature

on | off (Default value: **off**)

If this option is enabled, then the temperature will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. If the temperature falls below this limit, the event **Lower temperature limit violated** is triggered.

Titrando, 855

Input range	**–20.0 to 150.0 °C**
Default value	**–20.0 °C**

Titrino

Input range	**–170.0 to 500.0 °C**
Default value	**–170.0 °C**

Lower hysteresis

Lower hysteresis of the temperature. If the temperature exceeds the lower limit by this hysteresis value again, then the event **Lower temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Upper limit

Upper limit of the temperature. If the temperature exceeds this limit, then the event **Upper temperature limit violated** is triggered.

Titrando, 855

Input range	**–20.0 to 150.0 °C**
Default value	**150.0 °C**

Titrino

Input range	**–170.0 to 500.0 °C**
Default value	**500.0 °C**

Upper hysteresis

Upper hysteresis of the temperature. If the temperature once again falls below the upper limit by this hysteresis value, then the event **Upper temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando, 855)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **STAT U** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando, 855)
The running **STAT U** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **STAT U** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the running **STAT U** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is violated.

[New]

Opens the **Track call #** dialog window, in which the parameters for the track call can be entered *(see chapter 5.6.3.8.4, page 863)*.

[Properties]

Opens the **Track call #** dialog window, in which the parameters for the track call can be edited *(see chapter 5.6.3.8.4, page 863)*.

[Delete]

Deletes the track call selected in the table.

5.6.3.8.7.8 STAT U - Evaluations

Tab: **Method ► STAT U ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following methods for the evaluation of titration curves can be activated and defined on this tab:

Rate evaluation

Rate evaluation

on | off (Default value: **off**)

If this check box is activated, a maximum of nine time slots can be defined, in which the mean dosing rate can be determined by linear regression. The defined time slots are shown in the window table and can be edited with the following buttons:

[New]

Opens the **Evaluation window #** dialog window, in which the parameters for a new time slot can be entered *(see chapter 5.6.3.8.3, page 862)*.

[Properties]

Opens the **Evaluation window #** dialog window, in which the parameters for the selected time slot can be edited *(see chapter 5.6.3.8.3, page 862)*.

[Delete]

Deletes the time slot selected in the table.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Time** or **Volume**) for the fixed endpoint from the measuring point list.

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.3.8.7.10, page 916)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.3.8.7.10, page 916)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2000.0 mV/mL**
Default value	**25.0 mV/mL**

5.6.3.8.7.9 STAT U - Additional measured values

Tab: **Method ▶ STAT U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.3.8.7.10 STAT U - Fixed endpoint evaluation

Dialog window: **Method ▶ STAT U ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation ▶ [New/[Properties] ▶ Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**-2000.0 to 2000.0 mV**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.9 TET

5.6.3.9.1 TET - Overview

Dialog window: **Method ▶ TET ▶ Properties... ▶ TET - 'Command name'**

Command for thermometric titration with the 859 Titrotherm.

Instruments

This command can be executed with the following device:

Titrando: 859

Appearance

The command has the following appearance:

Parameters

The parameters for the command **TET** are configured on the following tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
  Entry of a waiting period before the start of the titration.
- *Titration parameters*
  Parameters for the run of the titration.
- *Stop conditions*
  Entry of criteria which cause the titration to stop.
- *Thermometric evaluation*
  Parameters for the thermometric evaluation of titration curves.
- *Additional evaluations*
  Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
  Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **TET** and can be used in formulas under the designation **'Command name.Variable designation'**:

Designation	Description
BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
CONC	Concentration of the solution used for the command
CYL	Cylinder volume of the dosing unit used for the command
DBL	Total duration for the processing of the command in s
DSC	Time for processing all start conditions in s
EME	End measured value (measured value after processing of the command) in the unit of the measured value
EP{x}.ERC	2. derivative for the endpoint x (1…9) in the unit of the measured value
EP{x}.MEA	Measured value for the endpoint × (1…9) in the unit of the measured value

Designation	Description
EP{x}.TIM	Time for the endpoint x (1...9) in s
EP{x}.VOL	Volume for the endpoint × (1…9) in mL
EVT	End volume (total dosed volume at the end of the command) in mL
FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
FP{x}.ERC	2. derivative for the fixed endpoint x (1...9)
FP{x}.MEA	Measured value for the fixed endpoint × (1…9) in the unit of the measured value
LP{x}.TIM	Time for the fixed endpoint x (1...9) in s
FP{x}.VOL	Volume for the fixed endpoint × (1…9) in mL
IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
LP.CAx	Calculated value × (1...3) for the last measuring point on the measuring point list
LP.ERC	2. derivative (1...3) for the last measuring point of the measuring point list
LP.EXx	External value × (1...3) for the last measuring point of the measuring point list
LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
LP.TIM	Time for the last measuring point of the measuring point list in s
LP.VOL	Volume for the last measuring point in the measuring point list in mL
MA.MEA	Maximum measured value in the unit of the measured value
MA.TIM	Time at maximum measured value in s
MA.VOL	Volume at maximum measured value in mL
MI.MEA	Minimum measured value in the unit of the measured value

Designation	Description
MI.TIM	Time at minimum measured value in s
MI.VOL	Volume at minimum measured value in mL
NMP	Number of measuring points in measuring point list
SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
TITER	Titer value of the solution used for the command

5.6.3.9.2 TET - General/Hardware

Tab: **Method ▶ TET ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **859 Titrotherm**
Default value	**859 Titrotherm**

Dosing device

Dosing device

Selection of the number of the dosing device (dosing unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Selection	**1** | **2** | **3** | **4**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device. With non-intelligent dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input the sensor is connected to.

Selection	**1** | **2**
Default value	**1**

Sensor

Selection of a sensor of type **Thermoprobe** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**'Sensor name'** | **not defined**
Default value	**not defined**

not defined
If the sensor is not defined, then it will be checked at the start of the determination whether a sensor of the type **Thermoprobe** is connected to the measuring input. If this is the case, the connected sensor is used; if it is no the case, an error message appears.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Input range	**-15 to 15**
Default value	**8**

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command.

5.6.3.9.3 TET - Start conditions

Tab: **Method ► TET ► Properties... ► Start conditions**

Command name

Name of the command.

Entry	**25 characters**

The start conditions are processed in the listed sequence before the titration is started.

Start volume

Start volume

Volume to be dosed with the indicated dosing rate before the start of the titration.

Input range	**0.00000 to 50.0000 mL**
Default value	**0 mL**

Dosing rate

Rate (volume/time unit) at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the dosing unit used.

Input range	**0.100 to 166.000 mL/min**
Selection	**maximum**
Default value	**maximum**

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the dosing of a start volume. The pause follows at the end of all the start conditions.

Input range	**0 to 9999 s**
Default value	**0 s**

5.6.3.9.4 TET - Titration parameters

Tab: **Method ▶ TET ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the running of the titration are defined on this tab.

Dosing

Dosing rate

Rate (volume/time unit) at which dosing is to be carried out. The maximum dosing rate depends on the cylinder volume of the dosing unit used.

Input range	**0.100 to 166.000 mL/min**
Default value	**2.000 mL/min**
Selection	**maximum**

Filter

Filtering factor

Factor which determines the digital filtering of the measuring curve. The higher this value, the more the noise is damped. The filtering has an influence on the shape of the peak and the EP shift.

Input range	**1 to 200**
Default value	**50**

Damping until

Range from the start of the measurement in which the curve is additionally damped. This parameter allows to minimize the influence of titration artifacts (e.g. spikes), which occur at the beginning of the measurement and can mistakenly be interpreted as endpoints. The damping functions as a linear ramp, i.e. its influence is the highest at the beginning and then decreases linearly to the defined volume.

Input range	**0.0 to 50.0 mL**
Default value	**0.2 mL**

5.6.3.9.5 TET - Stop conditions

Tab: **Method ► TET ► Properties... ► Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stop when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Input range	**0.01 to 50.00 mL**
Selection	**off**
Default value	**off**

Stop measured value

Stop when the measured value entered for a measuring point has been reached since the start of the titration. Thereby, the direction of the measurement curve (ascending or descending), which is determined after recording the first 50 measuring points, is taken into account.

Input range	**0.0 to 60.0 °C**
Selection	**off**
Default value	**off**

Stop time

Stop when the entered time has elapsed after the start of the titration (including start conditions).

Input range	**0 to 999999 s**

Selection	**off**
Default value	**off**

Stop slope

Stop when the criterion defined for the first derivative of the measured value (slope) is fulfilled.

First field: Selection of the reference condition.

Selection	**< | >**
Default value	**<**

Second field: Definition of reference value for the derivative of the measured value.

Input range	**-999999.999 to 999999.999 °C/mL** (Increment: **0.001**)
Default value	**0.100 °C/mL**
Selection	**off**

Stop slope active after

Required minimum volume for the stop. The field **Stop slope active after** is active only if the comparison value is not set to **off** for **Stop slope**.

Input range	**0.00 to 50.00 mL**
Selection	**off**
Default value	**off**

Additional volume after stop

After stopping the titration, this additional volume is dosed according to the stop conditions defined. The curve shape after reaching the endpoint can also be seen this way.

Input range	**0.01 to 50.00 mL**
Default value	**0.5 mL**
Selection	**off**

Filling rate

Rate (volume/time unit) at which the buret is to be filled after the titration. The maximum filling rate depends on the cylinder volume of the dosing unit used. If the selected filling rate is higher than the maximum possible dosing rate, it will be automatically corrected to this value.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.3.9.6 TET - Thermometric evaluation

Tab: **Method ▶ TET ▶ Properties... ▶ Thermometric evaluation**

Command name

Name of the command.

Entry	**25 characters**

Parameters for the thermometric evaluation of the titration curve with automatic endpoint recognition.

Evaluation start

Possibility to postpone the start of the evaluation. The evaluation starts not before having added the solution volume.

Input range	**0.0 to 50.0 mL**
Default value	**0.1 mL**

Endpoints

Selection of the sorting for the display of the endpoints in the table.

Selection	**Sort by volume (ascending)** | **Sort by peak height (descending)**
Default value	**Sort by volume (ascending)**

Table of endpoints

A maximum of 9 endpoints can be defined. The parameters for determining these endpoints are displayed in the window table which cannot be edited and which contains the columns **Reaction type** and **EP criterion**.

[New]

Open the dialog window **Endpoint #** in which the parameters for a new endpoint can be entered *(see chapter 5.6.3.9.9, page 928)*.

[Properties]

Open the dialog window **Endpoint #** in which the parameters for the selected endpoint can be edited *(see chapter 5.6.3.9.9, page 928)*.

[Delete]

Delete the endpoint selected in the table.

5.6.3.9.7 TET - Additional evaluations

Tab: **Method ▶ TET ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value** or **Volume**) for the fixed endpoint from the measuring point list.

Moves the selected line up (changes the sequence).

Moves the selected line down (changes the sequence).

[New]

Open the dialog window **Fixed endpoint evaluation #** to enter a new fixed endpoint *(see chapter 5.6.3.9.10, page 929)*.

[Properties]

Open the dialog window **Fixed endpoint evaluation #** to edit the fixed endpoint selected in the table *(see chapter 5.6.3.9.10, page 929)*.

[Delete]

Delete the selected line.

Minimum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated volume for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Only editable for **Minimum evaluation** = **on**, otherwise disabled.

Input range	**0.1 to 20.0 °C/mL**
Default value	**1.0 °C/mL**

Maximum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated volume for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Only editable for **Maximum evaluation** = **on**, otherwise disabled.

Input range	**0.1 to 20.0 °C/mL**
Default value	**1.0 °C/mL**

5.6.3.9.8 TET - Additional measured values

Tab: **Method ▶ TET ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Open the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Open the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Delete the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Open the dialog window **External measured value #** in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Open the dialog window **External measured value #** in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Delete the external measured value selected in the table.

5.6.3.9.9 TET - Endpoint

Dialog window: **Method ► TET ► Properties... ► Thermometric evaluation ► [New]/[Properties] ► Endpoint**

Reaction type

Selection of the reaction type according to which the curve is to be evaluated.

Selection	**exothermic** | **endothermic**
Default value	**exothermic**

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

for reaction type = exothermic

Input range	**-999999 to 0**
Default value	**-5**

for reaction type = endothermic

Input range	**0 to 999999**
Default value	**5**

5.6.3.9.10 TET - Fixed endpoint evaluation

Dialog window: **Method ▶ TET ▶ Properties... ▶ Additional evaluations ▶ Fixed endpoint evaluation ▶ [New]/[Property] ▶ Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time** | **Volume**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**0.0 to 60.0 °C**

Time

Input range	**0.0 to 999999.9 s**

Volume

Input range	**0.00000 to 9999.99 mL**

5.6.3.10 Evaluation

5.6.3.10.1 pK value and Half neutralization potential

Parameters: **Method ▶ DET/MET ▶ Properties... ▶ Additional evaluations ▶ pK/HNP evaluation**

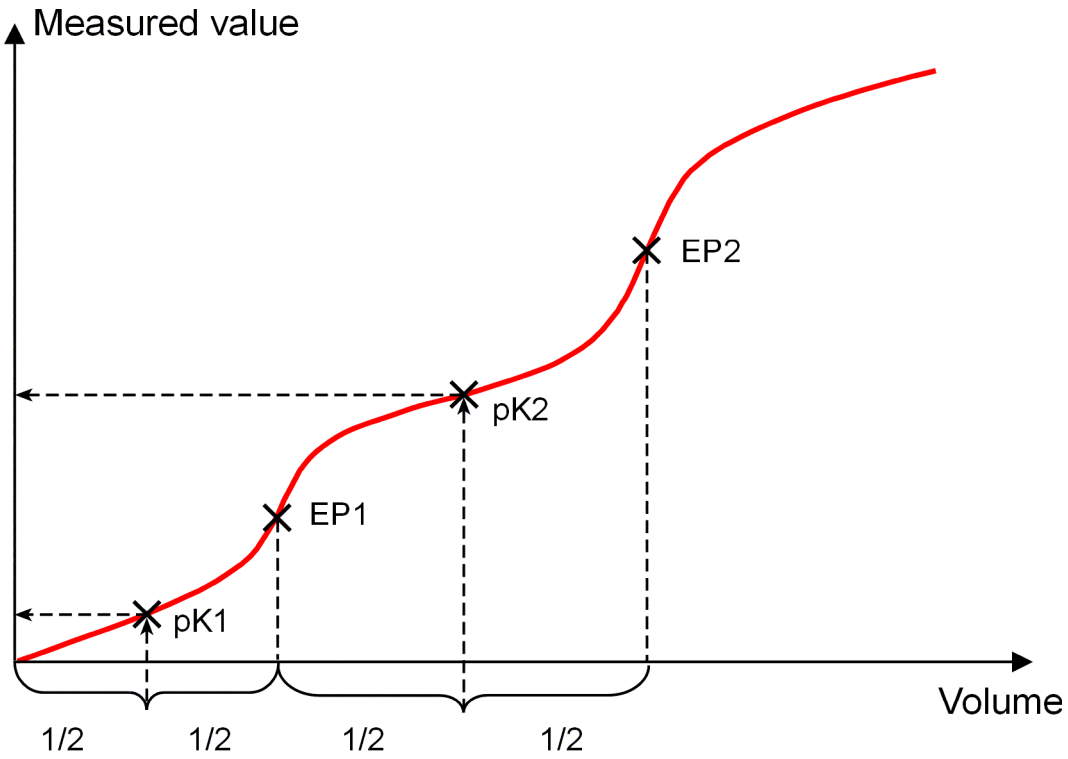
The **pK value** can be determined for pH titrations (DET and MET) and the **half neutralization potential** can be determined for U titrations.

The activities of conjugated acid-base pairs are linked by the following equation (Henderson-Hasselbalch equation):

$$\mathbf{pH = pK_a + \log (a_B/a_A)}$$

If the activities of the acid and the conjugated base are equal ($\mathbf{a_A = a_B}$), then $\mathbf{pH=pK_a}$. This is the value at the half neutralization point and can be extrapolated from the titration curve. A careful pH calibration is necessary for pK evaluations. Nonetheless, the determined pK value is only an approximation, as the ionic strengths are not taken into account. In order to obtain more accurate values, titrations must be carried out with decreasing ionic strengths and the results extrapolated to the ionic strength zero. pK evaluation in aqueous solution is limited to the range $3.5 < pK < 10.5$ because of the leveling effect of strong acids and the lack of jumps with very weak acids. pK values of mixtures of acids and polyvalent acids can also be determined.

In non-aqueous solutions the **half neutralization potential (HNP)** is frequently used instead of the pK value. The HNP is evaluated in the same way as the pK value.



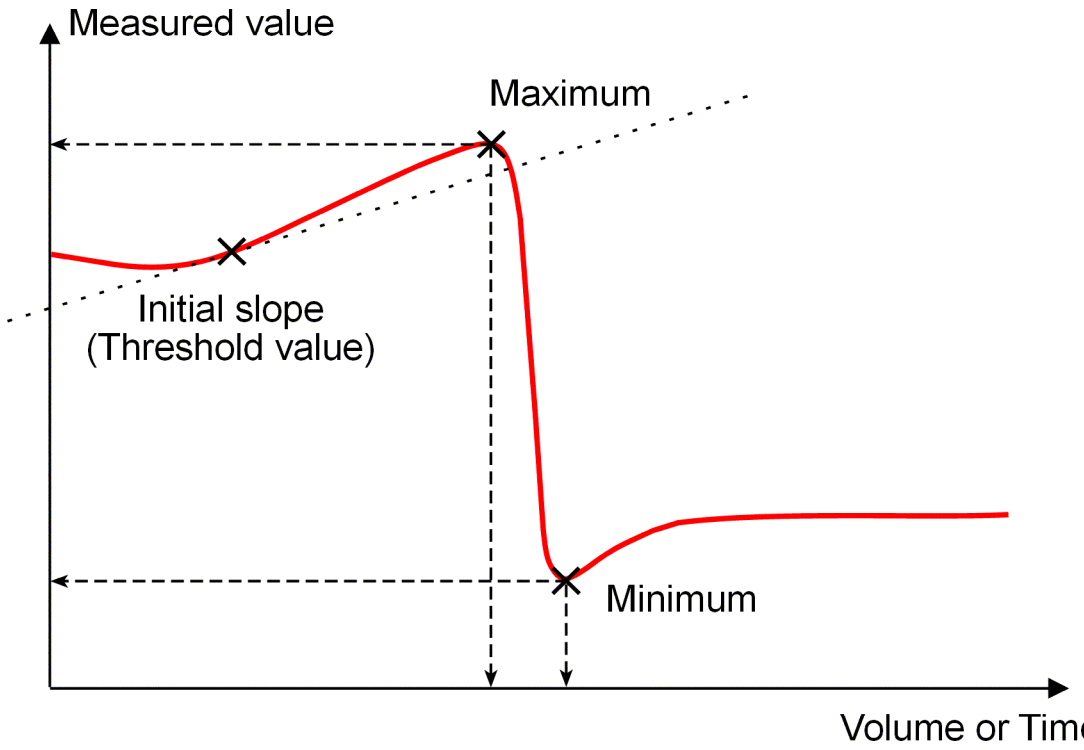
NOTICE

If a start volume is to be added then it must be smaller than 1/2 V(EP1).

5.6.3.10.2 Minimum/Maximum evaluation

Parameters: **Method ▶ DET/MET/SET/KFT/KFC/MEAS ▶ Properties... ▶ Additional evaluations ▶ Minimum/Maximum evaluation**

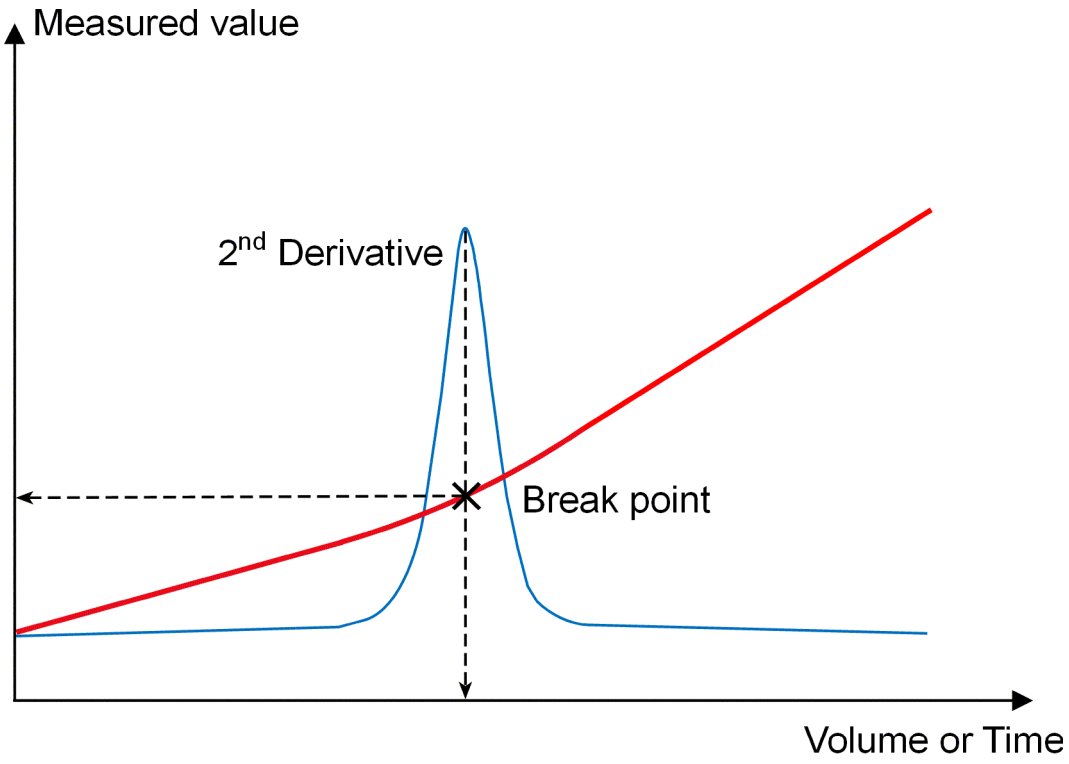
For the minimum or maximum measured value the associated **volume**, **time** and **temperature** are interpolated from the measuring point list. The evaluation begins as soon as the slope of the curve exceeds a particular threshold value.



5.6.3.10.3 Break-point evaluation

Parameters: **Method ► DET/MET/MEAS ► Properties... ► Additional evaluations ► Break-point evaluation**

A break-point evaluation is used to determine sharp change of direction in the titration curve. This evaluation is primarily used for photometric and conductivity titrations. The method is based on the search for extremes in the second derivative of the curve.



5.6.3.10.4 Gran evaluation

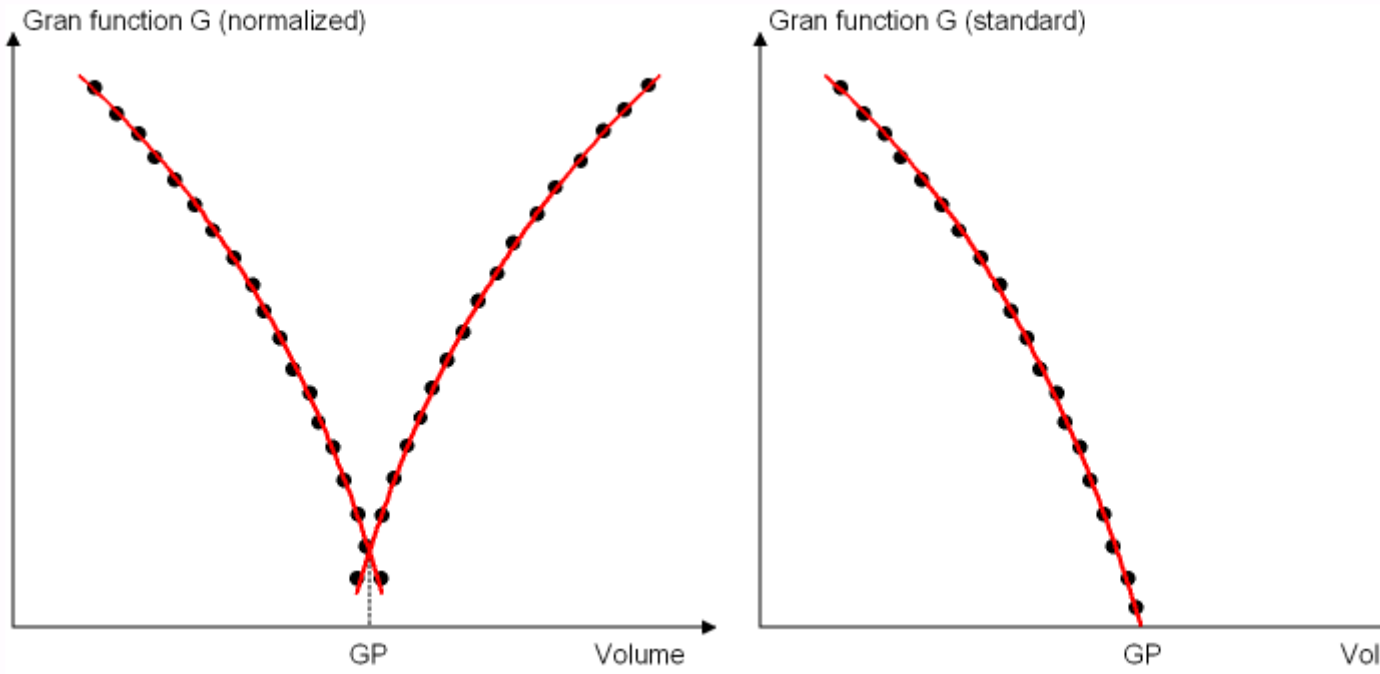
Parameters: **Method ► DET/MET ► Properties... ► Additional evaluations ► Gran evaluation**

The Gran evaluation can be used to determine S-shaped DET and MET titration curves. Two different procedures can be selected for this which are referred to as **Normalized** and **Standard**.

In the **normalized** procedure, the titration curves are linearized in 2 parts: the first part is before, the second after the equivalence point. The Gran function G is then plotted vs. the reagent consumption to get the Gran endpoint GP.

In the **standard** procedure, which is only available for *5.6.3.2.2.7DET pH - Additional evaluations* and *5.6.3.3.2MET pH*, only the part before the equivalence point will be linearized, and afterwards the intersection point with the y axis is determined as the endpoint GP.

The Gran evaluation is only suitable for curves with a single jump. All of the jumps are evaluated together as a group when a curve has several jumps. This may be desirable, as for example if 2 EPs are very close to one another in a steep jump and one wishes to have only one GP evaluated, e.g. with titrations of NaOH that contain carbonate.



5.6.3.11 Additional measured values

5.6.3.11.1 Calculated measured value

Dialog window: **Method ► DET/MET/SET/KFT/KFC/STAT/MEAS/DOS ► Properties... ► Additional measured values ► [New]/[Properties] ► Calculated measured value**

With the option **Additional calculated measured values**, a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulasas variables ***.CA1...3**.

Name

Designation for the calculated measured value. This name is used as axis legend.

Entry	**25 characters**
Default value	**Calculated measured value #**

Formula

Formula to calculate the measured value. It can be created with the formula editor which opens by pressing [÷].

Entry	**1000 characters**
Default value	**'empty'**

Unit

Unit of calculated measured value.

Selection	**empty** | **ppm** | **%** | **g/L** | **mg/L** | **mg/mL** | **mg/100g** | **mol/L** | **mmol/L** | **mL** | **g** | **mg** | **µg** | **°C** | **µL** | **s** | **mS/cm**
Default value	**empty**

Decimal places

Number of decimal places with which the calculated measured value will be displayed.

Input range	**0 to 5**
Default value	**2**

Comment

Comment on the calculated measured value.

Entry	**250 characters**
Default value	**'empty'**

5.6.3.11.2 External measured value

Dialog window: **Method ► DET/MET/SET/KFT/KFC/STAT/MEAS/DOS ► Properties... ► Additional measured values ► [New]/[Properties] ► External measured value**

With the option **Additional external measured values**, a maximum of 3 new measured values can be applied and saved from other existing measuring commands (e.g. **MEAS**) which are running at the same time in other tracks. These new measured values can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables ***.EX1…3**.

Command

Selection of the command from which the additional measured value will be taken over.

Selection	**Selection from existing measuring commands**

Response

Selection of the quantity from the command which will be adopted as quantity of the additional external measured value.

Selection	**Selection from existing measuring quantities**

Unit

Display of the unit of the external measured value.

Comment

Comment on the external measured value.

Entry	**250 characters**
Default value	**'empty'**

5.6.4 Measuring commands

5.6.4.1 Measuring commands - Overview

Menu item: **Method ► Insert ► New command... ► Measure**

Commands for **measurements** with different measured quantities.

The following measuring commands can be selected:

- *MEAS pH*
  Potentiometric pH measurement with pH electrodes.
- *MEAS U*
  Potentiometric voltage measurement with metal electrodes.
- *MEAS Ipol*
  Amperometric measurement with selectable polarization voltage (measured quantity current I).
- *MEAS Upol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *MEAS T*
  Temperature measurement.
- *MEAS T/Flow*
  Temperature and gas flow measurement.
- *MEAS Conc*
  Concentration measurement (direct measurement).
- *MEAS Cond*
  Conductivity measurement.
- *MEAS TC Cond*
  Measurement of the temperature coefficient of the conductivity.
- *MEAS Ref*
  Measurement of the dark spectrum and the reference spectrum with an Avantes spectrometer.
- *MEAS Spec*
  Measurement of the sample solution across a defined wavelength range.
- *MEAS Opt*
  Measurement of the sample solution at a defined wavelength.
- *MEAS Opt Conc*
  Measurement of the sample solution at a defined wavelength. In the process, the measured absorbance value is directly converted to a concentration value using the calibration function stored for the colorimetric sensor used.
- *MEAS TMF*
  Measurement of the transmission factor. It serves to adjust the 089 Photometer to 100% transmission. Distilled water is usually used.

- *STDADD man*
  Standard addition with manual addition of the standard addition solution.
- *STDADD dos*
  Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD auto*
  Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

5.6.4.2 Standard addition - Overview

Menu item: **Method ▶ Insert ▶ New command... ▶ Measure**

Recommendation

In order to guarantee a reliable evaluation of the standard addition, care must be taken to ensure that the buret volume and the concentration of the standard solution are adjusted to the respective measuring conditions. The individual addition volumes must be selected in such a way that the potential difference is at least 15 mV after each additive step. At least four volume additions should be carried out.

Table 44 Recommended concentrations of the standard solution for the standard addition

Buret volume in mL	$c_{Standard\ solution} : c_{Sample}$
5	40 : 1
10	20 : 1
20	10 : 1
50	5 : 1

Example of a standard addition

NOTICE

This example is valid for standard additions with any type of ion-selective electrodes.

Sample concentration	5 mg/L
Buret volume	10 mL
Sample size	10 mL
ISA/TISAB	10 mL

Total volume	20 mL
Factor $c_{Standard\ solution}/c_{Sample}$	20

This results in a sample concentration in the measuring solution of 2.5 mg/L. The optimum concentration of the standard solution is thus 2.5 mg/L · 20 = 50 mg/L. Please note that this is merely to be considered a guideline for standard additions. Even if you deviate from this recommendation, precise measurements will still be possible.

Principle

With the standard addition procedure, a known amount of the substance to be determined is added to the sample once or more. This addition can take place manually or automatically. As opposed to normal ion measurement with ion-selective electrodes *(see chapter 5.6.5.6.1, page 1114)*, the ions of interest and interfering ions cannot be distinguished in the standard addition procedure, as both are present in the sample at the beginning. Only the sum can be determined. Therefore, a linear correlation between U and $\log(c_i)$ is generally assumed for standard addition measurements.

$$U_i = E(0) + \frac{U_N}{z} \cdot \log(c_i)$$

The regression line (linear regression) is thus determined iteratively according to the method of least squares. This procedure provides the axis intercept $E(0)$, the slope s and the concentration of the measuring ion in the diluted measuring solution c_A.

$$c_A = 10^{\frac{U_A - E(0)}{s}}$$

The dilution is taken into account via the method parameters sample volume V_S (= **Sample size** in mL) and addition volume V_{Add}, so that the end result c_S (concentration of the ion searched in the sample solution) determined by tiamo can be calculated and directly displayed:

$$c_s = \frac{V_s + V_{Add}}{V_s} c_A$$

If instead of the sample volume the sample amount m_S (= **Sample size** in g) is entered, the result c_{res} is calculated by tiamo:

$$c_{res} = \frac{m_S + V_{Add}}{m_S} \cdot c_A$$

In order to obtain also the required end result c_S (concentration of the ion of interest in the sample solution) out of this, this must be calculated with

the aid of a **CALC** command according to the following formula (ρ = density in g/mL):

$$c_S = \frac{c_{res} \cdot m_S}{m_S + V_{add}} \cdot \rho \cdot \frac{V_{add}}{m_S}$$

CAUTION

Recalculating the values for the axis intercept $E(0)$, the slope s and the concentration c_A iteratively from the voltages U_i measured for the sample and the spiked solutions as well the known concentration of the standard requires much effort, because it is an equation system with three unknowns. However, the concentration c_S can at least be easily recalculated with the values for $E(0)$, U_S and s calculated by tiamo (see the following example).

Example

- **Parameters**
  Concentration of the standard addition solution = 1,000 ppm
  Volume of the standard addition solution V_{add} = 10 mL
  Sample size V_S = 10 mL
- **Measured data**

	dV (mL)	U (mV)	dU (mV)
Sample		59.8	
Increment 1	0.310	39.9	–20.0
Increment 2	0.705	19.9	–20.0
Increment 3	1.750	–1.1	–21.0

- **Result**
  $E(0)$ = 129.7
  s = –61.5
  $c(F^-)$ = **27.4 ppm**
- **Recalculation**
  c_A = 10^((59.8 – 129.7) / –61.5) = 13.696
  $c(F^-)$ = (10 + 10) / 10 * 13.696 = **27.39 ppm**

Commands

The following standard addition commands can be selected:

- *STDADD man*
  Standard addition with manual addition of the standard addition solution.
- *STDADD dos*
  Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD auto*
  Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

5.6.4.3 MEAS pH

5.6.4.3.1 MEAS pH - Overview

Dialog window: **Method ► MEAS pH ► Properties… ► MEAS pH - 'Command name'**

Command for potentiometric **pH measurements** with pH electrodes.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

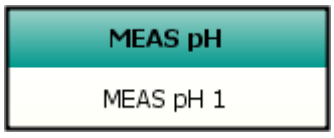
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS pH** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

- *Evaluations*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C

Identification	Description
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.3.2 MEAS pH - General/Hardware

Tab: **Method ▶ MEAS pH ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888), 867

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855, 867

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 867

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 867

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.3.3 MEAS pH - Measuring parameters

Tab: **Method ► MEAS pH ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the **Signal drift** or the **Stop measured value pH** is reached or a defined **Waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value pH** is fulfilled. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867	
Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Titrino	
Input range	**0.5 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855, 867	
Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867	
Input range	**0 to 999999 s**
Default value	**52 s**

Titrino	
Input range	**0 to 9999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value pH

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**120 s**

Titrino

Input range	**0 to 9999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value pH

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrando, 855, 867

Input range	**-20.0 to 150 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500 °C**
Default value	**25.0 °C**

5.6.4.3.4 MEAS pH - Evaluations

Tab: **Method ► MEAS pH ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.3.6, page 951)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.3.6, page 951)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/s**
Default value	**1.0 pH/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 pH/s**
Default value	**1.0 pH/s**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer break points will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**–20.000 to –20.000 pH**
Default value	**20.000 pH**

Window = Time	
Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value	
Input range	**–20.000 to 20.000 pH**
Default value	**20.000 pH**

Window = Time	
Input range	**0 to 999,999 s**
Default value	**999,999 s**

5.6.4.3.5 MEAS pH - Additional measured values

Tab: **Method ► MEAS pH ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined here. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.3.6 MEAS pH - Fixed endpoint evaluation

Dialog window: **Method ► MEAS pH ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of fixed endpoint.

Measured value	
Input range	**–20.000 to 20.000 pH**

Time	
Input range	**0.0 to 999,999.9 s**

5.6.4.4 MEAS U

5.6.4.4.1 MEAS U - Overview

Dialog window: **Method ▶ MEAS U ▶ Properties… ▶ MEAS U - 'Command name'**

Command for potentiometric **voltage measurements**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS U** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS U** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.WVL	Wavelength of the Optrode in nm

5.6.4.4.2 MEAS U - General/Hardware

Tab: **Method ▶ MEAS U ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888), 867

Selection	**1** | **2**
Default value	**1**

855, 888

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode**, **ISE electrode**, **Optrode type 1** or **Optrode type 2** from the sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Sensor (wavelength)

If an Optrode is selected as sensor, then the wavelength can also specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

Temperature measurement

Type of temperature measurement.

Titrando, 855, 867

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 867

Selection	**1** | **2** | **3** | **4** | **off**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 867

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.4.3 MEAS U - Measuring parameters

Tab: **Method ► MEAS U ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867	
Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Titrino	
Input range	**0.5 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855, 867	
Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**52 s**

Titrino

Input range	**0 to 9999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**120 s**

Titrino

Input range	**0 to 9999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrando, 855, 867

Input range	**-20.0 to 150 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500 °C**
Default value	**25.0 °C**

5.6.4.4.4 MEAS U - Evaluations

Tab: **Method ► MEAS U ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.4.6, page 965)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.4.6, page 965)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2,000.0 mV/s**
Default value	**25.0 mV/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2,000.0 mV/s**
Default value	**25.0 mV/s**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**–2,000.0 mV**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**2,000.0 mV**

Window = Time

Input range	**1 to 999,999 s**
Default value	**999,999 s**

5.6.4.4.5 MEAS U - Additional measured values

Tab: **Method ▶ MEAS U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.4.6 MEAS U - Fixed endpoint evaluation

Dialog window: **Method ► MEAS U ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value (Titrando, 867, 855)

Input range	**–2,000.0 to 2,000.0 mV**

Measured value (Titrino)

Input range	**–2,000 to 2,000 mV**

Time

Input range	**0.0 to 999,999.9 s**

5.6.4.5 MEAS Ipol

5.6.4.5.1 MEAS Ipol - Overview

Dialog window: **Method ► MEAS Ipol ► Properties… ► MEAS Ipol - 'Command name'**

Command for **voltametric measurements** with selectable polarization current.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 851, 852, 857, 888, 890, 901, 904, 905, 906, 907

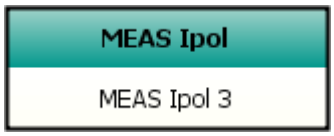
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS Ipol** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Ipol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value

Identification	Description
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.5.2 MEAS Ipol - General/Hardware

Tab: **Method ▶ MEAS Ipol ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 888, 890)

Selection	**1** | **2**
Default value	**1**

851, 855, 867, 888, 890

Selection	**1**
Default value	**1**

852

Selection	**2**
Default value	**2**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

Titrando, 855, 867

Input range	**-125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**-127 to 125.0 µA** (Increment: **1**)
Default value	**5 µA**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement

Titrando, 855, 867

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 867

Selection	**1** | **2** | **3** | **4** | **off**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 867

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.5.3 MEAS Ipol - Measuring parameters

Tab: **Method ▶ MEAS Ipol ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867

Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Titrino

Input range	**0.5 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**52 s**

Titrino

Input range	**0 to 9999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**120 s**

Titrino

Input range	**0 to 9999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**-2000.0 to 2000.0 mV**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrando, 855, 867	
Input range	**-20.0 to 150 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500 °C**
Default value	**25.0 °C**

5.6.4.5.4 MEAS Ipol - Evaluations

Tab: **Method ► MEAS Ipol ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.5.6, page 978)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.5.6, page 978)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2,000.0 mV/s**
Default value	**25.0 mV/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**1.0 to 2,000.0 mV/s**
Default value	**25.0 mV/s**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**-2,000.0 to 2,000.0 mV**
Default value	**-2,000.0 mV**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value

Input range	**-2,000.0 to 2,000.0 mV**
Default value	**2,000.0 mV**

Window = Time

Input range	**1 to 999,999 s**
Default value	**999,999 s**

5.6.4.5.5 MEAS Ipol - Additional measured values

Tab: **Method ▶ MEAS Ipol ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.5.6 MEAS Ipol - Fixed endpoint evaluation

Dialog window: **Method ► MEAS Ipol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► [New]/[Property]**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of fixed endpoint.

Measured value (Titrando, 867, 855)

Input range	**-2,000.0 to 2,000.0 mV**

Measured value (Titrino)

Input range	**-2,000 to 2,000 mV**

Time

Input range	**0.0 to 999,999.9 s**

5.6.4.6 MEAS Upol

5.6.4.6.1 MEAS Upol - Overview

Dialog window: **Method ► MEAS Upol ► Properties... ► MEAS Upol - 'Command name'**

Command for **amperometric measurements** with selectable polarization voltage.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 851, 852, 857, 888, 890, 901, 904, 905, 906, 907

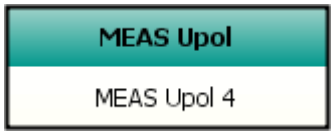
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS Upol** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Upol** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s

Identification	Description
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s

Identification	Description
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.6.2 MEAS Upol - General/Hardware

Tab: **Method ► MEAS Upol ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando (without 851, 888, 890), 867

Selection	**1** | **2**
Default value	**1**

851, 855, 888, 890

Selection	**1**
Default value	**1**

852

Selection	**2**
Default value	**2**

Sensor

Selection of a sensor of the type **Metal electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **Metal electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando, 855, 867

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Electrode check

on | off (Default value: **off**)

If this check box is enabled, then an electrode check will be carried out for polarizable electrodes during the transition from an inactive normal status to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrando, 855, 867

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 867

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 867

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.6.3 MEAS Upol - Measuring parameters

Tab: **Method ▶ MEAS Upol ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867

Input range	**0.01 to 99.90 µA/min**
Default value	**10.00 µA/min**

Titrino

Input range	**0.05 to 99.9 µA/min**
Default value	**10.0 µA/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**52 s**

Titrino

Input range	**0 to 9999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**–200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**120 s**

Titrino

Input range	**0 to 9999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**–200.0 to 200.0 µA**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrando, 855, 867

Input range	**-20.0 to 150 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500 °C**
Default value	**25.0 °C**

5.6.4.6.4 MEAS Upol - Evaluations

Tab: **Method ► MEAS Upol ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.6.6, page 991)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.6.6, page 991)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/s**
Default value	**5.0 µA/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.5 to 10.0 µA/s**
Default value	**5.0 µA/s**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando, 855 and 867.

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**–200.0 to 200.0 µA**
Default value	**–200.0 µA**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value

Input range	**–200.0 to 200.0 µA**
Default value	**200.0 µA**

Window = Time

Input range	**1 to 999,999 s**
Default value	**999,999 s**

5.6.4.6.5 MEAS Upol - Additional measured values

Tab: **Method ► MEAS Upol ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.6.6 MEAS Upol - Fixed endpoint evaluation

Dialog window: **Method ► MEAS Upol ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value	
Input range	**–200.0 to 200.0 µA**

Time	
Input range	**0.0 to 999,999.9 s**

5.6.4.7 MEAS T

5.6.4.7.1 MEAS T - Overview

Dialog window: **Method ▶ MEAS T ▶ Properties… ▶ MEAS T - 'Command name'**

Command for **temperature measurements**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Conductometer: 856

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS T** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Defining further methods for evaluating measurement curves.

- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS T** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value (temperature) for the break point x (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value (temperature) for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list

Identification	Description
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value (temperature) for the last measuring point in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (temperature) in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (temperature) in the unit of the measured value
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.7.2 MEAS T - General/Hardware

Tab: **Method ▶ MEAS T ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	**1** | **2**
Default value	**1**

851, 855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the **Temperature sensor**, **pH electrode** or **Conductivity sensor** type from the sensors configured in the sensor table.

Selection	**Sensor name** | **Temperature sensor** | **pH electrode** | **Conductivity sensor** | **not defined**
Default value	**Temperature sensor**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 856, 867

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 856, 867

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855, 856 and 867.

5.6.4.7.3 MEAS T - Measuring parameters

Tab: **Method ► MEAS T ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867

Input range	**0.1 to 999.0 °C**
Default value	**0.5 °C**

Titrino

Input range	**0.5 to 999.0 °C**
Default value	**0.5 °C**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855, 867

Input range	**0 to 999999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867

Input range	**0 to 999,999 s**
Default value	**215 s**

Titrino

Input range	**0 to 9,999 s**
Default value	**215 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**–20.0 to 150.0 °C**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrando, 855, 867

Input range	**0 to 999,999 s**
Default value	**600 s**

Titrino

Input range	**0 to 9,999 s**
Default value	**600 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16200 s** (Increment: **0.08**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Titrando, 855, 867

Input range	**–20.0 to 150.0 °C**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the

General/Hardware tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrando, 855, 867	
Input range	**-20.0 to 150 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500 °C**
Default value	**25.0 °C**

5.6.4.7.4 MEAS T - Evaluations

Tab: **Method ► MEAS T ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.7.6, page 1004)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.7.6, page 1004)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 °C/s**
Default value	**1.0 °C/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 °C/s**
Default value	**1.0 °C/s**

Break point evaluation

NOTICE

This evaluation method is possible only with Titrando, 855, 856 and 867.

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value

related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**–20.0 to 150.0 °C**
Default value	**–20.0 °C**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value	
Input range	**–20.0 to 150.0 °C**
Default value	**150.0 °C**

Window = Time	
Input range	**1 to 999,999 s**
Default value	**999,999 s**

5.6.4.7.5 MEAS T - Additional measured values

Tab: **Method ▶ MEAS T ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined here. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.7.6 MEAS T - Fixed endpoint evaluation

Dialog window: **Method ► MEAS pH ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**–20.0 to 150.0 °C**

Time

Input range	**0.0 to 999,999.9 s**

5.6.4.8 MEAS T/Flow

5.6.4.8.1 MEAS T/Flow - Overview

Dialog window: **Method ► MEAS T/Flow ► Properties... ► MEAS T/Flow - 'Command name'**

Command for **Temperature and gas flow measurements**.

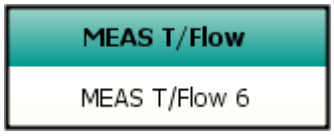
Devices

This command can be executed with the following devices:

Sample Processor: 774, 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS T/Flow** are configured on the following 4 tabs:

- *General/Hardware*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluation*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS T/Flow** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.DBL	Total duration for the processing of the command in s

Identification	Description
.EGF	Last measured gas flow rate (measured value following processing of the command) in mL/min
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.GMA	Maximum gas flow rate in mL/min
.GMI	Minimum gas flow rate in mL/min
.GMN	Average gas flow rate in mL/min
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.LP.CAx	Calculated value × (1…3) for the last measuring point of the measuring point list
.LP.EXx	External value × (1…3) for the last measuring point of the measuring point list
.LP.GFL	Gas flow value for the last measuring point of the measuring point list in mL/min
.LP.MEA	Measured value (temperature) for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (temperature) in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached

Identification	Description
.MI.MEA	Minimum measured value (temperature) in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MN.MEA	Average of the measured value in the unit of the measured value
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**;**0 = manual** or **after error**

5.6.4.8.2 MEAS T/Flow - General/Hardware

Tab: **Method ► MEAS T/Flow ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**774 Oven Sample Processor | 874 Oven Sample Processor**
Default value	**874 Oven Sample Processor**

5.6.4.8.3 MEAS T/Flow - Measuring parameters

Tab: **Method ► MEAS T/Flow ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measuring time

Maximum period of time for measurement.

Input range	**0 to 999999 s**
Default value	**600 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**1 to 999999.0 s**
Default value	**10 s**

Stop measured value Temp.

Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Input range	**50.0 to 250.0 °C**
Selection	**off**
Default value	**off**

5.6.4.8.4 MEAS T/Flow - Evaluations

Tab: **Method ► MEAS T/Flow ► Properties... ► Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 °C/s**
Default value	**1.0 °C/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 20.0 °C/s**
Default value	**1.0 °C/s**

5.6.4.8.5 MEAS T/Flow - Additional measured values

Tab: **Method ► MEAS T/Flow ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be

presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.9 MEAS Conc

5.6.4.9.1 MEAS Conc - Overview

Dialog window: **Method ► MEAS Conc ► Properties… ► MEAS Conc - 'Command name'**

Command for **Concentration measurements** (direct measurement).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS Conc** command are set on the following three tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Conc** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature after the command has been processed) in °C

Identification	Description
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.9.2 MEAS Conc - General/Hardware

Tab: **Method ▶ MEAS Conc ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855, 867

Selection	**1**
Default value	**1**

Sensor

Selection of an ISE sensor from the ISE sensors available in the sensor table.

Selection	**'Sensor name'** | **ISE electrode** | **not defined**
Default value	**ISE electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **off**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.9.3 MEAS Conc - Measuring parameters

Tab: **Method ▶ MEAS Conc ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 1.0E99**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 1.0E99**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**–20.0 to 150 °C**
Default value	**25.0**

5.6.4.9.4 MEAS Conc - Additional measured values

Tab: **Method ► Commands ► MEAS Conc ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be

presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.10 MEAS Cond

5.6.4.10.1 MEAS Cond - Overview

Dialog window: **Method ► MEAS Cond ► Properties… ► MEAS Cond - 'Command name'**

Command for **Conductivity measurements**.

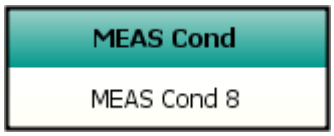
Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS Cond** command are set on the following four tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Defining further methods for evaluating measurement curves.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Cond** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value for the break point (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CLC	Cell constant of the sensor used in the command for conductivity measurement cells
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value

Identification	Description
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list

Identification	Description
.RTE	Reference temperature in °C
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TC.TC	Temperature coefficient in %/°C
.TC.CO	Coefficient c0 of the Chebyshev polynomial of the solution used
.TC.C1	Coefficient c1 of the Chebyshev polynomial of the solution used
.TC.C2	Coefficient c2 of the Chebyshev polynomial of the solution used
.TC.C3	Coefficient c3 of the Chebyshev polynomial of the solution used
.TC.C4	Coefficient c4 of the Chebyshev polynomial of the solution used
.TC.MAX	Maximum temperature coefficient in %/°C
.TC.MIN	Minimum temperature coefficient in %/°C
.TC.TSTART	Start temperature in °C
.TC.TSTOP	Stop temperature in °C

5.6.4.10.2 MEAS Cond - General/Hardware

Tab: **Method ▶ MEAS Cond ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument and the sensor are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Shows the device type.

Selection	**712 Conductometer** | **856 Conductivity Module**
Default value	**856 Conductivity Module**

Sensor

Sensor

Selection of a sensor of the **Conductivity sensor** type from the sensors configured in the sensor table.

Selection	**Sensor name** | **Conductivity sensor** | **not defined**
Default value	**Conductivity sensor**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement:

856

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

NOTICE

Is displayed only if the 856 Conductivity Module has been selected as device type.

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.10.3 MEAS Cond - Measuring parameters

Tab: **Method ▶ MEAS Cond ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

Measurement frequency

712

Selection	**auto** | **300 Hz** | **2.4 kHz**
Default value	**auto**

auto
The more suitable of the two frequencies is selected.

Type of measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **Waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled. This option is not available for the 712 Conductometer.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

856

Input range	**0.001 to 999.000 (mS/cm)/min**
Default value	**10.0 (mS/cm)/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

856

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

856

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

856

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

856

Input range	**0.0000 to 2,000.00 mS/cm**
Selection	**off**
Default value	**off**

off
No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

712

Input range	**0.4 to 999,999 s**
Default value	**2.0 s**

856

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0.0000 to 2,000.00 mS/cm**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

Measuring temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

712

Input range	**–170.0 to 500.0 °C**
Default value	**20.0 °C**

856

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Reference temperature

The electrical conductivity depends greatly on the temperature. The conductivity measured at a particular temperature is thus automatically converted to this reference temperature (usually 20 °C or 25 °C).

712

Input range	**–170.0 to 500.0 °C**
Default value	**20.0 °C**

856

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Selection	**off**

off
The conductivity at the measuring temperature is displayed.

Temperature compensation

Definition of the type how the temperature compensation is to be carried out.

Selection	**Temperature coefficient** | **Sample solution**
Default value	**Temperature coefficient**

Temperature coefficient
Manual entry of a constant temperature coefficient.

Sample solution
Selection of a function for the temperature coefficient from the table **Sample solutions (TC conductivity)**.

Temperature coefficient

The temperature compensation is calculated on the basis of the value entered (constant).

Input range	**0.00 to 9.99 %/°C**
Default value	**2.00 %/°C**

Sample solution

The temperature compensation is carried out on the basis of temperature-dependent coefficients and should be used for determinations where the sample temperature is not constant. There are two possibilities:

- It is possible to use a sample solution whose temperature coefficient has been determined by a previous measurement (MEAS TC Cond).
- For ground water, spring water and surface water, the temperature coefficients according to standard ISO 7888:1985 (German version: DIN EN 27888:1993) are stored in the system.

Selection	**DIN** | **Table entries**
Default value	**DIN**

5.6.4.10.4 MEAS Cond - Evaluations

Tab: **Method ▶ MEAS Cond ▶ Properties... ▶ Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line upward (modifies sequence).

Moves the selected line downward (modifies sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.10.6, page 1032)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.10.6, page 1032)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.0001 to 10.0 (mS/cm)/s**
Default value	**5.0 (mS/cm)/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.0001 to 10.0 (mS/cm)/s**
Default value	**5.0 (mS/cm)/s**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Input range	**0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

Selection	**Measured value** | **Time** | **off**
Default value	**off**

off
A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**0.0000 to 2,000.0 mS/cm**
Default value	**0.0000 mS/cm**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Measured value for the upper limit of the window.

Window = Measured value

Input range	**0.0000 to 2,000.0 mS/cm**
Default value	**2,000.0 mS/cm**

Window = Time

Input range	**1 to 999,999 s**
Default value	**999,999 s**

5.6.4.10.5 MEAS Cond - Additional measured values

Tab: **Method ► Commands ► MEAS Cond ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values pres-

ent in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.10.6 MEAS Cond - Fixed endpoint evaluation

Dialog window: **Method ► MEAS Cond ► Properties... ► Additional evaluations ► Fixed endpoint evaluation ► [New]/[Property] ► Fixed endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of fixed endpoint.

Measured value

Input range	**0.0000 to 2,000.00 mS/cm**

Time

Input range	**0.0 to 999,999.9 s**

5.6.4.11 MEAS TC Cond

5.6.4.11.1 MEAS TC Cond - Overview

Dialog window: **Method ► MEAS TC Cond ► Properties... ► MEAS TC Cond - 'Command name'**

Command for the **Measurement of the temperature coefficient of the conductivity**.

Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS TC Cond** command are set on the following two tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Cond** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{x}.MEA	Measured value for the break point (1 - 9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1 - 9) in °C
.BP{x}.TIM	Time for the break point x (1 - 9) in s
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used in the command
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{x}.MEA	Measured value for the fixed endpoint x (1 - 9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1 - 9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1 - 9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

Identification	Description
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature at minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Slope of the sensor used in the command
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TC.CO	Coefficient c0 of the Chebyshev polynomial of the solution used
.TC.C1	Coefficient c1 of the Chebyshev polynomial of the solution used
.TC.C2	Coefficient c2 of the Chebyshev polynomial of the solution used
.TC.C3	Coefficient c3 of the Chebyshev polynomial of the solution used

Identification	Description
.TC.C4	Coefficient c4 of the Chebyshev polynomial of the solution used
.TC.MAX	Maximum temperature coefficient in %/°C
.TC.MIN	Minimum temperature coefficient in %/°C
.TC.TSTART	Start temperature in °C
.TC.TSTOP	Stop temperature in °C

5.6.4.11.2 MEAS TC Cond - General/Hardware

Tab: **Method ► MEAS TC Cond ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Shows the device type.

Selection	**712 Conductometer** | **856 Conductivity Module**
Default value	**856 Conductivity Module**

Sensor

Sensor

Selection of a sensor of the **Conductivity sensor** type from the sensors configured in the sensor table.

Selection	**Sensor name** | **Conductivity sensor** | **not defined**
Default value	**Conductivity sensor**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Stirrer

This section is visible only if the 856 Conductivity Module was selected as device type.

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.11.3 MEAS TC Cond - Measuring parameters

Tab: **Method ▶ MEAS TC Cond ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement frequency

712

Selection	**auto** | **300 Hz** | **2.4 kHz**
Default value	**auto**

auto
The more suitable of the two frequencies is selected.

Stop time

Maximum period of time for measurement.

Input range	**0 to 999,999 s**
Default value	**3,000 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

712

Input range	**0.4 to 999,999 s**
Default value	**2.0 s**

856

Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Sample solution

Selection of the sample solution from the table **Sample solutions (TC conductivity)**.

Selection	**Table entries**
Default value	**first entry of table**

Start temperature

Temperature at the start of the measurement.

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Stop temperature

Temperature at end of the measurement.

856

Input range	**–20.0 to 150.0 °C**
Default value	**40.0 °C**

5.6.4.11.4 MEAS TC Cond - Additional measured values

Tab: **Method ▶ MEAS U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.12 MEAS Ref

5.6.4.12.1 MEAS Ref - Overview

Dialog window: **Method ► MEAS Ref ► Properties... ► MEAS Ref - 'Command name'**

Command for the **measurement of the dark spectrum and the reference spectrum** with an Avantes spectrometer.

Devices

This command can be executed with the following instrument:

Spectrometer: Avantes

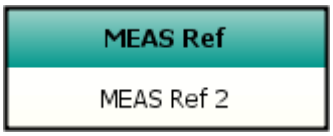
NOTICE

In a one-channel instrument setup, only instruments for which the entry **not defined** is selected under **Instrument for reference channel** in the configuration can be selected.

In a two-channel instrument setup, only instruments which are assigned an instrument for the reference channel can be selected *(see chapter 7.14.3, page 1573)*.

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS Ref** command are set on the following two tabs:

- *General/Hardware*
  Parameters for instrument.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **MEAS Ref** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.4.12.2 MEAS Ref - General/Hardware

Tab: **Method ▶ MEAS Ref ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the instrument type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**Avantes Spectrometer**
Default value	**Avantes Spectrometer**

Instrument for reference channel

Shows the name of the instrument for the reference channel.

5.6.4.12.3 MEAS Ref - Measuring parameters

Tab: **Method ► MEAS Ref ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Start wavelength

Lower limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

End wavelength

Upper limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**1,000.0 nm**

Integration time

Integration time for spectrum recording.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Input range	**0 to 100 Pixels**
Default value	**0 Pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

5.6.4.13 MEAS Spec

5.6.4.13.1 MEAS Spec - Overview

Dialog window: **Method ► MEAS Spec ► Properties... ► MEAS Spec - 'Command name'**

Command for the **measurement of the sample solution** across a defined wavelength range.

Devices

This command can be executed with the following instrument:

Spectrometer: Avantes

NOTICE

In a one-channel instrument setup, only instruments for which the entry **not defined** is selected under **Instrument for reference channel** in the configuration can be selected.

In a two-channel instrument setup, only instruments which are assigned an instrument for the reference channel can be selected *(see chapter 7.14.3, page 1573)*.

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS Spec** command are set on the following three tabs:

- *General/Hardware*
  Parameters for instrument.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Definition of evaluation results for the sample spectrum.

Command variables

The following command variables are generated by the **MEAS Spec** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.PK{#}.ABS	Absorbance of the peak with the greatest absorbance (maximum absorbance) for evaluation # (1 - 9)
.PK{#}.TRN	Transmission of the peak with the greatest absorbance (minimum transmission) for evaluation # (1- 9) in %
.PK{#}.CNT	Intensity of the peak with the greatest absorbance (maximum intensity) for evaluation # (1 - 9)
.PK{#}.CNR	Intensity in reference spectrum 'Command name'.PK{#}.WVL for evaluation # (1 - 9)
.PK{#}.CND	Intensity in dark spectrum 'Command name'.PK{#}.WVL for evaluation # (1 - 9)
.PK{#}.WVL	Wavelength of the peak with the greatest absorbance for evaluation # (1 - 9) of the discovered maximum

Identification	Description
.PK{#}.SAT	Specification as to whether the detector was saturated with 'Command name'.PK{#}.WVL for evaluation # (1 - 9)

5.6.4.13.2 MEAS Spec - General/Hardware

Tab: **Method ▶ MEAS Spec ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the instrument type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**Avantes Spectrometer**
Default value	**Avantes Spectrometer**

Instrument for reference channel

Shows the name of the instrument for the reference channel.

5.6.4.13.3 MEAS Spec - Measuring parameters

Tab: **Method ► MEAS Spec ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Start wavelength

Lower limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

End wavelength

Upper limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**1,000.0 nm**

Integration time

Integration time for spectrum recording.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Input range	**0 to 100 Pixels**
Default value	**0 Pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

5.6.4.13.4 MEAS Spec - Evaluations

Tab: **Method ▶ MEAS Spec ▶ Properties... ▶ Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

[New]

Opens the **Evaluation window #** dialog window for entering the start and end wavelengths *(see chapter 5.6.4.13.5, page 1046)*.

[Properties]

Opens the **Evaluation window #** dialog window for editing the start and end wavelengths selected in the table *(see chapter 5.6.4.13.5, page 1046)*.

[Delete]

Deletes the selected line.

5.6.4.13.5 MEAS Spec - Evaluation window

Dialog window: **Method ▶ MEAS Spec ▶ Properties... ▶ Evaluations ▶ [New...]/ [Properties] ▶ Evaluation window #**

Start wavelength

Lower limit of the evaluation range.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

End wavelength

Upper limit of the evaluation range.

Input range	**100.0 to 2,000.0 nm**
Default value	**1,000.0 nm**

5.6.4.14 MEAS Opt

5.6.4.14.1 MEAS Opt - Overview

Dialog window: **Method ▶ MEAS Opt ▶ Properties... ▶ MEAS Opt - 'Command name'**

Command for the **measurement of the sample solution** at a defined wavelength.

Devices

This command can be executed with the following instruments:

Spectrometer: Avantes

NOTICE

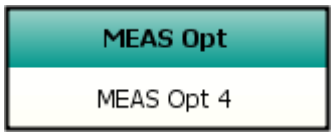
In a one-channel instrument setup, only instruments for which the entry **not defined** is selected under **Instrument for reference channel** in the configuration can be selected.

In a two-channel instrument setup, only instruments which are assigned an instrument for the reference channel can be selected *(see chapter 7.14.3, page 1573)*.

Photometer: 089

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS Opt** command are set on the following three tabs:

- *General/Hardware*
  Parameters for instrument.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Definition of evaluation results for absorbance measurements.

Command variables

The following command variables are generated by the **MEAS Opt** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BP{#}.[MEA]	Measured value for the break point (1 - 9) in the unit of the measured value
.BP{#}.CNT	Intensity for the break point x (1 - 9) in counts
.BP{#}.TEM [1)]	Temperature for the break point # (1 - 9) in °C

Identification	Description
.BP{#}.TIM	Time for the break point # (1 - 9) in s
.BP{#}.TRN	Transmission for the break point x (1 - 9) in %
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE [1)]	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.FP{#}.[MEA]	Measured value for the fixed endpoint # (1 - 9) in the unit of the measured value
.FP{#}.CNT	Intensity for the fixed endpoint x (1 - 9) in counts
.FP{#}.TEM [1)]	Temperature for the fixed endpoint # (1 - 9) in °C
.FP{#}.TIM	Time for fixed endpoint # (1 - 9) in s
.FP{#}.TRN	Transmission for the fixed endpoint x (1 - 9) in %
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE[1)]	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point on the measuring point list
.LP.CNT	Transmission of the last measuring point in the measuring point list in %
.LP.EXx	External value x (1 - 3) for the last measuring point on the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM [1)]	Temperature for the last measuring point in the measuring point list in °C

Identification	Description
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.TRN	Transmission of the last measuring point in the measuring point list in %
.MA{#}.[MEA]	Maximum measured value in the unit of the measured value
.MA{#}.CNT	Intensity for maximum measured value in counts
.MA{#}.TEM [1)]	Temperature for minimum measured value in °C
.MA{#}.TIM	Time for the minimum measured value in s
.MA{#}.TRN	Transmission for maximum measured value in %
.MI{#}.[MEA]	Minimum measured value in the unit of the measured value
.MI{#}.CNT	Intensity for minimum measured value in counts
.MI{#}.TEM [1)]	Temperature for minimum measured value in °C
.MI{#}.TIM	Time for the minimum measured value in s
.MI{#}.TRN	Transmission for minimum measured value in %
.MTE	Temperature measurement with sensor; (**1 = on**, **0 = off**)[2)]
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

[1)] Command variable is invalid for the Avantes spectrometer

[2)] For the Avantes spectrometer, MTE always equals 0

5.6.4.14.2 MEAS Opt - General/Hardware

Tab: **Method ▶ MEAS Opt ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the instrument type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**089 Photometer** | **Avantes Spectrometer**
Default value	**Avantes Spectrometer**

Instrument for reference channel

Shows the name of the instrument for the reference channel. Is only displayed for **Device type** = **Avantes spectrometer**.

Sensor

The Sensor section is only displayed for **Device type** = **089 Photometer**.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **off**
Default value	**continuous**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

off
The temperature will not be measured. The temperature entered manually under Temperature on the Measuring parameters tab will be used.

Stirrer

The Stirrer section is only displayed for **Device type** = **089 Photometer**.

Stirrer

Selection of the stirrer.

Selection	**1** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate.

Input range	**0 to 15**
Default value	**5**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.14.3 MEAS Opt - Measuring parameters

Tab: **Method ► MEAS Opt ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measuring parameters for the Avantes spectrometer

Wavelength

Wavelength at which the measured quantity (absorbance) is recorded.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

Blank value

Value by which the measured quantity (absorbance) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME from other measuring command) by which every measured absorbance value can then be corrected.

Input range	**–4,000 to 4,000 mAU**
Default value	**0 mAU**

Integration time

Integration time for absorbance measurement.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the light intensity of each measurement pixel is determined.

Input range	**1 to 100 pixels**
Default value	**0 pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

Measuring parameters for the 089 Photometer

Blank value

Value by which the measured quantity (absorbance) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME from other measuring command) by which every measured absorbance value can then be corrected.

Input range	**0 to 4,000 mAU**
Default value	**0 mAU**

Measurement

Two types of measurement can be selected, **Measurement with drift control** or **Measurement without drift control**.

Selection	**Measurement with drift control** | **Measurement without drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or the defined **Max. waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the **Measurement with drift control** option has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999,000 mAU/min**
Default value	**1.0 mAU/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**154 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Avantes Spectrometer

Input range	**0.1 to 999,999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

089 Photometer

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

Measurement without drift control

If the **Measurement without drift control** option has been selected, then the following parameters will be displayed:

Measuring time

Duration of the absorbance measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Avantes Spectrometer

Input range	**0.1 to 999,999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

089 Photometer

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

off
No stop.

Temperature

The **Temperature** section is only displayed for **Device type** = **089 Photometer**.

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**20.0 to 60 °C**
Default value	**25.0 °C**

5.6.4.14.4 MEAS Opt - Evaluations

Tab: **Method ▶ MEAS Opt ▶ Properties... ▶ Evaluations**

Command name

Name of the command.

Entry	**25 characters**

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fixed endpoint evaluation

Fixed endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value** or **Time**) for the fixed endpoint from the measuring point list.

Moves the selected line up (changes the sequence).

Moves the selected line down (changes the sequence).

[New]

Opens the **Fixed endpoint evaluation #** dialog window for entering a new fixed endpoint *(see chapter 5.6.4.14.6, page 1059)*.

[Properties]

Opens the **Fixed endpoint evaluation #** dialog window to edit the fixed endpoint selected in the table *(see chapter 5.6.4.14.6, page 1059)*.

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 1,000.0 mAU/s**
Default value	**20.0 mAU/s**

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is activated, then the associated time for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Input range	**0.1 to 1,000.0 mAU/s**
Default value	**20.0 mAU/s**

Break point evaluation

Break point evaluation

on | off (Default value: **off**)

If this option is activated, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value change, even small changes in the

measured value can be evaluated as a break point for a small measured value range.

Input range	**0.0 to 1.0**
Default value	**0.3**

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Input range	**0.0 to 10.0**
Default value	**0.9**

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Input range	**2 to 20**
Default value	**5**

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	**Measured value** | **Time** | **off**
Default value	**off**

Lower limit

Measured value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Input range	**0 to 4,000 mAU**
Default value	**0 mAU**

Window = Time

Input range	**0 to 999,999 s**
Default value	**0 s**

Upper limit

Measured value for the upper limit of the window.

Time for the upper limit of the window.

Window = Measured value

Input range	**0 to 4,000 mAU**
Default value	**4,000 mAU**

Window = Time	
Input range	**0 to 999,999 s**
Default value	**999,999 s**

5.6.4.14.5 MEAS Opt - Additional measured values

Tab: **Method ▶ MEAS Opt ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.14.6 MEAS Opt - Fixed endpoint evaluation

Dialog window: **Method ► MEAS Opt ► Properties... ► Evaluations ► Fixed endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	**Measured value** | **Time**
Default value	**Measured value**

Fixed value

Value of the fixed endpoint.

Measured value

Input range	**0 to 4,000 mAU**

Time

Input range	**0.0 to 999,999.9 s**

5.6.4.15 MEAS Opt Conc

5.6.4.15.1 MEAS Opt Conc - Overview

Dialog window: **Method ► MEAS Opt Conc ► Properties... ► MEAS Opt Conc - 'Command name'**

Command for the **measurement of the sample solution** at a defined wavelength. In the process, the measured absorbance value is directly converted to a concentration value using the calibration function stored for the colorimetric sensor used.

Devices

This command can be executed with the following devices:

Spectrometer: Avantes

NOTICE

In a one-channel instrument setup, only instruments for which the entry **not defined** is selected under **Instrument for reference channel** in the configuration can be selected.

In a two-channel instrument setup, only instruments which are assigned an instrument for the reference channel can be selected *(see chapter 7.14.3, page 1573)*.

Photometer: 089

Appearance

The command has the following appearance:

Parameters

The parameters for the **MEAS Opt Conc** command are set on the following three tabs:

- *(see chapter 5.6.4.15.2, page 1061)*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Additional measured values*
  Definition of additional measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **MEAS Opt Conc** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value

Identification	Description
.ETE[1)]	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE[1)]	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.CNT	Intensity of the last measuring point in the measuring point list in counts
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.TRN	Transmission of the last measuring point in the measuring point list in %
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

[1)] Command variable is invalid for the Avantes spectrometer

5.6.4.15.2 MEAS Opt Conc - General/Hardware

Tab: **Method ► MEAS Opt Conc ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected in the **Device name** field, the **Device type** field can no longer be edited and the device type belonging to the device is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**Avantes spectrometer** | **089 Photometer**
Default value	**Avantes spectrometer**

Instrument for reference channel

Shows the name of the instrument for the reference channel. Is only displayed for **Device type** = **Avantes spectrometer**.

Sensor

Colorimetric sensor

Selection of a colorimetric sensor from the table of colorimetric sensors. The calibration data for the colorimetric sensor will be adopted for the determination.

Selection	**'Name of the colorimetric sensor'** | **empty or 'first list entry'** | **not defined**
Default value	**empty or 'first list entry'**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Displayed only when **Device type** = **089 Photometer**.

Selection	**continuous** | **off**
Default value	**continuous**

Stirrer

The **Stirrer** section is only displayed for **Device type** = **089 Photometer**.

Stirrer

Selection of the stirrer.

Selection	**1** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate.

Input range	**0 to 15**
Default value	**5**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.15.3 MEAS Opt Conc - Measuring parameters

Tab: **Method ► MEAS Opt Conc ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

Measuring parameters for the Avantes spectrometer

The parameters for the measuring procedure can be defined on this tab.

Wavelength

Wavelength at which the measured quantity (absorbance) is recorded.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

Blank value

Value by which the measured quantity (concentration) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME

from other measuring command) by which every measured concentration value can then be corrected.

Input range	**–1.0E12 to 1.0E12 (max. 10 digits)**
Default value	**1.000**

Sample size unit

Concentration unit for the blank value.

Entry	**1 - 10 characters**
Selection	**mol/L** | **mmol/L** | **µmol/L** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **ppm** | **%** | **mEq/L**
Default value	**ppm**

Integration time

Integration time for absorbance measurement.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the light intensity of each measurement pixel is averaged.

Input range	**0 to 100 pixels**
Default value	**0 pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

Measuring parameters for the 089 Photometer

The parameters for the measuring procedure can be defined on this tab.

Blank value

Value by which the measured quantity (absorbance) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME

from other measuring command) by which every measured absorbance value can then be corrected.

Measurement

Two types of measurement can be selected, **Measurement with drift control** or **Measurement without drift control**.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or the defined **Max. waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

Measurement with drift control

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999,000 mAU/min**
Default value	**1.0 mAU/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**154 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**

off
No stop.

Measurement without drift control

Measuring time

Duration of the absorbance measurement.

Input range	**0 to 999,999 s**
Default value	**600 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.25 to 999,999.0 s**
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

Temperature (089 Photometer)

Temperature

Measuring temperature, which can be entered manually. If the **Temperature measurement** is set to **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**20.0 to 60 °C**
Default value	**25.0 °C**

5.6.4.15.4 MEAS Opt Conc - Additional measured values

Tab: **Method ▶ MEAS Opt Conc ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.4.16 MEAS TMF

5.6.4.16.1 MEAS TMF - Overview

Dialog window: **Method ► MEAS TMF ► Properties... ► MEAS TMF - 'Command name'**

Command for the **measurement of the transmission factor**. It serves to adjust the 089 Photometer to 100% transmission. Distilled H_2O is usually used.

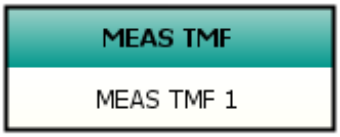
Devices

This command can be executed with the following instrument:

Photometer: 089

Appearance

The command has the following appearance:



Parameters

The parameters for the **MEAS TMF** command are set on the following tabs:

- *General/Hardware*
  Parameters for instrument.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **MEAS TMF** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TMF	Transmission factor

5.6.4.16.2 MEAS TMF - General/Hardware

Tab: **Method ► MEAS TMF ► Properties… ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the instrument type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**089 Photometer**
Default value	**089 Photometer**

Sensor

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **off**

continuous
The temperature will be measured continuously.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate.

Input range	**0 to 15**
Default value	**5**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.16.3 MEAS TMF - Measuring parameters

Tab: **Method ► MEAS TMF ► Properties… ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

Measurement

Two types of measurement can be selected, **Measurement with drift control** or **Measurement without drift control**.

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or the defined **Max. waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

Measurement with drift control

If the **Measurement with drift control** option has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999,000 mAU/min**
Default value	**1.0 mAU/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**154 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.00 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

Temperature

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**20.0 to 60 °C**
Default value	**25.0 °C**

Measurement without drift control

Measuring time

Duration of the absorbance measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.00 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

5.6.4.17 STDADD man

5.6.4.17.1 STDADD man - Overview

Dialog window: **Method ► STDADD man ► Properties... ► STDADD man - 'Command name'**

Command for **Standard addition** with manual addition of the standard addition solution.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **STDADD man** command are set on the following three tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Standard addition*
  Parameters for the standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve and evaluation data for a determination are displayed in the **Database** program part in the **Calibration curve** dialog window. The dialog window is opened with the **Determinations ► Show calibration curve...** menu item or the icon.

Command variables

The following command variables are generated in the method run by the command **STDADD man** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.COD	Coefficient of determination R^2
.CONC	Concentration of the solution used for the command
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point calculated from the calibration
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)

Identification	Description
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.17.2 STDADD man - General/Hardware

Tab: **Method ► STDADD man ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined here.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **ISE electrode** from the list of sensors available in the sensor table.

Selection	**'Sensor name'** | **ISE electrode** | **not defined**
Default value	**ISE electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.17.3 STDADD man - Standard addition

Tab: **Method ► STDADD man ► Properties... ► Standard addition**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the standard addition can be set on this tab.

Number of additions

Number of manual additions of standard solution.

Input range	**1 to 19**
Default value	**3**

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) that was added to the sample before the first standard addition.

Input range	**0.000 to 9,999.999 mL**
Default value	**0.000 mL**

Addition mode

Selection	**Fixed volume increments** | **Variable volume increments**
Default value	**Fixed volume increments**

Fixed volume increments
If this option is selected, then a fixed volume increment must be added for each standard addition.

Variable volume increments
If this option is selected, then the defined variable volume increment must be added for each standard addition.

Addition volume

Size of the fixed addition volume (only for **Addition mode** = **Fixed volume increments**).

Input range	**0.00000 to 99,999.9 mL**
Default value	**0.100 mL**

Addition volume 1 - 19

Size of the individual addition volumes (only for **Addition mode** = **Variable volume increments**).

Input range	**0.00000 to 99,999.9 mL**
Default value	**0.100 mL**

Addition solution

Concentration

Concentration of the addition solution.

Input range	**0.001 to 999,999.999**
Default value	**1.000**

Unit

Concentration unit of the addition solution.

Selection	**mol/L** | **mmol/L** | **µmol/L** | **ppm** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **%** | **mEq/L**
Default value	**ppm**

5.6.4.17.4 STDADD man - Measuring parameters

Tab: **Method ▶ STDADD man ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement with drift control

The drift-controlled measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Temperature

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**–20.0 to 150 °C**
Default value	**25.0 °C**

Switch off stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the actual measurement. In such cases, the two following parameters can be edited

Stir before measurement

Stirring time between dosing and measurement.

Input range	**0 to 999,999 s**
Default value	**0 s**

Pause before measurement

Waiting time before the measurement during which stirring is discontinued.

Input range	**0 to 999,999 s**
Default value	**0 s**

5.6.4.18 STDADD dos

5.6.4.18.1 STDADD dos - Overview

Dialog window: **Method ► STDADD dos ► Properties... ► STDADD dos - 'Command name'**

Command for **Standard addition** with addition of the standard addition solution from a dosing device.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **STDADD dos** command are set on the following three tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
  Parameters for the standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve and evaluation data for a determination are displayed in the **Database** program part in the **Calibration curve** dialog window. The dialog window is opened with the **Determinations ▶ Show calibration curve...** menu item or the icon.

Command variables

The following command variables are generated in the method run by the **STDADD dos** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.COD	Coefficient of determination R^2
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point calculated from the calibration
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C

Identifi-cation	Description
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TITER	Titer value of the solution used for the command
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.18.2 STDADD dos - General/Hardware

Tab: **Method ▶ STDADD ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the addition solution is to be dosed.

Titrando, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

NOTICE

If an existing solution is selected as addition solution, then the **Concentration** and the **Unit** of this solution are adopted for the calculation of the standard addition. If **not defined** is selected, then the **Concentration** and the **Unit** must be entered on the **Standard addition** tab.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **ISE electrode** from the list of sensors available in the sensor table.

Selection	**'Sensor name'** | **ISE electrode** | **not defined**
Default value	**ISE electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.18.3 STDADD dos - Standard addition

Tab: **Method ► STDADD dos ► Properties... ► Standard addition**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the standard addition can be set on this tab.

Number of additions

Number of additions of standard solution.

Input range	**1 to 19**
Default value	**3**

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) that was added to the sample before the first standard addition.

Input range	**0.000 to 9,999.999 mL**
Default value	**0.000 mL**

Addition mode

Selection	**Fixed volume increments** | **Variable volume increments**
Default value	**Fixed volume increments**

Fixed volume increments
If this option is selected, then a fixed volume increment must be added for each standard addition.

Variable volume increments
If this option is selected, then the defined variable volume increment must be added for each standard addition.

Addition volume

Size of the fixed addition volume (only for **Addition mode** = **Fixed volume increments**).

Input range	**0.00000 to 99,999.9 mL**
Default value	**0.100 mL**

Addition volume 1 - 19

Size of the individual addition volumes (only for **Addition mode** = **Variable volume increments**).

Input range	**0.00000 to 99,999.9 mL**
Default value	**0.100 mL**

Addition solution

NOTICE

Displayed only when **Solution** = **not defined**.

Concentration

Concentration of the addition solution.

Input range	**0.001 to 999,999.999**
Default value	**1.000**

Unit

Concentration unit of the addition solution.

Selection	**mol/L** | **mmol/L** | **µmol/L** | **ppm** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **%** | **mEq/L**
Default value	**ppm**

Dosing rate

Rate at which the volume increments are dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.4.18.4 STDADD dos - Measuring parameters

Tab: **Method ► STDADD ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

Measurement with drift control

The drift-controlled measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Temperature

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**–20.0 to 150 °C**
Default value	**25.0 °C**

Switching off the stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the actual measurement. In such cases, the two following parameters can be edited

Stir before measurement

Stirring time between dosing and measurement.

Input range	**0 to 999,999 s**
Default value	**0 s**

Pause before measurement

Waiting time before the measurement during which stirring is discontinued.

Input range	**0 to 999,999 s**
Default value	**0 s**

5.6.4.19 STDADD auto

5.6.4.19.1 STDADD auto - Overview

Dialog window: **Method ► STDADD auto ► Properties... ► STDADD auto - 'Command name'**

Command for **Standard addition** with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **STDADD auto** command are set on the following three tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
  Parameters for the standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve and evaluation data for a determination are displayed in the **Database** program part in the **Calibration curve** dialog window. The dialog window is opened with the **Determinations ► Show calibration curve...** menu item or the icon.

Command variables

The following command variables are generated in the method run by the **STDADD auto** command and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.COD	Coefficient of determination R^2
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point calculated from the calibration

Identification	Description
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TITER	Titer value of the solution used for the command
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.19.2 STDADD auto - General/Hardware

Tab: **Method ► STDADD auto ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the number of the dosing device (exchange or dosing unit) with which the addition solution is to be dosed.

Titrando, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

NOTICE

If an existing solution is selected as addition solution, then the **Concentration** and the **Unit** of this solution are adopted for the calculation of the standard addition. If **not defined** is selected, then the **Concentration** and the **Unit** must be entered on the **Standard addition** tab.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **ISE electrode** from the list of sensors available in the sensor table.

Selection	**'Sensor name'** | **ISE electrode** | **not defined**
Default value	**ISE electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished.

5.6.4.19.3 STDADD auto - Standard addition

Tab: **Method ► STDADD ► Properties... ► Standard addition**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the standard addition can be set on this tab.

Number of additions

Number of additions of standard solution.

Input range	**1 to 19**
Default value	**3**

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) that was added to the sample before the first standard addition.

Input range	**0.000 to 9,999.999 mL**
Default value	**0.000 mL**

Stop volume

Stop when the sum of the dosed volume increments exceeds the stop volume defined here.

Input range	**0.0 to 9,999.9 mL**
Default value	**100.0 mL**

Addition solution

NOTICE

Displayed only when **Solution** = **not defined**.

Concentration

Concentration of the addition solution.

Input range	**0.001 to 999,999.999**
Default value	**1.000**

Unit

Concentration unit of the addition solution.

Selection	**mol/L** | **mmol/L** | **µmol/L** | **ppm** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **%** | **mEq/L**
Default value	**ppm**

Control parameters

Dosing rate

Rate at which the volume increments are dosed.

Selection	**slow** | **medium** | **fast**
Default value	**fast**

Delta U

Potential difference that is to be reached with a standard addition.

Input range	**1 to 999 mV**
Default value	**10 mV**

5.6.4.19.4 STDADD auto - Measuring parameters

Tab: **Method ► STDADD ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement with drift control

The drift-controlled measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999.0 mV/min**
Default value	**10.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Temperature

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**–20.0 to 150 °C**
Default value	**25.0 °C**

Switching off the stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the actual measurement. In such cases, the two following parameters can be edited

Stir before measurement

Stirring time between dosing and measurement.

Input range	**0 to 999,999 s**
Default value	**0 s**

Pause before measurement

Waiting time before the measurement during which stirring is discontinued.

Input range	**0 to 999,999 s**
Default value	**0 s**

5.6.5 Calibration commands

5.6.5.1 Calibration commands - Overview

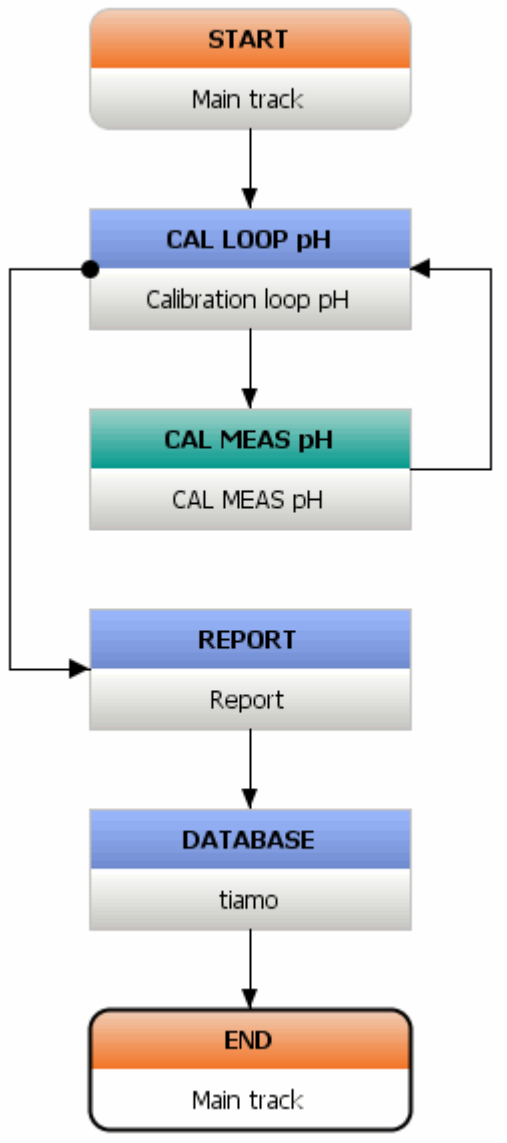
Menu item: **Method ▶ Insert ▶ New command... ▶ Calibration**

Commands for **calibration** of pH electrodes and ion-selective electrodes.

General

The commands **CAL LOOP** and **CAL MEAS** are available for calibrating electrodes. The number and type of buffers or standards, respectively, that can be measured with the **CAL MEAS** command is defined in the **CAL LOOP** loop command. Each time the loop is executed, the validity of the measurement is checked, and at the end the calibration data for the electrode is calculated.

The basic structure of a calibration method looks as follows:



The calibration can be carried out with either manual solution changes or automatic solution changes with the aid of a Sample Processor.

Commands

The following commands can be selected for calibration:

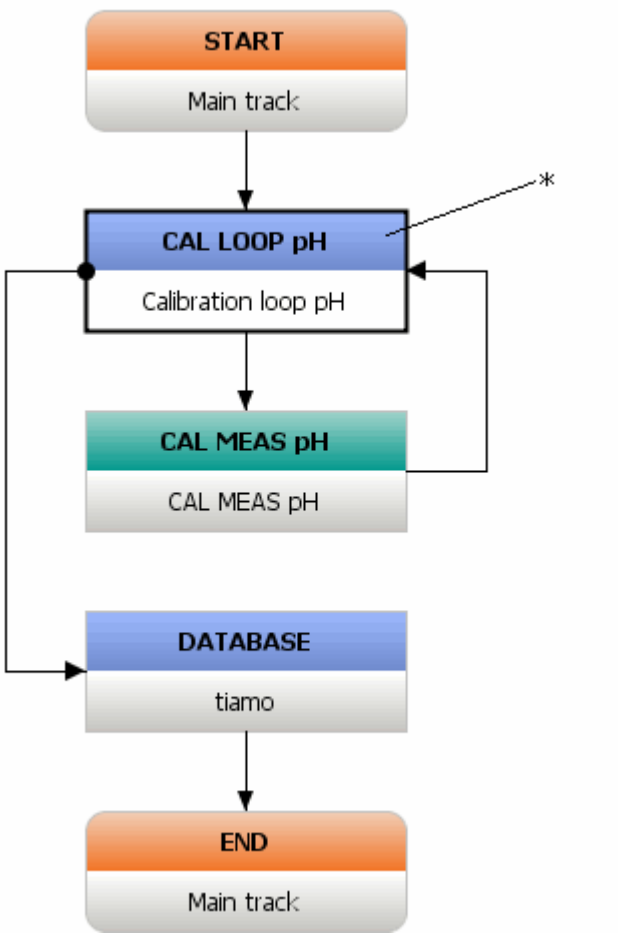
- *CAL Cond*
  Measurement of conductivity standards for the determination of the cell constant of conductivity measuring cells.
- *CAL Spec*
  Measuring command for wavelength calibration.
- *CAL LOOP Conc*
  Calibration loop for the calibration of ion-selective electrodes (ISE electrodes).

- *CAL MEAS Conc*
  Measurement of standards for the calibration of ion-selective electrodes (ISE electrodes).
- *ELT LOOP*
  Loop command for the test of pH electrodes.
- *ELT MEAS*
  Command for measuring calibration buffers for the test of pH electrodes.
- *CAL LOOP Opt*
  Loop command for the calibration of colorimetric sensors.
- *CAL MEAS Opt*
  Command for measuring standard solutions for the calibration of colorimetric sensors.
- *CALL LOOP pH*
  Calibration loop for the calibration of pH electrodes.
- *CAL MEAS pH*
  Measurement of buffers for the calibration of pH electrodes.

5.6.5.2 Calibrating with manual solution exchange

Program part: **Method ► Calibration commands**

The basic structure of a calibration method with manual solution exchange looks as follows:



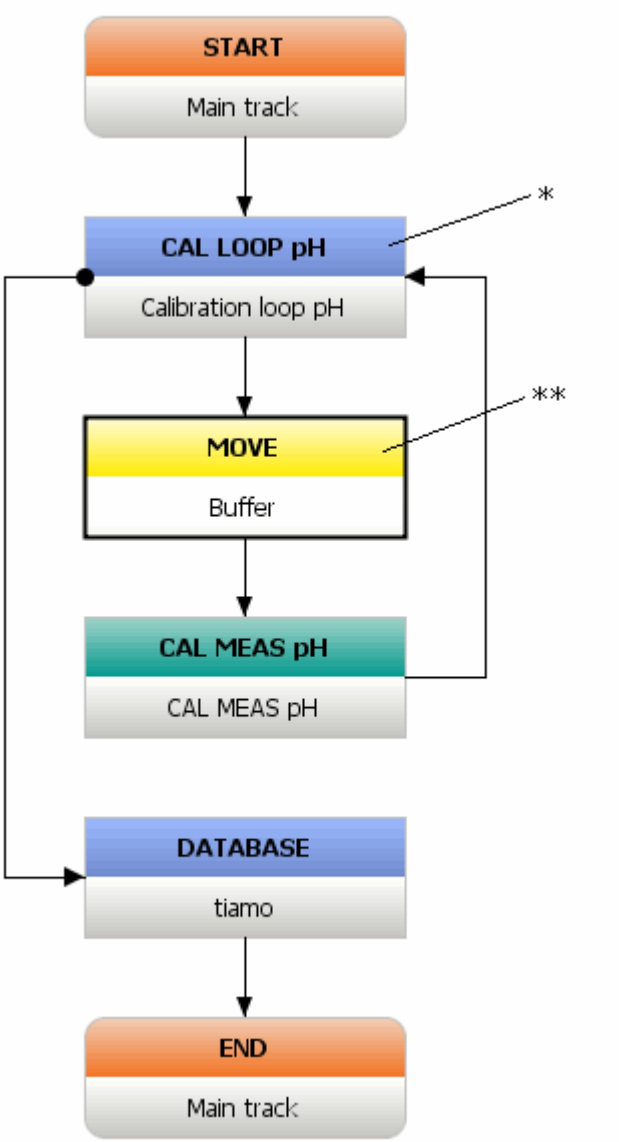
* Definition of the number of calibration solutions and the type of solution exchange.

The request for changing the buffer or the standard must be **activated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. During the run, a request for specifying the next buffer or standard is displayed after each measurement.

5.6.5.3 Calibrating with automatic solution exchange

Program part: **Method ▶ Calibration commands**

The basic structure of a calibration method with automatic solution exchange on a sample changer looks as follows:



* Definition of the number of calibration solutions and the type of solution exchange.

** Move to the next calibration solution.

The request for changing the buffer or the standard must be **deactivated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. No request for changing the buffer or standard is then displayed during the run.

For the automatic move to the next calibration solution on the sample changer rack, a **MOVE** command must be inserted between the loop command **CAL LOOP** and the measuring command **CAL MEAS**. The positions of the calibration solutions on the rack are defined in this command. The following three possibilities are available to do so:

- **Defining rack positions for calibration solutions in the method**
  Starting from an initial rack position **###** defined for the first calibration solution in the **MOVE** command, the further calibration solutions will be used in sequential order at the subsequent positions. For this, the following settings have to be made in the **MOVE** command under **Target**:
  Move: **Rack position**
  Number: **= ### –1 + 'Command name.LCO'** (entry with formula editor, e.g. **= 19 + 'Calibration loop pH.LCO'** for the above sample method with the first calibration solution at position **20**).
- **Defining special beakers for calibration solutions in the method**
  Starting from an initial special beaker **###** defined for the first calibration solution in the **MOVE** command, the further calibration solutions will be used in sequential order at the subsequent special beakers. The number of special beakers to be defined for the rack that is set up must correspond to the number of calibration buffers used. The following settings must be made in the **MOVE** command under **Target**:
  Move: **Special beaker**
  Number: **= ### + 'Command name.LCO'** (entry with formula editor, e.g. **= 5 + 'Calibration loop pH.LCO'** for the sample method above with the first calibration solution at special beaker position **6**).
- **Defining rack positions for calibration solutions in the sample data**
  Starting from the **Sample position** defined in the sample data (variable **'MV.Sample position'**) for the first calibration solution, the further calibration solutions will be used in sequential order at the subsequent rack positions. For this, the following settings have to be made in the **MOVE** command under **Target**:
  Move: **Rack position**
  Number: **= 'MV.Sample position'– 1 + 'Command name.LCO'** (entry with formula editor, e.g. **= 'MV.Sample position'– 1 + 'Calibration loop pH.LCO'** for the above sample method).

The variable **'Command name.LCO'** (index number of the calibration loop) is increased by **+1** after each pass of the loop.

NOTICE

The formula editor is opened with a right-click in the input field.

5.6.5.4 CAL Cond

5.6.5.4.1 CAL Cond - Overview

Dialog window: **Method ► CAL Cond ► Properties... ► CAL Cond - 'Command name'**

Command for **Conductivity standard measurements** for the determination of the cell constant of conductivity sensors.

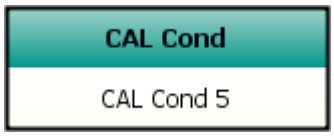
Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:



Parameters

The parameters for the **CAL Cond** command are set on the following three tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Conductivity standard*
  Definition of the values or rather the mode of entry for the calibration with a standard.

Command variables

The following command variables are generated by the **CAL Cond** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.CLC	Cell constant determined by calibration for the sensor used in the command for conductivity sensors (only **MEAS Cond** and **CAL Cond**)

Identification	Description
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C for the last measurement
.FIN	Command status: **1 = Command has been ended at least once**, **0 = Command was started but not ended**, **invalid = Command was not started (variable not available).**
.IME	Initial measured value (measured value when starting the command) in the unit of the measured value for the last measurement
.ITE	Initial temperature (temperature before the command has been processed) in °C for the last measurement
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.RTE	Reference temperature in °C (only **MEAS Cond** and **CAL Cond**)
.STY	Type of stop with which the command was stopped: **1 = finished normally**, **0 = stopped manually with [Quit] or [Stop]**.
.TC	Temperature coefficient in %/°C

5.6.5.4.2 CAL Cond - General/Hardware

Tab: **Method ► CAL Cond ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Shows the device type.

Selection	**712 Conductometer** | **856 Conductivity Module**
Default value	**856 Conductivity Module**

Sensor

Sensor

Selection of a conductivity sensor from the conductivity sensors available in the sensor table.

Selection	**'Sensor name'** | **Conductivity sensor** | **not defined**
Default value	**Conductivity sensor**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

856

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected, then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

This section is visible only if the 856 Conductivity Module was selected as device type.

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **off**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.5.4.3 CAL Cond - Measuring parameters

Tab: **Method ► CAL Cond ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Measurement

Measurement frequency

712

Selection	**auto** | **300 Hz** | **2.4 kHz**
Default value	**auto**

auto
The more suitable of the two frequencies is selected.

Type of measurement

Selection of the measuring mode.

712

Selection	**Measurement without drift control**

856

Selection	**Measurement with drift control** | **Measurement without drift control**
Default value	**Measurement with drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **Waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled. This option is not available for the 712 Conductometer.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop conditions **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

856

Input range	**0.001 to 999.0 (mS/cm)/min**
Default value	**10.0 (mS/cm)/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

856

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

856

Input range	**0 to 999,999 s**
Default value	**52 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

856

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

712

Input range	**0.4 to 999,999 s**
Default value	**2.0 s**

856

Input range	**0.1 to 999,999.0 s**
Default value	**2.0 s**

Temperature

Measuring temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

5.6.5.4.4 CAL Cond - Conductivity standard

Tab: **Method ▶ CAL Cond ▶ Properties... ▶ Conductivity standard**

Command name

Name of the command.

Entry	**25 characters**

Definition of the conductivity standard

Selection of the mode in which the data for the conductivity standard is to be defined.

Selection	**Input** | **Request** | **Template**
Default value	**Input**

Input
If this option is selected, then the values for the conductivity standard can be entered directly.

Request
If this option is selected, then the current temperature of the solution is measured first after the start of a determination. Then the dialog window **Data conductivity standard** is displayed *(see chapter 5.6.5.4.5, page 1109)*. After the data has been entered, the method continues running.

Template
If this option is selected, then a conductivity standard can be selected. The temperature coefficient for the specified reference temperature is calculated from the data of this conductivity standard.

Parameters for input

If the **Input** option has been selected, then the following parameters will be displayed:

Reference temperature

Entry of a temperature for which a calibration point of the conductivity standard is known. It should be as close to the measuring temperature as possible.

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Conductivity

Entry of the conductivity of the standard at reference temperature.

Input range	**0.00000 to 2,000.00 mS/cm**
Default value	**11.66 mS/cm**

Temperature coefficient

Temperature coefficient of the standard at reference temperature.

Input range	**0.00 to 9.99 %/°C**
Default value	**2.07 %/°C**

Parameters for template

If the **Input** option has been selected, then the following parameters will be displayed:

Name standard

Selection list with conductivity standards. The temperature coefficient at the specified reference temperature is calculated from the data of one of these standards.

Selection	**'Conductivity standard'**

5.6.5.4.5 CAL Cond - Data - Conductivity standard

Dialog window: **Method ► CAL Cond ► Data conductivity standard**

Current temperature

Shows the currently measured temperature of the conductivity standard.

Transfer data from standard

Entry of the data of the conductivity standard, which should be as close to the **Current temperature** as possible. This data is usually shown on the data sheet / certificate of the conductivity standard.

Reference temperature

Entry of a temperature for which a calibration point of the conductivity standard is known. It should be as close to the measuring temperature as possible.

Input range	**–20.0 to 150.0 °C**
Default value	**20.0 °C**

Conductivity

Entry of the conductivity of the standard at reference temperature.

Input range	**0.00000 to 2,000.00 mS/cm**
Default value	**1.0 mS/cm**

Temperature coefficient

Temperature coefficient of the standard at reference temperature.

Input range	**0.00 to 9.99 %/°C**
Default value	**1.00 %/°C**

5.6.5.5 CAL Spec

5.6.5.5.1 CAL Spec - Overview

Dialog window: **Method ► CAL Spec ► Properties... ► CAL Spec - 'Command name'**

Command for **wavelength calibration**.

Devices

This command can be executed with the following instrument:

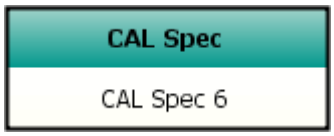
Spectrometer: Avantes

NOTICE

Only instruments for a one-channel instrument setup can be selected. For a wavelength calibration of a two-channel instrument setup, both instruments have to be reconfigured in such a way that they have neither an instrument for the reference channel nor an instrument for the measuring channel (Instrument for reference channel = **not defined** then has to apply to the instrument for the measuring channel). In addition, the light source should be set to **continuous**, and the measuring setup should be optimized for an AvaLight-CAL light source.

Appearance

The command has the following appearance:



Parameters

The parameters for the **CAL Spec** command are set on the following three tabs:

- *General/Hardware*
  Parameters for instrument.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Calibration wavelengths*
  Entry of the reference wavelengths, definition of the behavior of the calibration.

Command variables

The following command variables are generated by the **CAL Spec** command in the method run and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.C0	Coefficient c0 of the calibration curve
.C1	Coefficient c1 of the calibration curve
.C2	Coefficient c2 of the calibration curve

Identification	Description
.C3	Coefficient c3 of the calibration curve
.CAL	Status of the calibration: **1 = calibrated normally**, **0 = canceled**, because reference wavelength was not found.
.DBL	Total duration for the processing of the command in s
.STY	Type of stop with which the command was stopped: **1 = stopped normally**, **0 = stopped manually with [Quit] or [Stop]** .
.CP{#}.MEA	Measured wavelength of the calibration point in nm. If no measured peak can be assigned, then **not found** will be entered.
.CP{#}.REF	Reference wavelength of the calibration point in nm.
.FIN	Command status: **1 = Command has been ended at least once**, **0 = Command was started but not ended**, **invalid = Command was not started (variable not available)**.
.TOL	Tolerance within which a measured peak can be assigned to a calibration wavelength.

5.6.5.5.2 CAL Spec - General/Hardware

Tab: **Method ▶ CAL Spec ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

In two-channel measurements, i.e. in a master/slave setup, only master spectrometers can be selected.

In one-channel measurements, i.e. no master/slave setup, only instruments for which the entry **not defined** is selected under **Device assignment** in the configuration can be selected.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the instrument type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**Avantes Spectrometer**
Default value	**Avantes Spectrometer**

5.6.5.5.3 CAL Spec - Measuring parameters

Tab: **Method ▶ CAL Spec ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The parameters for the measuring procedure can be defined on this tab.

Integration time

Integration time for spectrum recording.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

5.6.5.5.4 CAL Spec - Calibration wavelengths

Tab: **Method ▶ CAL Spec ▶ Properties... ▶ Calibration wavelengths**

Command name

Name of the command.

Entry	**25 characters**

The reference wavelengths with which the spectrometer is calibrated can be entered on this tab.

Tolerance

Tolerance for the preset wavelength when assigning the highest peak maximum found during the calibration measurement to the reference wavelength. If a peak is outside the range **Wavelength** +/- **Tolerance**, the calibration will be canceled. The existing calibration in the configuration remains in effect.

Input range	**0.1 to 1,100.0 nm**
Default value	**0.5 nm**

[New]

Opens the **Calibration wavelength #** dialog window for entering wavelengths and tolerances *(see chapter 5.6.5.5.5, page 1114)*.

[Properties]

Opens the **Calibration wavelength #** dialog window to edit the values selected in the table *(see chapter 5.6.5.5.5, page 1114)*.

[Delete]

Deletes the selected line.

5.6.5.5.5 CAL Spec - Calibration wavelength

Tab: **Method ► CAL Spec ► Properties... ► Calibration wavelengths ► [New/ [Properties] ► Calibration wavelength #**

Calibration wavelengths

Input range	**200.0 to 1,100.0 nm**
Default value	**'empty' nm**

5.6.5.6 CAL LOOP Conc

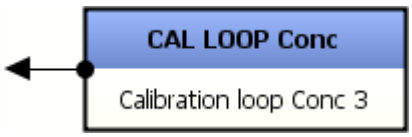
5.6.5.6.1 CAL LOOP Conc - Overview

Dialog window: **Method ► CAL LOOP Conc ► Properties... ► CAL LOOP Conc - 'Command name'**

Loop command for the **calibration of ion-selective electrodes**, used together with the **CAL MEAS Conc** command.

Appearance

The command has the following appearance:



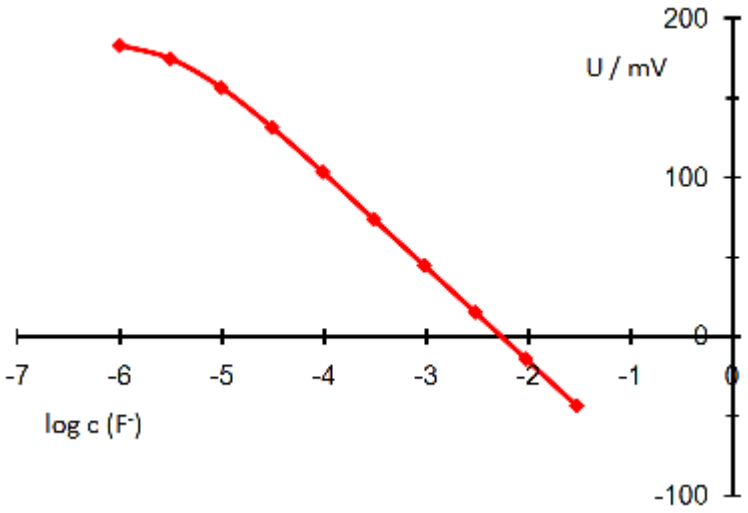
Parameters

The parameters for the **CAL LOOP Conc** command are configured in the following dialog window:

- *CAL LOOP Conc - Properties*

Principle

For calibrating ion-selective electrodes (ISE), a linear correlation of the measured potential U_i and the logarithm of the sought ion concentration c_i cannot always be assumed. In ion measurements, interfering ions have an influence on the measurement and that is why this effect is perceptible by a flattening of the curve, especially in low concentration ranges.



The influence of interfering ions can be described by the Nikolsky equation. This is an extended Nernst equation which takes the selectivity of the ISE into account. For the ISE calibration with tiamo, it is used in the following form:

$$U_i = E(0) + \frac{U_N}{z} \log\left(c_i + c_B\right)$$

The Nernst constant U_N represents the theoretical slope s of the calibration function, divided by the charge z of the measuring ion. With anions it has a negative sign, with cations a positive one.

The influence of the interfering ions is indicated as blank value concentration c_B. A significant blank value reduces the lower measuring range and therefore causes a deterioration of the limit of detection.

For the calibration, there are thus three unknown quantities to be calculated, namely $E(0)$, s and c_B. In order to unambiguously calculate all parameters, at least three standard measurements are therefore necessary. A higher number of standards increases the reliability of the mathematical calculation of the calibration function.

tiamo determines the calibration data for the concentration measurement as for the pH calibration in accordance with the number of the standard solutions used.

- **1-point calibration**
  - *s*: the existing value is retained, if available. If not, the theoretical slope U_N / z is used.
  - $E(0) = U_1 + s \cdot \log(c_1)$
  - c_B: is set equal to zero.
- **Two-point calibration**
  - $s = \frac{U_2 - U_1}{\log(c_2) - \log(c_1)}$
  - $E(0) = \overline{U} + s \cdot \overline{\log(c)}$
  - c_B: is set equal to zero.
- **Three- and multiple-point calibration**
  With at least three calibration solutions the calibration function is determined according to the method of least squares. The sought calibration parameters *s*, *E*(0) and c_B are calculated iteratively. If the value for c_B is lower than approx. 0.2% of the lowest concentration, it is set equal to zero. In such a case a linear relation between U_i and $\log(c_i)$ results.
  With four or more calibration standards, the variance *Var* is always calculated and output. If $c_B = 0$, the variance is even calculated for three standards.

$$Var = \frac{\sum_i (U_i - U_{i,c})^2}{n - F}$$

  U_i: measured potential
  $U_{i,c}$: potential calculated from the calibration curve
  n: number of measuring points
  F: degrees of freedom (2 for $c_B = 0$, 3 for $c_B \neq 0$)

Command variables

The following command variables are generated by the **CAL LOOP Conc** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BLV	Blank value calculated from the calibration
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started

Identification	Description
.ENP	Electrode zero point calculated from the calibration
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.LCO	Loop counter = current number of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (**Date/Time**)
.SLO	Electrode slope calculated from the calibration
.VAR	Variance of the calculated result of the calibration in the selected unit

5.6.5.6.2 CAL LOOP Conc - Properties

Dialog window: **Method ► CAL LOOP Conc ► Properties... ► CAL LOOP Conc - 'Command name'**

The number of standards and their concentration are defined in the **CAL LOOP Conc - 'Command name'** dialog window.

Command name

Name of the command.

Entry	**25 characters**

Standards

Number of standards

Selection of the number of standards with which the concentration calibration is to be carried out.

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9**
Default value	**2**

Unit conc.

Selection of the concentration unit for the standards.

Selection	**mol/L** | **mmol/L** | **µmol/L** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **ppm** | **%** | **mEq/L**
Default value	**ppm**

Conc. standard #

Enter the corresponding concentration for each standard used.

Input range	**0.001 to 999,999.999**

Request for standard exchange

on | off (Default value: **on**)

If this option is enabled, a request for manual solution exchange is displayed after each measurement. This parameter must be disabled for automatic solution exchange when calibrating with a sample changer.

5.6.5.7 CAL MEAS Conc

5.6.5.7.1 CAL MEAS Conc - Overview

Dialog window: **Method ▶ CAL MEAS Conc ▶ Properties.. ▶ CAL MEAS Conc - 'Command name'**

Measuring command for **Calibration with ISE electrodes**, which is used together with the **CAL LOOP Conc** command.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **CAL MEAS Conc** command are set on the following two tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **CAL MEAS Conc** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.5.7.2 CAL MEAS Conc - General/Hardware

Tab: **Method ► CAL MEAS Conc ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Sensor

Selection of an ISE sensor from the ISE sensors available in the sensor table.

Selection	**'Sensor name'** | **ISE electrode** | **not defined**
Default value	**ISE electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement:

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.5.7.3 CAL MEAS Conc - Measuring parameters

Tab: **Method ▶ CAL MEAS Conc ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The measuring parameters for the calibration are defined on this tab.

Measurement with drift control

The ISE calibration is carried out drift-controlled. The measurement is stopped as soon as the **Signal drift** is reached or a defined **Waiting time** has elapsed.

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999.0 mV/min**
Default value	**2.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**10 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**110 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Input range	**0.1 to 999,999 s**
Default value	**2.0 s**

Temperature

Temperature

The temperature at which calibration is carried out can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously. The value is used for temperature correction in pH measurements.

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

5.6.5.8 ELT LOOP

5.6.5.8.1 ELT LOOP - Overview

Dialog window: **Method ► ELT LOOP ► Properties... ► ELT LOOP - 'Command name'**

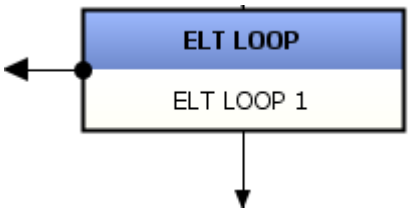
Loop command for the **electrode test** (test of pH electrodes), used together with the **ELT MEAS** command.

Electrodes

This command can be carried out with electrodes of the **pH electrode** type.

Appearance

The command has the following appearance:



Parameters

The parameters for the **ELT LOOP** command are configured in the following dialog window:

- *ELT LOOP - Properties*

Command variables

The following command variables are generated by the **ELT LOOP** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identi-fica-tion	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.ETR	Result of the electrode test: 0 = No data available 1 = Short circuit 2 = Excessive start drift 3 = Wrong buffer 4 = Problems with the diaphragm 5 = Reference system defective 6 = No buffer values for the temperature or excessive deviation of the temperature between buffers 7 = Partial short circuit 8 = Glass defective 9 = Poor electrode 10 = Usable electrode 11 = Good electrode 12 = Excellent electrode
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.LCO	Loop counter = current number of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (**Date/Time**)
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.VAR	Variance of the calculated result of the calibration in the selected unit

5.6.5.8.2 ELT LOOP - Properties

Dialog window: **Method ► ELT LOOP ► Properties...**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the buffer used and for the electrode test are set in this dialog window.

Buffers

Number of buffers

Shows the number of buffers (3) with which the electrode test is to be carried out.

Buffer type

Selection of a predefined buffer series for the pH calibration. It is imperative that the selected buffer series include the buffers 4, 7 and 9.

If these buffers are used, *tiamo* will recognize the specific buffer automatically.

Selection	**Metrohm** | **NIST** | **DIN** | **Fluka Basel** | **Mettler** | **Merck CertiPUR 20°C/Titrisol** | **Merck CertiPUR 25°C** | **Radiometer** | **Baker** | **Hamilton DURACAL** | **Precisa**
Default value	**Metrohm**

Request for buffer exchange

on | off (Default value: **on**)

If this check box is activated, a request for manual buffer exchange is displayed after each time the calibration loop is run through. This parameter must be disabled for automatic buffer exchange when calibrating with a sample changer.

Electrode test

Electrode type

Selection of a predefined electrode type which is to be used to assess the pH electrode.

Selection	**Standard** | **Gel** | **Non-aqueous** | **'Electrode type name'**
Default value	**Standard**

'Electrode type name'
Uses the own electrode type defined under this name in the configuration under **Tools ► Templates ► Electrode type**.

Save calibration data

on | off (Default value: **off**)

If this check box is activated, then the calibration data **Slope** and **pH(0)** determined with the electrode test is stored in the configuration with the sensor used.

5.6.5.9 ELT MEAS

5.6.5.9.1 ELT MEAS - Overview

Dialog window: **Method ► ELT MEAS ► Properties... ► ELT MEAS - 'Command name'**

Command for **measuring calibration buffers** for the electrode test (test of pH electrodes), used together with the command **ELT LOOP**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **ELT MEAS** command are set on the following two tabs:

- *General/Hardware*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **ELT MEAS** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.5.9.2 ELT MEAS - General/Hardware

Tab: **Method ► ELT MEAS ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**'Device type'** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855, 867

Selection	**1**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**'Sensor name'** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Input range	**–15 to 15 (without 0)**
Default value	**8**

5.6.5.9.3 ELT MEAS - Measuring parameters

Tab: **Method ▶ ELT MEAS ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

Temperature

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**–20.0 to 150 °C**
Default value	**25.0 °C**

5.6.5.10 CAL LOOP Opt

5.6.5.10.1 CAL LOOP Opt - Overview

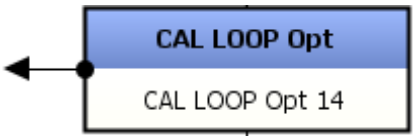
Dialog window: **Method ▶ CAL LOOP Opt ▶ Properties... ▶ CAL LOOP Opt - 'Command name'**

Loop command for the **calibration of colorimetric sensors**, used together with the **CAL MEAS Opt** command.

The concentrations which are to be measured with the **CAL MEAS Opt** command are defined in this loop command. Each time the loop is executed, the validity of the concentration measurement is checked, and at the end the calibration data for the colorimetric sensor is calculated.

Appearance

The command has the following appearance:



Parameters

The parameters for the **CAL LOOP Opt** command are set in the following dialog window:

- *CAL LOOP Opt - Properties*

Command variables

The following command variables are generated by the **CAL LOOP pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.C0	Coefficient c0 calculated from the calibration
.C1	Coefficient c1 calculated from the calibration
.C2	Coefficient c2 calculated from the calibration
.C3	Coefficient c3 calculated from the calibration
.COD	Coefficient of determination R^2), which is calculated on the basis of the calibration function and of the confidence interval
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.LCO	Loop counter = current number of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (**Date/Time**)
.STC{x}	Concentration of the standard x (1 - 50) used for the command

5.6.5.10.2 CAL LOOP Opt - Properties

Dialog window: **Method ► CAL LOOP Opt ► Properties... ► CAL LOOP Opt - 'Command name'**

The concentrations of the standards, the concentration unit and the type of the calibration function are defined in the **CAL LOOP Opt - 'Command name'** dialog window.

Command name

Name of the command.

Entry	**25 characters**

Standards

Unit conc.

Selection of the concentration unit for the standards.

Selection	**mol/L** | **mmol/L** | **µmol/L** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL** | **ppm** | **%** | **mEq/L**
Default value	**ppm**

The table must contain at least two but no more than 50 concentrations, and individual concentration values may appear repeatedly.

Conc. standard

Concentration of the standard.

Input range	**0.000 to 999,999.999**
Default value	**1.000**

Moves the concentration upward (modifies sequence).

Moves the concentration downward (modifies sequence).

[New]

Add the concentration for the next standard.

[Properties]

Edit the concentration of the selected standard.

[Delete]

Deletes the selected concentration.

Request for standard exchange

on | off (Default value: **on**)

If this check box is activated, a request for manual solution exchange is displayed after each time the calibration loop is run through. This parameter must be disabled for automatic solution exchange when calibrating with a sample changer.

Calibration curve

Calibration function

Selection of the function with which the calibration curve is to be calculated out of the calibration points.

Selection	**linear** | **quadratic** | **cubic** | **automatic**
Default value	**linear**

Confidence interval

Range within which the measured values for the determination of the calibration curve must lie. Values outside this range are called outliers; they are not integrated in the calculation of the calibration coefficient.

Selection	**99%** | **98%** | **95%** | **off**
Default value	**98%**

off
The confidence interval will not be checked.

5.6.5.11 CAL MEAS Opt

5.6.5.11.1 CAL MEAS Opt - Overview

Dialog window: **Method ► CAL MEAS Opt ► Properties... ► CAL MEAS Opt - 'Command name'**

Command for **measuring standard solutions for the calibration of colorimetric sensors**, used together with the **CAL LOOP Opt** command.

Devices

This command can be executed with the following devices:

Spectrometer: Avantes

NOTICE

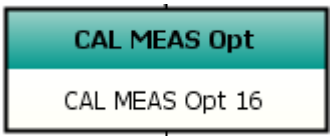
In a one-channel instrument setup, only instruments for which the entry **not defined** is selected under **Instrument for reference channel** in the configuration can be selected.

In a two-channel instrument setup, only instruments which are assigned an instrument for the reference channel can be selected *(see chapter 7.14.3, page 1573)*.

Photometer: 089

Appearance

The command has the following appearance:



Parameters

The parameters for the **CAL MEAS Opt** command are set on the following two tabs:

- *General/Hardware*
  Selection of device type and colorimetric sensor.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **CAL MEAS Opt** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE[1)]	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE[1)]	Initial temperature (temperature before start conditions are processed) in °C
.LP.CNT	Transmission of the last measuring point in the measuring point list in %
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.TRN	Transmission of the last measuring point in the measuring point list in %
.MTE	Temperature measurement with sensor; (**1 = on**, **0 = off**)

Identification	Description
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

[1] Command variable is invalid for the Avantes spectrometer

5.6.5.11.2 CAL MEAS Opt - General/Hardware

Tab: **Method ▶ CAL MEAS Opt ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. Only devices with which the command can be executed are available.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected in the **Device name** field, the **Device type** field can no longer be edited and the device type belonging to the device is displayed.

If the **not defined** option is selected in the **Device name** field, all device types or groups with which the command can be executed can be selected, regardless of the devices present in the device table.

Selection	**Avantes spectrometer** | **089 Photometer**
Default value	**Avantes spectrometer**

Instrument for reference channel

Shows the name of the instrument for the reference channel. Is only displayed for **Device type** = **Avantes spectrometer**.

Sensor

Colorimetric sensor

Selection of a colorimetric sensor from the table of colorimetric sensors. The calibration data for the colorimetric sensor will be adopted for the determination.

Selection	**'Name of the colorimetric sensor'** | **empty or 'first list entry'** | **not defined**
Default value	**empty or 'first list entry'**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Displayed only when **Device type** = **089 Photometer**.

Selection	**continuous** | **off**
Default value	**continuous**

continuous
The temperature will be measured continuously.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

The **Stirrer** section is only displayed for **Device type** = **089 Photometer**.

Stirrer

Selection of the stirrer.

Selection	**1** | **off**
Default value	**off**

Stirring rate

Setting the stirring rate.

Input range	**0 to 15**
Default value	**5**

Switch off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.5.11.3 CAL MEAS Opt - Measuring parameters

Tab: **Method ► CAL MEAS Opt ► Properties... ► Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The measuring parameters for the calibration are defined on this tab.

Measuring parameters for the Avantes spectrometer

Wavelength

Wavelength at which the measured quantity (absorbance) is recorded.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

Blank value

Value by which the measured quantity (absorbance) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME from other measuring command) by which every measured absorbance value can then be corrected.

Input range	**–4,000 to 4,000 mAU**
Default value	**0 mAU**

Integration time

Integration time for absorbance measurement.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the light intensity of each measurement pixel is averaged.

Input range	**1 to 100 pixels**
Default value	**1 pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

Measuring parameters for the 089 Photometer

Blank value

Value by which the measured quantity (absorbance) is corrected. Here an expression can also be entered through the formula editor (e.g. xx.EME from other measuring command) by which every measured absorbance value can then be corrected.

Input range	**0 to 4,000 mAU**
Default value	**0 mAU**

Measurement

Two types of measurement can be selected, **Measurement with drift control** or **Measurement without drift control**.

Selection	**Measurement with drift control** | **Measurement without drift control**

Measurement with drift control
The measurement is carried out drift-controlled if this option is selected. The measurement is canceled as soon as the defined **Signal drift** or the **Stop measured value** is reached or the defined **Max. waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control
The measurement is carried out without drift control if this option is selected. Measurement is continued for as long as one of the two stop criteria **Measuring time** or **Stop measured value** is fulfilled. The corresponding parameters are not visible if this option is disabled.

NOTICE

A constant measured value is often only reached after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e., reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been reached.

Measurement with drift control

If the **Measurement with drift control** option has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Input range	**0.1 to 999,000 mAU/min**
Default value	**1.0 mAU/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Input range	**0 to 999,999 s**
Default value	**154 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Avantes spectrometer

Input range	**0.1 to 999,999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

089 Photometer

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

Measurement without drift control

If the **Measurement without drift control** option has been selected, then the following parameters will be displayed:

Measuring time

Duration of the absorbance measurement.

Input range	**0 to 999,999 s**
Default value	**120 s**

Measuring interval

Time interval for entering a measured value in the measuring point list.

Avantes spectrometer

Input range	**0.1 to 999,999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

089 Photometer

Input range	**0.25 to 999,999.00 s** (Increment: **0.25**)
Default value	**2.0 s**

Stop measured value

Stop when the entered measured value has been reached since the start of the measurement.

Input range	**0 to 4,000 mAU**
Selection	**off**
Default value	**off**

Temp.

The **Temp.** section is only displayed for **Device type** = **089 Photometer**.

Temp.

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously.

Input range	**20.0 to 60 °C**
Default value	**25.0 °C**

5.6.5.12 CAL LOOP pH

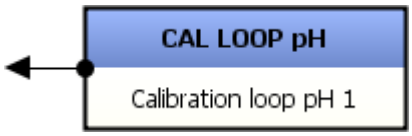
5.6.5.12.1 CAL LOOP pH - Overview

Dialog window: **Method ► CAL LOOP pH ► Properties... ► CAL LOOP pH - 'Command name'**

Loop command for the **calibration of pH electrodes**, used together with the **CAL MEAS pH** command.

Appearance

The command has the following appearance:



Parameters

The parameters for the **CAL LOOP pH** command are configured in the following dialog window:

- *CAL LOOP pH - Properties*

Command variables

The following command variables are generated by the **CAL LOOP pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.ENP	Electrode zero point calculated from the calibration
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

Identification	Description
.LCO	Loop counter = current number of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (**Date/Time**)
.SLO	Electrode slope calculated from the calibration
.VAR	Variance of the calculated result of the calibration in the selected unit

5.6.5.12.2 CAL LOOP pH - Properties

Dialog window: **Method ► CAL LOOP pH ► Properties... ► CAL LOOP pH - 'Command name'**

The number of buffers and the buffer type are defined in the **CAL LOOP pH - 'Command name'** dialog window.

Command name

Name of the command.

Entry	**25 characters**

Buffers

Number of buffers

Selection of the number of buffers with which the pH calibration is to be carried out.

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9**
Default value	**2**

Buffer type

Selection of a predefined buffer series for the pH calibration.

If these buffers are used, *tiamo* will recognize the specific buffer automatically.

Selection	**Metrohm** | **NIST** | **DIN** | **Fisher** | **Fluka Basel** | **Mettler** | **Merck CertiPUR 20°C/Titrisol** | **Merck CertiPUR 25°C** | **Beckman** | **Custom** | **Special** | **Radiometer** | **Baker** | **Hamilton DURACAL** | **Precisa**
Default value	**Metrohm**

Custom
The custom buffer series defined in the configuration under **Tools ► Templates ► Custom calibration buffers** is used.

Special
Up to nine calibration buffers can be defined directly in the properties window of the **CAL LOOP pH** command.

NOTICE

The automatic buffer recognition is deactivated for the buffer type **Special**, and the buffers must therefore be measured at the time of calibration in the same order as they were defined in the **CAL LOOP pH** command.

Buffer # pH

pH value of the special buffers (displayed only for **Buffer type** = **Special**).

Input range	**–20.000 to 20.000**

NOTICE

Enter the pH values for the calibration temperature used. A message will be displayed correspondingly often during the run to indicate the next buffer to be measured.

Request for buffer exchange

on | off (Default value: **on**)

If this check box is activated, a request for manual buffer exchange is displayed after each time the calibration loop is run through. This parameter must be disabled for automatic buffer exchange when calibrating with a sample changer.

5.6.5.12.3 Buffer data

Dialog window: **Method ► CAL LOOP pH ► Properties... ► CAL LOOP pH - 'Command name'**

The temperature-dependent pH values of several common pH buffers are stored in the system for automatic buffer recognition during pH calibration. In addition to the Metrohm buffer solutions 6.2307.1X0, other reference and technical buffers are also included in the tables.

The following tables provide an overview of the stored pH(T) series:

Metrohm

Temp. (°C)	Met4	Met7	Met9
	pH 4.00	pH 7.00	pH 9.00
0	3.99	7.11	9.27
5	3.99	7.08	9.18
10	3.99	7.06	9.13
15	3.99	7.04	9.08
20	3.99	7.02	9.04
25	4.00	7.00	9.00
30	4.00	6.99	8.96
35	4.01	6.98	8.93
40	4.02	6.98	8.90
45	4.03	6.97	8.87
50	4.04	6.97	8.84
55	4.06	6.97	8.81
60	4.07	6.97	8.79
65	4.09	6.98	8.76
70	4.11	6.98	8.74
75	4.13	6.99	8.73
80	4.15	7.00	8.71
85	4.18	7.00	8.70
90	4.20	7.01	8.68
95	4.23	7.02	8.67

NIST

Temp. (°C)	NIST1	NIST4	NIST7	NIST9	NIST13
	pH 1	pH 4	pH 7	pH 9	pH 13
0	-	4.010	6.984	9.464	13.423
5	1.668	4.004	6.950	9.392	13.207
10	1.670	4.001	6.922	9.331	13.003
15	1.672	4.001	6.900	9.277	12.810

Temp. (°C)	NIST1	NIST4	NIST7	NIST9	NIST13
	pH 1	pH 4	pH 7	pH 9	pH 13
20	1.676	4.003	6.880	9.228	12.627
25	1.680	4.008	6.865	9.184	12.454
30	1.685	4.015	6.853	9.144	12.289
35	1.691	4.025	6.843	9.107	12.133
40	1.697	4.036	6.837	9.076	11.984
45	1.704	4.049	6.834	9.046	11.841
50	1.712	4.064	6.833	9.018	11.705
55	1.715	4.075	6.834	8.985	11.574
60	1.723	4.091	6.836	8.962	11.449
65	1.732	4.108	6.840	8.941	-
70	1.743	4.126	6.845	8.921	-
75	1.754	4.145	6.852	8.902	-
80	1.766	4.164	6.859	8.885	-
85	1.778	4.185	6.867	8.867	-
90	1.792	4.205	6.877	8.850	-
95	1.806	4.227	6.886	8.833	-

DIN

Temp. (°C)	DIN1	DIN3	DIN4	DIN7	DIN9	DIN12
	pH 1	pH 3	pH 4	pH 7	pH 9	pH 12
0	1.08	-	4.67	6.89	9.48	-
5	1.08	-	4.66	6.86	9.43	-
10	1.09	3.10	4.66	6.84	9.37	13.37
15	1.09	3.08	4.65	6.82	9.32	13.15
20	1.09	3.07	4.65	6.80	9.27	12.96
25	1.09	3.06	4.65	6.79	9.23	12.75
30	1.10	3.05	4.65	6.78	9.18	12.61
35	1.10	3.05	4.66	6.77	9.13	12.44
40	1.10	3.04	4.66	6.76	9.09	12.29

Temp. (°C)	DIN1	DIN3	DIN4	DIN7	DIN9	DIN12
	pH 1	pH 3	pH 4	pH 7	pH 9	pH 12
45	1.10	3.04	4.67	6.76	9.04	12.13
50	1.11	3.04	4.68	6.76	9.00	11.98
55	1.11	3.04	4.69	6.76	8.97	11.84
60	1.11	3.04	4.70	6.76	8.92	11.69
65	1.11	3.04	4.71	6.76	8.90	11.56
70	1.11	3.04	4.72	6.76	8.88	11.43
75	1.12	3.04	4.74	6.77	8.86	11.30
80	1.12	3.05	4.75	6.78	8.85	11.19
85	1.12	3.06	4.77	6.79	8.83	11.08
90	1.13	3.07	4.79	6.80	8.82	10.99
95	-	-	-	-	-	-

Fisher

Temp. (°C)	Fis2	Fis4	Fis7	Fis10
	pH 2	pH 4	pH 7	pH 10
0	-	4.01	7.13	10.34
5	1.98	3.99	7.10	10.26
10	1.98	4.00	7.07	10.19
15	2.02	3.99	7.05	10.12
20	2.00	4.00	7.02	10.06
25	2.00	4.00	7.00	10.00
30	2.00	4.01	6.99	9.94
35	2.02	4.02	6.98	9.90
40	2.01	4.03	6.97	9.85
45	2.01	4.04	6.97	9.81
50	2.01	4.06	6.97	9.78
55	-	4.07	6.97	9.74
60	-	4.09	6.98	9.70
65	-	4.11	6.99	9.68

Temp. (°C)	Fis2	Fis4	Fis7	Fis10
	pH 2	pH 4	pH 7	pH 10
70	-	4.13	7.00	9.65
75	-	4.14	7.02	9.63
80	-	4.16	7.03	9.62
85	-	4.18	7.06	9.61
90	-	4.21	7.08	9.60
95	-	4.23	7.11	9.60

Fluka Basel

Temp. (°C)	FBS4	FBS7	FBS9
	pH 4	pH 7	pH 9
0	4.01	7.11	9.20
5	4.00	7.08	9.15
10	4.00	7.05	9.10
15	4.00	7.02	9.05
20	4.00	7.00	9.00
25	4.01	6.98	8.96
30	4.01	6.97	8.91
35	4.02	6.96	8.88
40	4.03	6.95	8.84
45	4.04	6.94	8.80
50	4.06	6.94	8.77
55	4.07	6.93	8.74
60	4.09	6.93	8.71
65	4.11	6.93	8.69
70	4.13	6.94	8.67
75	4.14	6.94	8.65
80	4.16	6.95	8.63
85	4.18	6.96	8.61
90	4.21	6.97	8.60

Temp. (°C)	FBS4	FBS7	FBS9
	pH 4	pH 7	pH 9
95	4.23	6.98	8.59

Mettler-Toledo

Temp. (°C)	MT2	MT4	MT7	MT9	MT11
	pH 2	pH 4	pH 7	pH 9	pH 11
0	2.03	4.01	7.12	9.52	11.90
5	2.02	4.01	7.09	9.45	11.72
10	2.01	4.00	7.06	9.38	11.54
15	2.00	4.00	7.04	9.32	11.36
20	2.00	4.00	7.02	9.26	11.18
25	2.00	4.01	7.00	9.21	11.00
30	1.99	4.01	6.99	9.16	10.82
35	1.99	4.02	6.98	9.11	10.64
40	1.98	4.03	6.97	9.06	10.46
45	1.98	4.04	6.97	9.03	10.28
50	1.98	4.06	6.97	8.99	10.10
55	1.98	4.08	6.98	8.96	-
60	1.98	4.10	6.98	8.93	-
65	1.98	4.13	6.99	8.90	-
70	1.99	4.16	7.00	8.88	-
75	1.99	4.19	7.02	8.85	-
80	2.00	4.22	7.04	8.83	-
85	2.00	4.26	7.06	8.81	-
90	2.00	4.30	7.09	8.79	-
95	-	4.35	7.12	8.77	-

Merck CertiPUR 20°C/Titrisol

Temp. (°C)	Mer2	Mer4	Mer7	Mer9	Mer12
	pH 2	pH 4	pH 7	pH 9	pH 12
0	2.01	4.05	7.13	9.24	12.58

Temp. (°C)	Mer2	Mer4	Mer7	Mer9	Mer12
	pH 2	pH 4	pH 7	pH 9	pH 12
5	2.01	4.04	7.07	9.16	12.41
10	2.01	4.02	7.05	9.11	12.26
15	2.00	4.01	7.02	9.05	12.10
20	2.00	4.00	7.00	9.00	12.00
25	2.00	4.01	6.98	8.95	11.88
30	2.00	4.01	6.98	8.91	11.72
35	2.00	4.01	6.96	8.88	11.67
40	2.00	4.01	6.95	8.85	11.54
45	2.00	4.00	6.95	8.82	11.44
50	2.00	4.00	6.95	8.79	11.33
55	2.00	4.00	6.95	8.76	11.19
60	2.00	4.00	6.96	8.73	11.04
65	2.00	4.00	6.96	8.715	10.97
70	2.01	4.00	6.96	8.70	10.90
75	2.01	4.00	6.96	8.68	10.80
80	2.01	4.00	6.97	8.66	10.70
85	2.01	4.00	6.98	8.65	10.59
90	2.01	4.00	7.00	8.64	10.48
95	-	4.00	7.02	-	-

Merck CertiPUR 25°C

Temp. (°C)	MerC4.01	MerC7.00	MerC9.00	MerC10.00
	pH 4.01	pH 7.00	pH 9.00	pH 10.00
0	-	-	-	-
5	4.00	7.09	9.22	10.22
10	4.00	7.06	9.16	10.16
15	4.00	7.04	9.10	10.10
20	4.00	7.02	9.05	10.05
25	4.01	7.00	9.00	10.00

Temp. (°C)	MerC4.01	MerC7.00	MerC9.00	MerC10.00
	pH 4.01	pH 7.00	pH 9.00	pH 10.00
30	4.01	6.98	8.96	9.94
35	4.03	6.98	8.93	9.90
40	4.03	6.97	8.89	9.86
45	4.05	6.97	8.87	9.80
50	4.06	6.97	8.84	9.73
55	-	-	-	-
60	-	-	-	-
65	-	-	-	-
70	-	-	-	-
75	-	-	-	-
80	-	-	-	-
85	-	-	-	-
90	-	-	-	-
95	-	-	-	-

Beckman

Temp. (°C)	Bec4	Bec7	Bec10
	pH 4	pH 7	pH 10
0	4.00	7.12	10.32
5	4.00	7.09	10.25
10	4.00	7.06	10.18
15	4.00	7.04	10.12
20	4.00	7.02	10.06
25	4.00	7.00	10.01
30	4.01	6.99	9.97
35	4.02	6.99	9.93
40	4.03	6.98	9.89
45	4.05	6.98	9.86
50	4.06	6.97	9.83

Temp. (°C)	Bec4	Bec7	Bec10
	pH 4	pH 7	pH 10
55	4.08	6.98	-
60	4.09	6.98	-
65	4.11	6.99	-
70	4.12	6.99	-
75	4.14	7.00	-
80	4.16	7.00	-
85	4.18	7.01	-
90	4.19	7.02	-
95	4.21	7.03	-

Radiometer

Temp. (°C)	Rad4.01	Rad7.00	Rad9.18
	pH 4.01	pH 7	pH 9.18
0	4.000	7.118	9.464
5	3.998	7.087	9.395
10	3.997	7.059	9.332
15	3.998	7.036	9.276
20	4.001	7.016	9.225
25	4.005	7.000	9.180
30	4.011	6.987	9.139
35	4.018	6.977	9.102
40	4.027	6.970	9.068
45	4.038	6.965	9.038
50	4.050	6.964	9.011
55	4.064	6.965	8.985
60	4.080	6.968	8.962
65	4.097	6.974	8.941
70	4.116	6.982	8.921
75	4.137	6.992	8.900

Temp. (°C)	Rad4.01	Rad7.00	Rad9.18
	pH 4.01	pH 7	pH 9.18
80	4.159	7.004	8.885
85	4.183	7.018	8.867
90	4.210	7.034	8.850
95	4.240	-	-

Baker

Temp. (°C)	Bak4	Bak7	Bak9	Bak10
	pH 4.00	pH 7.00	pH 9.00	pH 10.00
0	4.00	7.13	9.23	10.30
5	4.00	7.09	9.17	10.24
10	4.00	7.05	9.10	10.17
15	4.00	7.03	9.05	10.11
20	4.00	7.00	9.00	10.05
25	4.00	6.98	8.96	10.00
30	4.01	6.98	8.91	9.96
35	4.02	6.98	8.88	9.93
40	4.03	6.97	8.84	9.89
45	4.04	6.97	8.81	9.86
50	4.05	6.96	8.78	9.82
55	4.07	6.96	8.76	9.79
60	4.08	6.96	8.73	9.76
65	4.10	6.97	8.71	9.74
70	4.12	6.97	8.69	9.72
75	4.14	6.98	8.68	9.70
80	4.16	6.98	8.66	9.68
85	4.19	6.99	8.64	9.66
90	4.21	7.00	8.62	9.64
95	-	-	-	-

Hamilton DURACAL

Temp. (°C)	Ham4.01	Ham7.00	Ham9.21	Ham10.01
	pH 4.01	pH 7.00	pH 9.21	pH10.01
0	-	-	-	-
5	4.01	7.09	9.45	10.19
10	4.00	7.06	9.38	10.15
15	4.00	7.04	9.32	10.11
20	4.00	7.02	9.26	10.06
25	4.01	7.00	9.21	10.01
30	4.01	6.99	9.16	9.97
35	4.02	6.98	9.11	9.92
40	4.03	6.97	9.06	9.86
45	4.04	6.97	9.03	9.83
50	4.06	6.97	8.99	9.79
55	-	-	-	-
60	-	-	-	-
65	-	-	-	-
70	-	-	-	-
75	-	-	-	-
80	-	-	-	-
85	-	-	-	-
90	-	-	-	-
95	-	-	-	-

Precisa

Temp. (°C)	Pre4	Pre7	Pre9
	pH 4.00	pH 7.00	pH 9.00
0	3.99	7.11	9.27
5	3.99	7.08	9.18
10	3.99	7.06	9.13
15	3.99	7.04	9.08

Temp. (°C)	Pre4	Pre7	Pre9
	pH 4.00	pH 7.00	pH 9.00
20	3.99	7.02	9.04
25	4.00	7.00	9.00
30	4.00	6.99	8.96
35	4.01	6.98	8.93
40	4.02	6.98	8.90
45	4.03	6.97	8.87
50	4.04	6.97	8.84
55	4.06	6.97	8.81
60	4.07	6.97	8.79
65	4.09	6.98	8.76
70	4.11	6.98	8.74
75	4.13	6.99	8.73
80	4.15	7.00	8.71
85	4.18	7.00	8.70
90	4.20	7.01	8.68
95	4.23	7.02	8.67

5.6.5.13 CAL MEAS pH

5.6.5.13.1 CAL MEAS pH - Overview

Dialog window: **Method ► CAL MEAS pH ► Properties... ► CAL MEAS pH - 'Command name'**

Measuring command for **Calibration with pH electrodes**, which is used together with the command **CAL LOOP pH** .

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/ion meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the **CAL MEAS pH** command are set on the following two tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

Command variables

The following command variables are generated by the **CAL MEAS pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature after the command has been processed) in °C
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the unit of the measured value

Identification	Description
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

5.6.5.13.2 CAL MEAS pH - General/Hardware

Tab: **Method ► CAL MEAS pH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855, 867

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** will be used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855, 867

Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 855, 867

Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.5.13.3 CAL MEAS pH - Measuring parameters

Tab: **Method ▶ CAL MEAS pH ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Entry	**25 characters**

The measuring parameters for the calibration are defined on this tab.

Measurement with drift control

The pH calibration is carried out drift-controlled. The measurement is stopped as soon as the **Signal drift** is reached or a defined **waiting time** has elapsed.

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrando, 855, 867

Input range	**0.1 to 999.0 mV/min**
Default value	**2.0 mV/min**

Titrino

Input range	**0.5 to 9990 mV/min**
Default value	**2.0 mV/min**

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the minimum waiting time is elapsing.

Titrando, 855, 867

Input range	**0 to 999,999 s**
Default value	**10 s**

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered, then a waiting time that is suitable for the drift will be calculated automatically according to the following formula:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855, 867

Input range	**0 to 999,999 s**
Default value	**110 s**

Titrino

Input range	**0 to 9,999 s**
Default value	**110 s**

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrando, 855, 867

Input range	**0.1 to 999,999.0 s** (Increment: **0.1**)
Default value	**2.0 s**

Titrino

Input range	**0.08 to 16,200 s** (Increment: **0.08**)
Default value	**2.0 s**

Temperature

Temperature

The temperature at which calibration is carried out can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously. The value is used for temperature correction with the pH measurement.

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

5.6.6 Dosing commands

5.6.6.1 Dosing commands - Overview

Menu item: **Method ► Insert ► New command... ► Dosing**

Commands for **dosing** with dosing units or exchange units.

The following dosing commands can be selected:

- *ADD*
  Dosing of a predefined volume.
- *DOS pH*
  Controlled dosing with monitoring of measured value pH and temperature.
- *DOS U*
  Controlled dosing with monitoring of measured value U and temperature.
- *LQH*
  Extensive dosing possibilities with a Dosino.
- *PREP*
  Preparing an exchange or dosing unit.
- *EMPTY*
  Empties a dosing unit.
- *RLS DOS*
  Releases a dosing unit.

5.6.6.2 ADD

5.6.6.2.1 ADD - Overview

Dialog window: **Method ► ADD ► Properties... ► ADD - 'Command name'**

Command for **Dosing a fixed volume** of a solution with an exchange or dosing unit.

Devices

This command can be executed with the following instruments:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 859, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Conductometer: 856

Dosing Interface: 846

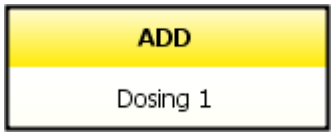
pH/ion meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **ADD** command are set on the following two tabs:

- *General/Hardware*
  Parameters for devices, dosing devices and stirrers.
- *Dosing parameters*
  Parameters for setting the dosing.

Command variables

The following command variables are generated by the **ADD** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

Identification	Description
.TITER	Titer value of the solution used for the command
.VOL	Currently dosed volume

5.6.6.2.2 ADD - General/Hardware

Tab: **Method ► ADD ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device with which the dosing is to be carried out. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

778, 789, 814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

730, 774

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 758, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, then two dosing devices are used for dosing without interruption, meaning that while the first dosing device is filling the second one is dosing and vice versa. This parameter is displayed only for Titrandos, 846, 856, 867, 814, 815, 855, 864 and 874.

Dosing device

Selection of the number of the second dosing device (exchange or dosing unit), with which the solution is to be dosed when the first dosing device is not available.

Titrando, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**2**

814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**2**

Solution

Entry of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device and whether the dosing device type is correct. With nonintelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 846, 856, 867, 814, 815, 855, 864, 874

Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Filling rate

Rate at which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 846, 856, 867, 814, 815, 855, 864, 874

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 846, 856, 867, 814, 815, 855, 864, 874	
Selection	**1** | **2** | **3** | **4** | **off**
Default value	**1**

off
Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the stirring direction.

Titrando, 846, 856, 867, 814, 815, 855, 864, 874	
Input range	**–15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched off automatically when the dosing has finished. This parameter is displayed only for Titrandos, 846, 856, 867, 814, 815, 855, 864 and 874.

5.6.6.2.3 ADD - Dosing parameters

Tab: **Method ► ADD ► Properties... ► Dosing parameters**

Command name

Name of the command.

Entry	**25 characters**

The volume to be dosed as well as the dosing and filling rate are defined on this tab.

Volume

Fixed volume that is to be dosed.

Titrando, 846, 814, 815, 855, 864, 874	
Input range	**0.00000 to 99,999.9 mL**
Default value	**10.0000 mL**

Titrino	
Input range	**0.0001 to 9,999.0 mL**
Default value	**10.0000 mL**

730, 778, 789	
Input range	**0.001 to 999.999 mL**
Default value	**10.0000 mL**

774

Input range	**0.01 to 999.999 mL**
Default value	**10.0000 mL**

Dosing rate

Rate (volume per time unit) at which the volume is dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrando, 846, 814, 815, 855, 864, 874

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

730, 774, 778, 789

Input range	**0.01 to 160.00 mL/min**
Default value	**maximum mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The dosing rate should be reduced for viscous liquids.

Filling rate

The buret will be filled at this rate after dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 814, 815, 855, 864, 874

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

730, 774, 778, 789

Input range	**0.01 to 160.00 mL/min**
Default value	**maximum mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The filling rate should be reduced for viscous liquids.

Fill automatically at start

on | off (Default value: **on**)

If this option is activated, the buret is filled automatically before dosing. This parameter is displayed only for Titrandos, 846, 855, 856, 864, 867, 814, 815 and 874.

This option ensures that the buret is filled and set to the dosing port of the selected solution before the **ADD** command is carried out.

NOTICE

If **Fill automatically at start** is **disabled**, then the **ADD** command starts adding solvent immediately. It has to be ensured in the method (e.g. by adding a preceding **ADD** or **LQH** command) that the buret is set to the correct dosing port.

Fill automatically at end

on | off (Default value: **on**)

If this option is activated, the buret is filled automatically after dosing.

This option ensures that the buret is filled again after the **ADD** command has been carried out and set to port 2, so that it can be removed.

5.6.6.3 DOS

5.6.6.3.1 DOS - Overview

Menu item: **Method ► Insert ► New command...**

Command for **controlled dosing** with the possibility of monitoring measured value and temperature.

Principle

A specified volume of a solution is dosed while monitoring measured value and temperature with the **DOS** command. Three different dosing types can be selected for the dosing. Two of the three parameters **Volume**, **Dosing rate** and **Dosing time** can be specified. The third parameter is calculated according to the following formula:

Volume = Dosing time • Dosing rate

If continuous dosing is required, then tandem dosing can be selected, i.e. two dosing devices are used for combined dosing. While the first dosing device is filling, the second one is dosing and vice versa.

Commands

Depending on the measured value, one of the following two **DOS** commands can be chosen:

- *5.6.6.3.4DOS pH*
  Controlled dosing with the measured quantity pH.
- *5.6.6.3.5DOS U*
  Controlled dosing with the measured quantity voltage U.

5.6.6.3.2 DOS - Monitored dosing

Tab: **Method ▶ Commands ▶ DOS ▶ Dosing parameters**

Command name

Name of the command.

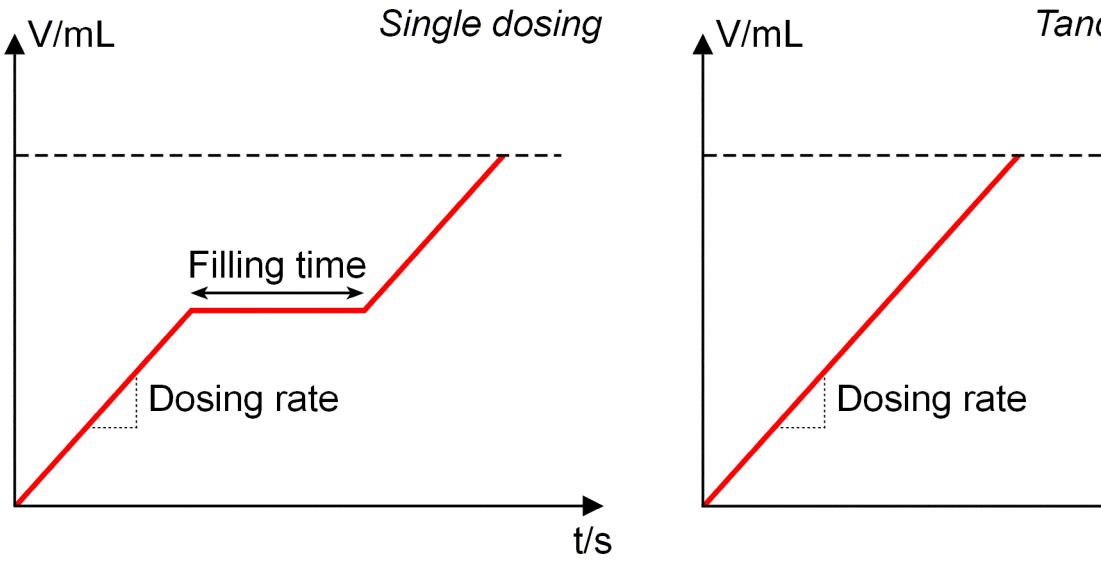
Entry	**25 characters**

Dosing criterion

Selection	**Volume/Dosing rate** | **Volume/Dosing time** | **Dosing rate/Dosing time**
Default value	**Volume/Dosing rate**

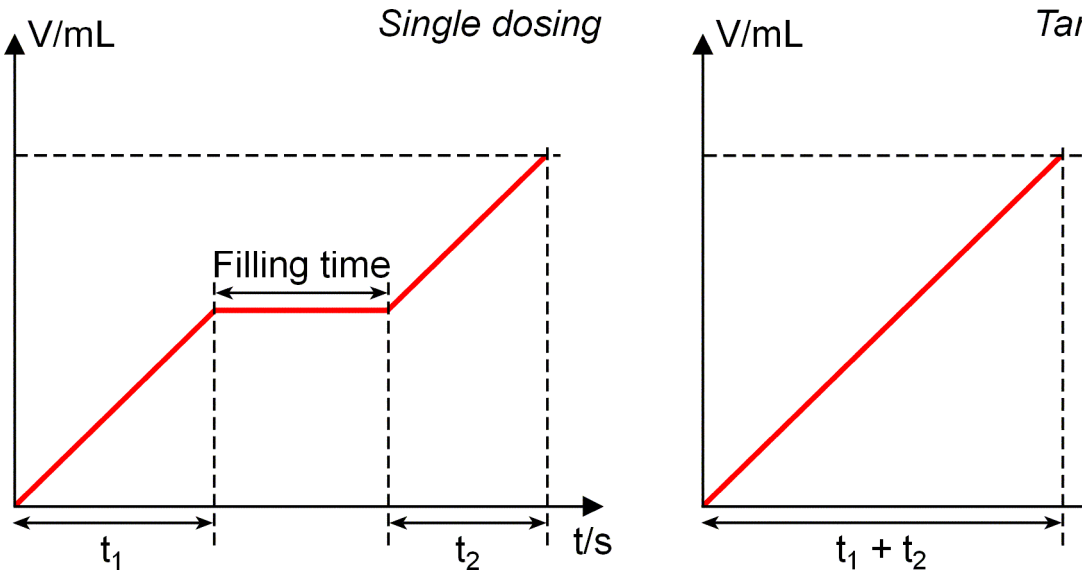
Specification of volume and dosing rate

You define the volume to be dosed and the required dosing rate. The filling times prolong the dosing time.



Specification of volume and dosing time

You specify the volume and the time at which this volume should be dosed (especially suitable for syntheses). The dosing rate is optimized automatically.



The time defined under dosing time corresponds to the net dosing time t_1+t_2, i.e. the filling time of the exchange/dosing unit is not included in the total.

If the specifications cannot be reached with the maximum dosing rate, then dosing will be carried out at maximum rate. The following formula can be used to estimate whether the maximum dosing rate is being used or not:

Dosing rate = desired flow rate in mL/min • 2.22

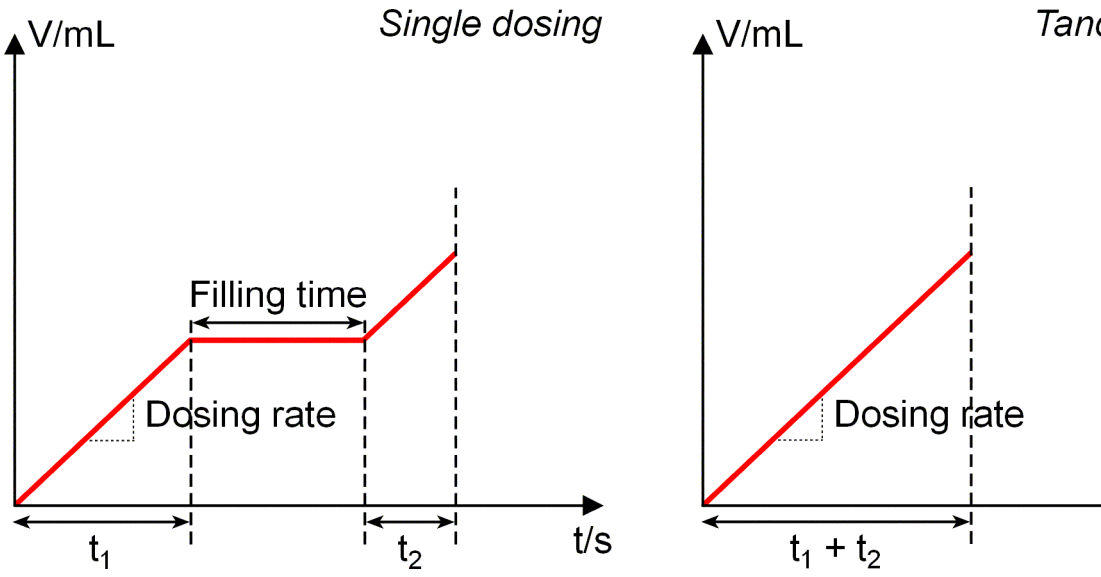
NOTICE

This formula applies only for using a single dosing device. The dosing rate is equal to the flow rate in the case of tandem dosing.

If the required dosing rate exceeds the maximum dosing rate for the selected exchange unit or dosing unit (or cylinder volume), then a larger cylinder volume must be selected.

Specification of dosing rate and dosing time

You specify the rate at which dosing is carried out during a certain time. As in the previous case, the filling times are not taken into account and thus prolong the dosing time.



Flow rate of a single dosing device

The cylinder volume and the filling time of the exchange or dosing unit must be taken into account for the calculation of the effective flow rate.

Cylinder volume	Max. flow rate	
	Exchange unit	Dosing unit
1 mL	approx. 80 mL/h	---
2 mL	---	approx. 170 mL/h
5 mL	approx. 400 mL/h	approx. 430 mL/h
10 mL	approx. 800 mL/h	approx. 860 mL/h
20 mL	approx. 1.6 L/h	approx. 1.7 L/h
50 mL	approx. 4.0 L/h	approx. 4.3 L/h

Filling times

Filling times are not included in the calculation of the dosing rate. The filling times (including valve switching) can be estimated according to the following formula:

Filling time in s = (max. filling rate/current filling rate) • t + 4 s

t = 20 s (for exchange units) or 18 s (for dosing units)

The maximum filling rate depends on the cylinder volume of the exchange/dosing unit attached. The approximate filling times (including valve switching) are given in the table below for various cylinder volumes (exchange and dosing unit) at different filling rates:

Cylinder volume	Filling time in s			
	max.	100 mL/min	50 mL/min	10 mL/min
1 mL	24/---	---	---	---
2 mL	---/22	---	---	---
5 mL	24/22	---	---	34
10 mL	24/22	---	---	64
20 mL	24/22	---	28	124
50 mL	24/22	34	64	304

Example

1 L reagent is to be dosed within 1 hour with a 50 mL exchange unit. How large is the dosing rate?

Total duration = 60 min

Dosing volume = 1,000 mL

Filling time = 24 s (at max. filling rate)

Cylinder volume = 50 mL

Number of refills = dosing volume/cylinder volume = 1,000/50 = 20

If the division results in a whole number, then the last filling is not a refill anymore and needs to be deducted. In our example, the dosing cylinder must be refilled 19 times. There is no dosing during this time, i.e. the net dosing time is:

3,600 s - 19 × 24 s = 3,144 s = 52.4 min

The corresponding dosing rate is

1,000 mL/52.4 min = 19.1 mL/min

Summarized in a formula:

Dosing rate in mL/min = dosing volume/(total duration - number of refills • filling time • 1/60)

5.6.6.3.3 DOS - Track call

Dialog window: **Method ► DOS ph/DOS U ► Monitoring ► [New]/[Properties] ► Track call #**

Monitoring

Selection of the quantity to be monitored. When its limit values are violated a track is started.

Selection	**Measured value** | **Temperature** | **Any**
Default value	**Measured value**

Any
Any of the two quantities.

Limit exceeding

Selection of the exceeded limit for which a track is to be started.

Selection	**Lower limit** | **Upper limit** | **Any** | **OK**
Default value	**Any**

Any
The track will be started if either the upper or the lower limit is violated.

OK
The track will be started when the monitored quantities are once again within the limit values (including hysteresis).

Track name

Selection of the track that is to be started automatically.

Selection	**Selection of existing tracks**

NOTICE

If a track is called for that is already running then it will be allowed to finish and then restarted when it is free again.

5.6.6.3.4 DOS pH

5.6.6.3.4.1 DOS pH - Overview

Dialog window: **Method ► DOS pH ► Properties... ► DOS pH - 'Command name'**

Command for **controlled dosing** with measured value pH.

Devices

This command can be executed with the following devices:

Titrando: 835, 836, 842, 857, 902, 906, 907

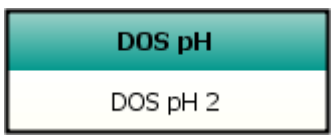
Titrino: 718, 736, 751, 799

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **DOS pH** command are set on the following five tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
  Parameters for setting the dosing.
- *Stop conditions*
  Definition of conditions which cause the dosing to stop.
- *Monitoring*
  Definition of the monitoring of measured value and temperature.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated by the **DOS pH** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL

Identification	Description
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value in the measuring point list
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**

Identification	Description
.TITER	Titer value of the solution used for the command
.VOL	Dosed volume

5.6.6.3.4.2 DOS pH - General/Hardware

Tab: **Method ▶ DOS pH ▶ Properties... ▶ General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device with which the dosing is to be carried out. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, then two dosing devices are used for dosing without interruption. While the first dosing device is filling, the second one is dosing and vice versa. This parameter is displayed only for Titrandos and 855.

Dosing device

Selection of the number of the second dosing device (exchange or dosing unit), with which the solution is to be dosed when the first dosing device is not available.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**2**

855

Selection	**1** | **2** | **3**
Default value	**2**

Solution

Entry of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device and whether the dosing device type is correct. With nonintelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 855

Selection	**Solution name** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Filling rate

Rate (volume/time unit) at which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	**Sensor name** | **pH electrode** | **not defined**
Default value	**pH electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for Titrinos.

5.6.6.3.4.3 DOS pH - Dosing parameters

Tab: **Method ► DOS pH ► Properties... ► Dosing parameters**

Command name

Name of the command.

Entry	**25 characters**

The volume to be dosed as well as the dosing and filling rate can be defined on this tab.

Dosing criterion

Selection of the two parameters that can be defined for dosing. The third parameter is calculated automatically according to the formula **Volume = Dosing time * Dosing rate** and is not shown *(see chapter 5.6.6.3.2, page 1168)*.

Selection	**Volume/Dosing rate** | **Volume/Dosing time** | **Dosing rate/Dosing time**
Default value	**Volume/Dosing rate**

Volume

Fixed volume that is to be dosed. This parameter appears only for **Dosing criterion** = **Volume/Dosing rate** or **Volume/Dosing time**.

Input range	**0.00000 to 99,999.9 mL**
Default value	**10.0000 mL**

Dosing rate

Rate (volume/time unit) at which dosing is to be carried out. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value. This parameter appears only for **Dosing criterion** = **Volume/Dosing rate** or **Dosing rate/Dosing time**.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The dosing rate should be reduced for viscous liquids.

Dosing time

Time during which dosing should take place. This parameter appears only for **Dosing criterion** = **Volume/Dosing time** or **Dosing rate/Dosing time**.

Input range	**0 to 9,999,999 s**
Default value	**100 s**

Pause

Waiting time before the start of the dosing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**,

then the temperature will be measured continuously. This value is used for temperature correction in monitoring with pH measurements.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855	
Input range	**0.1 to 999,999 s**
Default value	**5.0 s**

Titrino	
Input range	**1 to 999,999 s**
Default value	**5 s**

5.6.6.3.4.4 DOS pH - Stop conditions

Tab: **Method ▶ DOS pH ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the dosing are defined on this tab. If several stop conditions are set, then the criterion which is fulfilled first will stop the dosing.

Stop volume

Stop when the specified volume has been dosed since the start of the dosing. Adapt the stop volume to suit the size of the measuring vessel.

Titrando, 855	
Input range	**0.00000 to 9,999.99 mL**
Default value	**100.000 mL**
Selection	**off**

off
Means that no stop will take place.

Titrino

Input range	**0.000 to 9,999.99 mL**
Default value	**100.00 mL**
Selection	**off**

off
Means that no stop will take place.

Stop time

Stop when the entered time has elapsed since the start of the dosing.

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

off
Means that no stop will take place.

Filling rate

Rate (volume / time unit) at which the dosing cylinder is to be filled after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The filling rate should be reduced for viscous liquids.

5.6.6.3.4.5 DOS pH - Monitoring

Tab: **Method ▶ DOS pH ▶ Properties... ▶ Monitoring**

Command name

Name of the command.

Entry	**25 characters**

The following monitoring processes can be activated and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is enabled, then the measured value will be monitored and any violated limits will be entered in the measuring point list.

Lower limit pH

Lower limit of the measured value. If the measured value falls below this limit, the event **Measured value lower limit violated** is triggered.

Titrando, 855

Input range	**-20.000 to 20.000**
Default value	**-20.000**

Titrino

Input range	**-20.00 to 20.00**
Default value	**-20.00**

Lower hysteresis pH

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value again, then the event **Measured value lower limit OK** is triggered.

Titrando, 855

Input range	**0.000 to 20.000**
Default value	**0.020**

Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit violated** is triggered.

Titrando, 855

Input range	**-20.000 to 20.000**
Default value	**20.000**

Titrino

Input range	**-20.00 to 20.00**
Default value	**20.00**

Upper hysteresis pH

Upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit OK** is triggered.

Titrando, 855	
Input range	**0.000 to 20.000**
Default value	**0.020**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **DOS** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **DOS** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **DOS** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the current **DOS** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Monitoring Temperature

Monitoring Temperature

on | off (Default value: **off**)

If this option is enabled, then the temperature will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. If the temperature falls below this limit, the event **Lower temperature limit violated** is triggered.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**-20.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**-170.0 °C**

Lower hysteresis

Lower hysteresis of the temperature. If the temperature exceeds the lower limit by this hysteresis value again, then the event **Lower temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Upper limit

Upper limit of the temperature. If the temperature exceeds this limit, then the event **Upper temperature limit violated** is triggered.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**150.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**500.0 °C**

Upper hysteresis

Upper hysteresis of the temperature. If the temperature once again falls below the upper limit by this hysteresis value, then the event **Upper temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **DOS** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **DOS** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **DOS** command will be interrupted and a message will be displayed. As soon as the monitored temperature is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the current **DOS** command will be interrupted. As soon as the monitored temperature is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is violated.

[New]

Opens the **Track call** dialog window, in which the parameters for a new track call can be entered *(see chapter 5.6.6.3.3, page 1171)*.

[Properties]

Opens the **Track call** dialog window, in which the parameters for the selected track call can be edited *(see chapter 5.6.6.3.3, page 1171)*.

[Delete]

Deletes the track call selected in the table.

5.6.6.3.4.6 DOS pH - Additional measured values

Tab: **Method ► DOS pH ► Properties... ► Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.6.3.5 DOS U

5.6.6.3.5.1 DOS U - Overview

Dialog window: **Method ► DOS U ► Properties... ► DOS U - 'Command name'**

Command for **controlled dosing** with measured value U.

Devices

This command can be executed with the following devices:

Titrando: 835, 836, 842, 857, 902, 906, 907

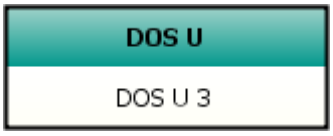
Titrino: 718, 736, 751, 799

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the **DOS U** command are set on the following five tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
  Parameters for setting the dosing.
- *Stop conditions*
  Definition of conditions which cause the dosing to stop.
- *Monitoring*
  Definition of the monitoring of measured value and temperature.
- *Additional measured values*
  Definition of additional measured values of other measuring commands, which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DOS U** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature after the command has been processed) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1 - 3) for the last measuring point in the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1 - 3) for the last measuring point in the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value

Identification	Description
.LP.TEM	Temperature for the last measuring point in the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)
.NMP	Number of measuring points in measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: **1 = normal**; **0 = manual** or **after error**
.TITER	Titer value of the solution used for the command
.VOL	Dosed volume

5.6.6.3.5.2 DOS U - General/Hardware

Tab: **Method ► DOS U ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the instrument, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device with which the dosing is to be carried out. All the dosing device connectors which are possible with the selected device type are always displayed.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**1**

855

Selection	**1** | **2** | **3**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the

command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, then two dosing devices are used for dosing without interruption. While the first dosing device is filling, the second one is dosing and vice versa. This parameter is displayed only for Titrandos and 855.

Dosing device

Selection of the number of the second dosing device (exchange or dosing unit), with which the solution is to be dosed when the first dosing device is not available.

Titrando

Selection	**1** | **2** | **3** | **4**
Default value	**2**

855

Selection	**1** | **2** | **3**
Default value	**2**

Solution

Entry of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device and whether the dosing device type is correct. With nonintelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 855

Selection	**Solution name** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

Filling rate

Rate at which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	**1** | **2**
Default value	**1**

855

Selection	**1**
Default value	**1**

Titrino

Selection	**1** | **2** | **diff.**
Default value	**1**

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors available in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode** | **not defined**
Default value	**Metal electrode**

not defined
If a nonintelligent sensor is used, then the user has to assign the sensor at the start of the method. If an intelligent sensor is connected to the measuring input, then it is automatically assigned when **not defined** is selected.

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	**continuous** | **automatic** | **off**
Default value	**automatic**

continuous
A temperature sensor must be connected. The temperature will then be measured continuously.

automatic
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will used.

off
The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrando, 855

Selection	**1** | **2** | **3** | **4** | **off**

off
No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrando, 855

Input range	**-15 to 15**
Default value	**8**

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for Titrinos.

5.6.6.3.5.3 DOS U - Dosing parameters

Tab: **Method ► DOS U ► Properties.. ► Dosing parameters**

Command name

Name of the command.

Entry	**25 characters**

The volume to be dosed as well as the dosing and filling rate can be defined on this tab.

Dosing criterion

Selection of the two parameters that can be defined for dosing. The third parameter is calculated automatically according to the formula **Volume = Dosing time * Dosing rate** and is not shown *(see chapter 5.6.6.3.2, page 1168)*.

Selection	**Volume/Dosing rate** | **Volume/Dosing time** | **Dosing rate/Dosing time**
Default value	**Volume/Dosing rate**

Volume

Fixed volume that is to be dosed. This parameter appears only for **Dosing criterion** = **Volume/Dosing rate** or **Volume/Dosing time**.

Input range	**0.00000 to 99,999.9 mL**
Default value	**10.0000 mL**

Dosing rate

Rate (volume/time unit) at which dosing is to be carried out. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value. This parameter appears only for **Dosing criterion** = **Volume/Dosing rate** or **Dosing rate/Dosing time**.

Titrando, 855

Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The dosing rate should be reduced for viscous liquids.

Dosing time

Time during which dosing should take place. This parameter appears only for **Dosing criterion** = **Volume/Dosing time** or **Dosing rate/Dosing time**.

Input range	**0 to 9,999,999 s**
Default value	**100 s**

Pause

Waiting time before the start of the dosing.

Input range	**0 to 999,999 s**
Default value	**0 s**

Temperature

Measuring temperature, which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set to **automatic** or **continuous** on the **General/Hardware** tab under **Sensor**, then the temperature will be measured continuously. This value is used for temperature correction in monitoring with pH measurements.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**25.0 °C**

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Input range	**0.1 to 999,999 s**
Default value	**5.0 s**

Titrino

Input range	**1 to 999,999 s**
Default value	**5 s**

5.6.6.3.5.4 DOS U - Stop conditions

Tab: **Method ▶ DOS U ▶ Properties... ▶ Stop conditions**

Command name

Name of the command.

Entry	**25 characters**

The conditions for stopping the dosing are defined on this tab. If several stop conditions are set, then the criterion which is fulfilled first will stop the dosing.

Stop volume

Stop when the specified volume has been dosed since the start of the dosing. Adapt the stop volume to suit the size of the measuring vessel.

Titrando, 855

Input range	**0.00000 to 9,999.99 mL**
Default value	**100.000 mL**
Selection	**off**

Titrino

Input range	**0.000 to 9,999.99 mL**
Default value	**100.00 mL**
Selection	**off**

Stop time

Input range	**0 to 999,999 s**
Selection	**off**
Default value	**off**

off
Stop when the entered time has elapsed since the start of the dosing.

Filling rate

Rate (volume / time unit) at which the dosing cylinder is to be filled after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during filling to the largest possible value.

Titrando, 855	
Input range	**0.01 to 166.00 mL/min**
Default value	**maximum mL/min**

Titrino	
Input range	**0.01 to 150.00 mL/min**
Default value	**maximum mL/min**

NOTICE

The filling rate should be reduced for viscous liquids.

5.6.6.3.5.5 DOS U - Monitoring

Tab: **Method ▶ DOS U ▶ Properties... ▶ Monitoring**

Command name

Name of the command.

Entry	**25 characters**

The following monitoring processes can be activated and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is enabled, then the measured value will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the measured value. If the measured value falls below this limit, the event **Measured value lower limit violated** is triggered.

Titrando, 855	
Input range	**-2,000.0 to 2,000.0 mV**
Default value	**-2,000.0 mV**

Titrino	
Input range	**-2,000 to 2,000 mV**
Default value	**-2,000 mV**

Lower hysteresis

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value again, then the event **Measured value lower limit OK** is triggered.

Titrando, 855	
Input range	**0.0 to 2,000.0 mV**
Default value	**2.0 mV**

Upper limit

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit violated** is triggered.

Titrando, 855	
Input range	**-2,000.0 to 2,000.0 mV**
Default value	**2,000.0 mV**

Titrino	
Input range	**-2,000 to 2,000 mV**
Default value	**2,000 mV**

Upper hysteresis

Upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit OK** is triggered.

Titrando, 855	
Input range	**0.0 to 2,000.0 mV**
Default value	**2.0 mV**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **DOS** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **DOS** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **DOS** command will be interrupted and a message will be displayed. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the current **DOS** command will be interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Monitoring Temperature

Monitoring Temperature

on | off (Default value: **off**)

If this option is enabled, then the temperature will be monitored and any violated limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. If the temperature falls below this limit, the event **Lower temperature limit violated** is triggered.

Titrando, 855

Input range	**-20.0 to 150.0 °C**
Default value	**-20.0 °C**

Titrino

Input range	**-170.0 to 500.0 °C**
Default value	**-170.0 °C**

Lower hysteresis

Lower hysteresis of the temperature. If the temperature exceeds the lower limit by this hysteresis value again, then the event **Lower temperature limit OK** is triggered.

Titrando, 855

Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Upper limit

Upper limit of the temperature. If the temperature exceeds this limit, then the event **Upper temperature limit violated** is triggered.

Titrando, 855	
Input range	**-20.0 to 150.0 °C**
Default value	**150.0 °C**

Titrino	
Input range	**-170.0 to 500.0 °C**
Default value	**500.0 °C**

Upper hysteresis

Upper hysteresis of the temperature. If the temperature once again falls below the upper limit by this hysteresis value, then the event **Upper temperature limit OK** is triggered.

Titrando	
Input range	**0.0 to 150.0 °C**
Default value	**0.2 °C**

Action

Selection of the event to be triggered if the upper or lower limit is violated:

Selection	**Cancel determination** | **Cancel command (Titrando only)** | **Wait for [Continue]** | **Wait for limit ok** | **none**
Default value	**none**

Cancel determination
The running **DOS** command will be canceled, then the exit track (if present) will be started and the determination will be finished.

Cancel command (Titrando only)
The running **DOS** command will be canceled, then the next command will be carried out.

Wait for [Continue]
Reagent dosing in the running **DOS** command will be interrupted and a message will be displayed. As soon as the monitored temperature is again within the limits (including hysteresis), reagent dosing can be resumed by pressing **[Continue]** in this message box.

Wait for limit ok
Reagent dosing in the current **DOS** command will be interrupted. As soon as the monitored temperature is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none
No action will be taken if limits are violated.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is violated.

[New]

Opens the **Track call** dialog window, in which the parameters for a new track call can be entered *(see chapter 5.6.6.3.3, page 1171)*.

[Properties]

Opens the **Track call** dialog window, in which the parameters for the selected track call can be edited *(see chapter 5.6.6.3.3, page 1171)*.

[Delete]

Deletes the track call selected in the table.

5.6.6.3.5.6 DOS U - Additional measured values

Tab: **Methods ▶ Commands ▶ DOS U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Entry	**25 characters**

A maximum of 6 additional measured values can be defined on this tab. These values can then be saved together with the measured values present in the default settings in additional measured value columns.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1…3** and used in formulas as variables **'Command name.CA1…3'**.

[New]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be entered *(see chapter 5.6.3.11.1, page 933)*.

[Properties]

Opens the **Calc. measured value #** dialog window, in which the parameters for the additional measured value can be edited *(see chapter 5.6.3.11.1, page 933)*.

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1…3** and used in formulas as variables **'Command name.EX1…3'**-

[New]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be entered *(see chapter 5.6.3.11.2, page 934)*.

[Properties]

Opens the **External measured value #** dialog window, in which the parameters for the external measured value can be edited *(see chapter 5.6.3.11.2, page 934)*.

[Delete]

Deletes the external measured value selected in the table.

5.6.6.4 LQH

5.6.6.4.1 LQH - Overview

Dialog window: **Method ► LQH ► Properties... ► LQH - 'Command name'**

Command for **complex dosing tasks** with a Dosino dosing device (700 or 800).

Devices

This command can be executed with the following devices equipped with a Dosino 700/800:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 859, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

pH/Ion Meter: 867

Sample Processor: 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **LQH** are configured on the following 2 tabs:

- *General/Hardware*
  Parameters for device and dosing device.
- *Parameters*
  Parameters for adjusting the Liquid Handling function.

Command variables

The following command variables are generated in the method run by the command **LQH** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.TITER	Titer value of the solution used for the command
.VOL	Currently dosed volume

5.6.6.4.2 LQH - General/Hardware

Tab: **Method ► LQH ► Properties... ► General/Hardware**

Command name

Name of the command.

Entry	**25 characters**

The general parameters for the device and for the dosing device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device to be used for the liquid handling tasks. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

778, 789, 814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether

the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

5.6.6.4.3 LQH - Parameters

Tab: **Method ▶ LQH ▶ Properties... ▶ Parameters**

Command name

Name of the command.

Entry	**25 characters**

The liquid handling function is defined on this tab.

Function

Selection of the liquid handling function that is to be carried out.

Selection	**Dosing** | **Fill** | **Aspirate** | **Eject to stop** | **Eject to end volume** | **Exchange position** | **Change port** | **Compensate**
Default value	**Dosing**

Dosing
The given volume is added. No automatic filling takes place either before or after the command.

Fill
Fill the cylinder can take place from a freely selectable port. The valve disc then remains at the selected port.

Aspirate
With this function, liquid is aspirated from the given port. As with Dosing, the cylinder is not filled automatically beforehand or afterwards. It should be possible to achieve the volume to be aspirated with a single piston stroke.

Eject to stop
With this function, the entire cylinder content is ejected via the specified port. The piston is lowered to the stop point, i.e. past the maximum volume mark. This function should only be carried out to eject any air bubbles.

Eject to end volume
The whole cylinder content is ejected via the given port. In contrast to the function **Eject to stop**, the piston moves only to the maximum volume mark, i.e. until it has executed 10'000 pulses. This command should be used for pipetting functions for emptying the cylinder.

Exchange position
With this function the cylinder is filled via the given port first. The valve disc is then turned to **Port 2** and the dosing unit can be removed from the dosing drive.

Change port
With **Change port** the valve disc is only moved to the given port; no piston movement takes place.

Compensate
As the dosing units are exchangeable, the coupling of the Dosino piston rod (spindle) has a low mechanical tolerance that can be noticed when the piston changes its direction of movement. This tolerance can be compensated for with the **Compensate** function. A short piston movement is first made in the same direction as the previous movement, which is then followed by a piston movement in the reverse direction.

Port

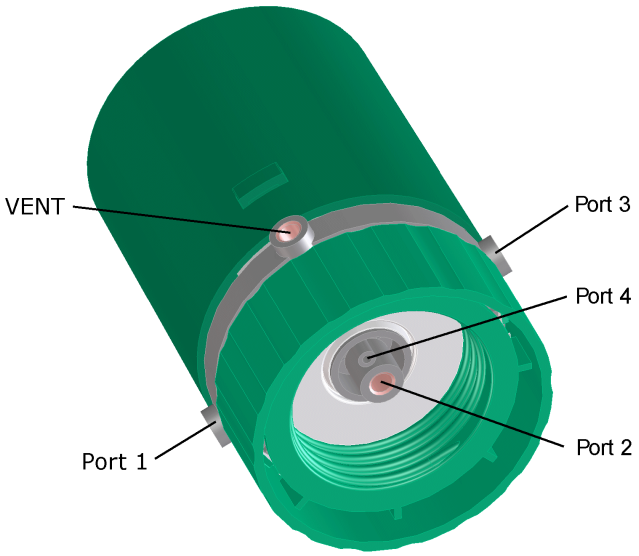
The port where each function is to be carried out needs to be defined for each liquid handling command.

Selection	**1** | **2** | **3** | **4**

1
Default setting for Dosing and Aspirate

2
Default setting for Fill, Exchange position and Change port

4
Default setting for Eject to stop, Eject to end volume and Compensate



Volume

Enter the volume to be moved. This parameter is available only for the **Functions Dosing** or **Aspirate**.

Dosing

Input range	**0.00000 to 99999.9 mL**
Default value	**10.0000 mL**

Aspirate

Input range	**0.00000 to 50.0 mL**
Default value	**10.0000 mL**

Rate

Speed at which the commands **Dosing**, **Fill**, **Aspirate**, **Eject** and **Exchange position** are carried out. The maximum rate depends on the cylinder volume of the exchange unit or dosing device used. **Aspiration** and **Ejection** of the sample should be done at a rate <10 mL/min.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

5.6.6.5 PREP

5.6.6.5.1 PREP - Overview

Dialog window: **Method ► PREP ► Properties... ► PREP - 'Command name'**

Command for **Rinsing cylinder and tubing** of an exchange or dosing unit.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 859, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 736, 751, 758, 799

Dosing Interface: 846

Conductometer: 856

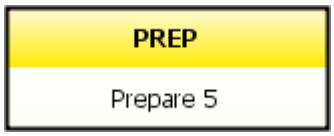
pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **PREP** are configured in the following dialog window:

- *PREP - Properties*

Command variables

The following command variables are generated in the method run by the command **PREP** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started

Identification	Description
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.6.5.2 PREP - Properties

Dialog window **Method ► PREP ► Properties... ► PREP - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device to be prepared. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

778, 789, 814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

730, 774

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12**
Default value	**1**

Titrino

Selection	**internal D0**

736, 751, 758, 799

Selection	**internal D0** | **external D1** | **external D2**
Default value	**internal D0**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

5.6.6 EMPTY

5.6.6.1 EMPTY - Overview

Dialog window: **Method ► EMPTY ► Properties... ► EMPTY - 'Command name'**

Command for **Emptying cylinder and tubing** of a dosing unit.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 859, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 736, 751, 758, 799

Dosing Interface: 846

Conductometer: 856

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **EMPTY** are configured in the following dialog window:

- *EMPTY - Properties*

Command variables

The following command variables are generated in the method run by the command **EMPTY** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.6.6.2 EMPTY - Properties

Dialog window: **Method ► EMPTY ► Properties... ► EMPTY - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Dosing device

Dosing device

Selection of the dosing device (Dosinos only) to be emptied. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

730, 774

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12**
Default value	**1**

Titrino

Selection	**external D1** | **external D2**
Default value	**external D1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

5.6.6.7 RLS DOS

5.6.6.7.1 RLS DOS - Overview

Dialog window: **Method ► RLS DOS ► Properties... ► RLS DOS - 'Command name'**

Command to **release a dosing device** for using it in other parallel running methods. It removes the reservation made by the current method.

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **RLS DOS** are configured in the following dialog window:

- *RLS DOS - Properties*

Command variables

The following command variables are generated in the method run by the command **RLS DOS** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.6.7.2 RLS DOS - Properties

Dialog window **Method ► RLS DOS ► Properties... ► RLS DOS - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**'Sample changer types'** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Dosing device

Dosing device

Selection of the dosing device to be prepared. All the dosing device connections which are possible with the selected device type are displayed.

778, 789, 814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

730, 774

Selection	**1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12**
Default value	**1**

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent dosing units are used, then a check will be made in the method run to see whether the correct solution has been attached to the selected dosing device. With non-intelligent dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Entry	**24 characters**
Selection	**'Solution name'** | **not defined**
Default value	**not defined**

not defined
No tests will be carried out.

NOTICE

For **Dosing device** and **Solution** exactly the same settings have to be selected as for the dosing device reserved earlier by another command, otherwise the dosing device is not being released.

NOTICE

If the tandem dosing is used in a command (e.g. **ADD**), then both dosing devices used have to be released each with a separate command **RLS DOS**.

5.6.7 Automation commands

5.6.7.1 Automation commands - Overview

Menu item: **Method ► Paste ► New command... ► Automation**

Commands for the operation of Sample Processors.

The following eight automation commands can be selected:

- *MOVE*
  Moving to a rack position or an external position.
- *SWING*
  Swinging of the robotic arm (with Swing Head only).
- *LIFT*
  Moving to a lift position.
- *PUMP*
  Switching on/off the connected or built-in pumps.
- *STIR*
  Controlling a connected stirrer.
- *RACK*
  Initialization of the rack attached.
- *HEATER*
  Controlling the oven temperature of the 774 Oven Sample Processor.
- *FLOW*
  Regulation of the gas flow of the 774 Oven Sample Processor.
- *RLS DEV*
  Release of a device for using it in other parallel running methods.

5.6.7.2 MOVE

5.6.7.2.1 MOVE - Overview

Dialog window: **Method ► MOVE ► Properties... ► MOVE - 'Command name'**

Command for **moving to a rack position** (sample position or special beaker).

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874

Appearance

The command has the following appearance:

Parameters

The parameters for the command **MOVE** are configured in the following dialog window:

- *MOVE - Properties*

Command variables

The following command variables are generated in the method run by the command **MOVE** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.RAN	Current, absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when ending the command)
.RPO	Current rack position (entry at time of ending the command); **0** means **'not defined'**
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)

5.6.7.2.2 MOVE - Properties

Dialog window: **Method ► MOVE ► Properties... ► MOVE - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Target

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	**1** | **2**
Default value	**1**

Move

Selecting the target position on the rack:

Selection	**Sample position** | **Rack position** | **Special beaker** | **Relative angle**
Default value	**Sample position**

Sample position
Position defined for the current determination in the **Run** subwindow of the program part **Workplace** as the **Sample position** parameter.

Rack position
Absolute position on the rack.

Special beaker
Special position on the rack defined in the rack properties of the **Configuration** program part.

Relative angle
The sample rack can be rotated by a certain angle relative to the current position independently of rack positions. This can be used for example to remove vial caps automatically.

Number

Specification of the number of the rack position. This parameter is only visible for **Move** = **Rack position** or **Special beaker**. The rack position can be entered as a formula as well, which is necessary for the automatic calibration of electrodes, for example. The formula editor is opened by right-clicking on the input field.

Move = Rack position

Input range	**1 to 999**
Default value	**1**

Move = Special beaker (for 778, 789, 814, 815, 855, 864, 874)

Input range	**1 to 16**
Default value	**1**

Move = Special beaker (for 730)

Input range	**1 to 8**
Default value	**1**

Move = Special beaker (for 774)

Entry	**1**

Move angle

This parameter specifies the angle by which the sample rack should be rotated relative to the current position. It is only visible for **Move** = **Relative angle**.

778, 789, 814, 815, 855, 864, 874

Input range	**-259.90 to 259.90 °**
Default value	**5.00 °**

Beaker test

Selection of the action to be carried out if the beaker sensor defined for the rack does not detect any beakers at the target position. If the **robotic arm** is selected as the beaker sensor, then a Swing Head must be installed. A work position also defined in the rack data must also be defined in such a way that a contact exists between beaker sensor and beaker. This work position will be approached automatically for beaker recognition after the command **MOVE**. This section is not visible when **Move** = **Relative angle**.

Selection	**Display message** | **Stop determination** | **Stop determination and series**
Default value	**Display message**

Display message
A message is displayed and the determination is stopped.

Stop determination
The determination is stopped and the next determination of the series is started.

Stop determination and series
The determination as well as the series are stopped. An Exit track will be started if there is one defined.

Parameters

Shift rate

Selection of the speed at which the sample rack rotates.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

Shift direction

Selection of the shift direction of the sample rack.

Selection	**auto** | **+** | **–**
Default value	**auto**

auto
The direction of rotation with the smallest angle of rotation is selected automatically.

+
Rack rotates counterclockwise.

–
Rack rotates clockwise.

Swing rate

Selects speed of the robotic arm when moving to a rack position or a special beaker (only with multiple row sample racks).

778, 789, 814, 815, 855, 864, 874

Input range	**10 to 55 °/s**
Default value	**55 °/s**

5.6.7.3 SWING

5.6.7.3.1 SWING - Overview

Dialog window: **Method ► SWING ► Properties... ► SWING - 'Command name'**

Command for **swinging the robotic arm**. This command is only executable if the Sample Processor is equipped with a **786 Swing Head** with a robotic arm.

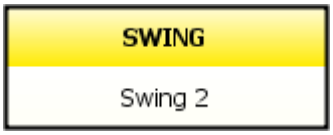
Devices

This command can be executed with the following devices:

Sample Processor: 778, 789, 814, 815, 855, 864

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SWING** are configured in the following dialog window:

- *SWING - Properties*

Command variables

The following command variables are generated in the method run by the command **SWING** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)
.SPO	Current external position (entry when ending the command); **0** means **invalid position**

5.6.7.3.2 SWING - Properties

Dialog window: **Method ► SWING ► Properties... ► SWING - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Target

Tower

Selecting the tower of the Sample Processor for moving the robotic arm to the required position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	**1** | **2**
Default value	**1**

Swing

Selecting the target position for the robotic arm.

Selection	**External position** | **Maximum angle** | **Relative angle**
Default value	**External position**

External position
Swinging to one of the 4 external positions available for each tower. They are defined in the Tower properties of the Sample Processor.

Maximum angle
Swinging outwards to the maximum permissible angle *(see chapter 7.7.8, page 1533)*.

Relative angle
Swinging by the specified swing angle relative to the current position. This can be used for example to remove vial caps automatically.

Number

Indicates the number of the external position which is to be swung to. This parameter is only visible for **Swing** = **External position**.

Input range	**1 to 4**
Default value	**1**

Swing angle

Angle by which the robotic arm is to be swung relative to the current position. This parameter is visible only when **Swing** = **Relative angle**.

Input range	**-180.0 to 180.0 °**
Default value	**10.0 °**

Parameters

Swing rate

Speed of the robotic arm when swinging to an external position or a particular angle.

Input range	**10 to 55 °/s**
Default value	**55 °/s**

5.6.7.4 LIFT

5.6.7.4.1 LIFT - Overview

Dialog window: **Method ▶ LIFT ▶ Properties... ▶ LIFT - 'Command name'**

Command for **moving to a Work position, Shift position, Rinse position and Special position** with a Sample Processor.

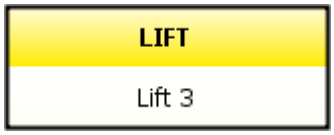
Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **LIFT** are configured in the following dialog window:

- *LIFT - Properties*

Command variables

The following command variables are generated in the method run by the command **LIFT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.LPO	Current absolute lift position in mm (entry when ending the command)

5.6.7.4.2 LIFT - Properties

Dialog window: **Method ► LIFT ► Properties... ► LIFT - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Target

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	**1** | **2**
Default value	**1**

Lift position

Entering the desired lift position in mm or selecting a lift position predefined for the rack **Work position**, **Shift position**, **Rinse position** or **Special position**. A lift height of 0 mm corresponds to the **Home position**. Here the lift is moved to the uppermost stop.

730, 778, 789, 814, 815, 855, 864

Input range	**0 to 235 mm**
Selection	**Work position** | **Shift position** | **Rinse position** | **Special position** | **Home position**
Default value	**Work position**

774

Input range	**0 to 100 mm**
Selection	**Work position** | **Shift position** | **Rinse position** | **Special position** | **Home position**
Default value	**Work position**

874

Input range	**0 to 110 mm**
Selection	**Work position** | **Shift position** | **Rinse position** | **Special position** | **Home position**
Default value	**Work position**

NOTICE

Please make sure that none of the lift positions exceed the maximum stroke path given in the tower properties of the device.

Parameters

Lift rate

Selection of the speed for moving the lift.

778, 789, 814, 815, 855, 864, 874

Input range	**5 to 25 mm/s**
Default value	**25 mm/s**

730

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

774

Input range	**3 to 12 mm/s**
Default value	**12 mm/s**

5.6.7.5 PUMP

5.6.7.5.1 PUMP - Overview

Dialog window: **Method ► PUMP ► Properties... ► PUMP - 'Command name'**

Command for **controlling pumps** connected to or built into the Sample Processor.

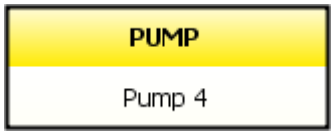
Devices

This command can be executed with the following devices:

Sample Processor: 730, 778, 789, 814, 815, 855, 864

Appearance

The command has the following appearance:



Parameters

The parameters for the command **PUMP** are configured in the following dialog window:

- *PUMP - Properties*

Command variables

The following command variables are generated in the method run by the command **PUMP** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.7.5.2 PUMP - Properties

Dialog window: **Method ► PUMP ► Properties... ► PUMP - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Pumps

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	**1** | **2**
Default value	**1**

Pump(s)

Selection of the pump that is to be actuated. The pump(s) can either be built-in or externally connected. With **1+2** both pumps at the selected tower will be switched at the same time.

Selection	**1** | **2** | **1+2**
Default value	**1**

1
Pump 1 is actuated.

2
Pump 2 is actuated.

1+2
Both pumps at the selected tower will be switched at the same time.

Actions

Selection	**Switch on** | **Switch off** | **Duration**
Default value	**Switch on**

Switch on
Switch on the pump(s).

Switch off
Switch off the pump(s).

Duration
Switch on the pump(s) for a particular period.

Input range	**0 to 9999.9**
Default value	**10.0**

Selection	**s** | **min**
Default value	**s**

5.6.7.6 STIR

5.6.7.6.1 STIR - Overview

Dialog window: **Method ► STIR ► Properties... ► STIR - 'Command name'**

Command for **controlling a connected stirrer**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 751, 758, 784, 785, 795, 798, 799

Conductometer: 856

Coulometer: 756, 831

Dosing Interface: 846

Titrotherm: 859

pH/Ion - Meter: 867

Sample Processor: 730, 778, 789, 814, 815, 857, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **STIR** are configured in the following dialog window:

- *STIR - Properties*

Command variables

The following command variables are generated in the method run by the command **STIR** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.7.6.2 STIR - Properties

Dialog window: **Methods ► STIR ► Properties... ► STIR - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Stirrer

Stirrer

on | off (Default value: **off**)

Selection of the stirrer.

Titrando, 730, 846, 856, 867

Selection	**1** | **2** | **3** | **4**
Default value	**1**

778, 789

Selection	**T1** | **T2 (tower stirrer)** | **1 … 3 (MSB stirrer)**
Default value	**T1**

814, 815, 855, 864, 874

Selection	**1** | **2** | **3**
Default value	**1**

Titrino, 756, 831

Selection	**1**

Stirrer type

Display of the stirrer type. **Unknown** is displayed either with devices unable to read out the stirrer type or if no stirrer is connected

Selection	**801 Magnetic Stirrer** | **802 Rod Stirrer** | **803 Ti Stand magnetic stirrer** | **804 Ti Stand rod stirrer** | **unknown**

Stirring rate

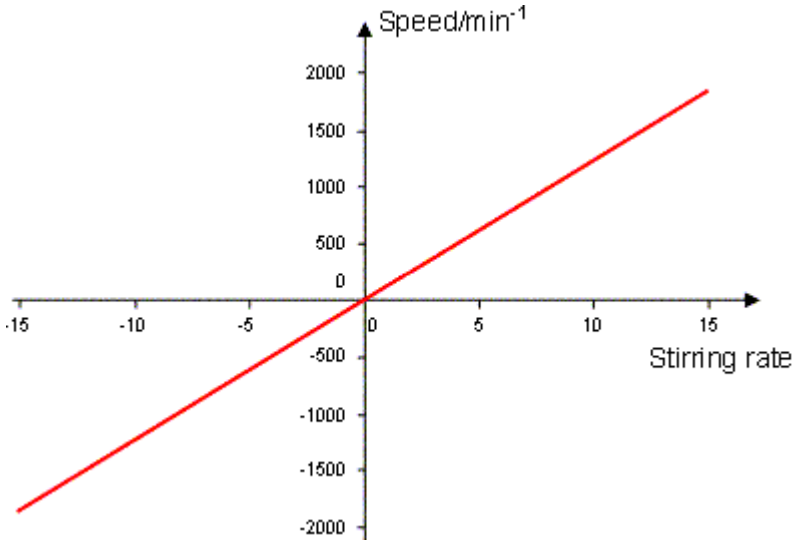
Setting the stirring rate or rotational speed. The algebraic sign of the stirring rate changes the direction in which the stirring is done. The default setting **8** corresponds to a rotational speed of 1000 rpm.

Titrando, 814, 815, 846, 855, 856, 867, 864, 874

Input range	**-15 to 15**
Default value	**8**

730, 778, 789

Input range	**0 to 15**
Default value	**8**



Action

Selection	**Switch on** | **Switch off** | **Period of operation**
Default value	**Switch on**

Switch on
Switch on the stirrer. The stirrer keeps switched on after the command has finished.

Switch off
Switch off the stirrer.

Period of operation
The stirrer can be switched on for a particular period.

Input range	**0 to 9999.9**
Default value	**10.0**

Selection	**s** | **min**
Default value	**s**

5.6.7.7 RACK

5.6.7.7.1 RACK - Overview

Dialog window: **Method ▶ RACK ▶ Properties... ▶ RACK - 'Command name'**

Command for **initialization of the attached sample rack**. The rack, lift and robotic arm (if present) are reset, the rack code is read off and the corresponding rack data is transferred to the Sample Processor.

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874

Appearance

The command has the following appearance:

Parameters

The parameters for the command **RACK** are configured in the following dialog window:

- *RACK - Properties*

Command variables

The following command variables are generated in the method run by the command **RACK** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.7.7.2 RACK - Properties

Dialog window: **Method ▶ RACK ▶ Properties... ▶ RACK - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types | 814 USB Sample Processor**
Default value	**814 USB Sample Processor**

Rack test

on | off (Default value: **off**)

If this option is enabled, the rack attached will be checked to see that it is the correct one.

Test rack

Selection of the rack name for the rack which must be put on. In this way you can ensure that the method can only be carried out with this rack. If another sample rack is detected while executing the command, a message is displayed and an exit track will be started if there is one defined.

Selection	**all sample racks listed in the configuration**

5.6.7.8 HEATER

5.6.7.8.1 HEATER - Overview

Dialog window: **Method ▶ HEATER ▶ Properties... ▶ HEATER - 'Command name'**

Command for **controlling the oven temperature**.

Instruments

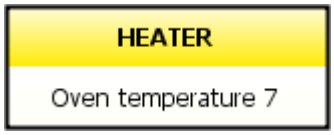
This command can be executed with the following devices:

Sample changer: 774 and 874

Photometer: 089

Appearance

The command has the following appearance:



Parameters

The parameters for the command **HEATER** are configured in the following dialog window:

- *HEATER - Properties*

Command variables

The following command variables are generated in the method run by the command **HEATER** and can be used in formulas under the designation **'Command name.Variable designation'**:

Designation	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.7.8.2 HEATER - Properties

Dialog window: **Method ▶ HEATER ▶ Properties... ▶ HEATER - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**774 Oven Sample Processor** | **089 Photometer** | **874 Oven Sample Processor**
Default value	**874 Oven Sample Processor**

Heater (Sample changer)

Target temperature

Temperature to which the oven has to be heated. This value is live editable only for the 874.

Input range	**50 to 250 °C**
Selection	**Init.temp.** | **off**
Default value	**Init.temp.**

Init.temp.
With **Init.temp.** the oven heating is switched on at the same time as the device and the oven is heated up to this temperature. The initial temperature must be entered by keypad on the 774. When connecting to tiamo, the value is read out and displayed in the device configuration. The value cannot be altered in tiamo. The initial temperature is entered and altered in tiamo with the 874.

off
The heater is switched off during the determination.

NOTICE

It is advisable to define an initial temperature if you work always at the same temperature.

Heating time

The target temperature has to be reached within this time. The heating rate can be modified with the heating time in order to program temperature ramps or entire temperature profiles (with several **HEATER** commands). **Off** causes heating at the maximum possible heating rate (see device manual).

This value is live editable for the 874

Input range	**1 to 999 min**
Selection	**off**
Default value	**off**

Max. waiting time

If the **Target temperature** is not reached within the defined **Heating time** then this waiting time will start. This parameter is only visible if a **Heating time** has been defined.

This value is live editable for the 874.

Input range	**1 to 999 min**
Selection	**off**
Default value	**off**

Action if timeout expires

on | off (Default value: **on**)

If this option is activated, then an action can be defined which is to be carried out if the target temperature has not yet been reached after expiry of the maximum waiting time (is displayed only when **Timeout ≠ off**).

Selection	**Display message** | **Cancel determination** | **Cancel determination and series**
Default value	**Display message**

Display message
A message is displayed and you can select whether you want to continue the run or cancel it.

Cancel determination
The determination is canceled and the next determination of the series is started.

Cancel determination and series
The determination as well as the series will be canceled, then the exit track (if present) will be started

Heater (Photometer)

Target temperature

Temperature to which the cuvette has to be heated. With **Init.temp.** the cuvette heating is switched on at the same time as the device and the cuvette is heated up to this temperature.

This value is live editable.

The initial temperature is defined in the device configuration.

Input range	**20 to 80 °C**
Selection	**Init.temp.** | **off**
Default value	**Init.temp.**

Init.temp.
With **Init.temp.** the cuvette heating is switched on at the same time as the device and the cuvette is heated up to this temperature. The initial temperature is entered and altered in tiamo.

off
Switch off the heater.

5.6.7.9 FLOW

5.6.7.9.1 FLOW - Overview

Dialog window: **Method ► FLOW ► Properties... ► FLOW - 'Command name'**

Command for the **control of the gas flow**.

Devices

This command can be executed with the following instruments:

Sample changers: 774, 874

Appearance

The command has the following appearance:

Parameters

The parameters for the **FLOW** command are set in the following dialog window:

- *FLOW - Properties*

Command variables

The following command variables are generated by the **FLOW** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.7.9.2 FLOW - Properties

Dialog window: **Method ▶ FLOW ▶ Properties... ▶ FLOW - 'Command name'**

Dialog window: **FLOW - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Shows the device type. If an instrument is selected in the **Device name** field, the **Device type** field can no longer be edited and the instrument type belonging to the instrument is displayed.

If the **not defined** option is selected in the **Device name** field, all instrument types or groups with which the command can be executed can be selected, regardless of the instruments present in the device table.

Selection	**774 Oven Sample Processor** | **874 USB Oven Sample Processor**
Default value	**874 USB Oven Sample Processor**

Gas

Gas type

Gas type of the carrier gas.

Selection	**Air** | **Nitrogen** | **Other gas**
Default value	**Air**

Gas flow factor

Factor for the correct determination of the gas flow. This parameter is displayed only if **Gas type** = **Other gas**. For the 774 Oven Sample Processor, the gas flow factor values for commonly used carrier gases are lis-

ted in the manual. For the 874 USB Oven Sample Processor, these values can be found in the table *Gas flow factors of various gases*.

Input range	**0.001 to 2.000** (Increment: **0.001**)
Default value	**1.000**

Gas flow

Inlet

Selection of the carrier gas inlet.

Selection	**Pump** | **Valve**
Default value	**Pump**

Pump
Use of ambient air as carrier gas.

Valve
Use of gas out of a compressed gas cylinder.

Flow rate

874

Input range	**10 to 150 mL/min**
Default value	**50 mL/min**

Gas flow

Selection	**Switch on** | **Switch off**
Default value	**Switch on**

Switch on
Switches the gas flow on.

Switch off
Switches the gas flow off.

5.6.7.10 RLS DEV

5.6.7.10.1 RLS DEV - Overview

Dialog window: **Method ► RLS DEV ► Properties... ► RLS DEV - 'Device name'**

Command to **release a device** for using it in other parallel running methods. It removes the reservation made by the current method.

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **RLS DEV** are configured in the following dialog window:

- *RLS DEV - Properties*

Command variables

The following command variables are generated in the method run by the command **RLS DEV** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.7.10.2 RLS DEV - Properties

Dialog window **Method ▶ RLS DEV ▶ Properties... ▶ RLS DEV - 'Command name''**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**'Sample changer types'** | **814 USB Sample Processor**
Default value	**814 USB Sample Processor**

5.6.8 Result commands

5.6.8.1 Result commands - Overview

Menu item: **Method ► Paste ► New command... ► Results**

Commands for the **calculation, storage and output of results**.

The following four result commands can be selected:

- *CALC - Overview*
  Calculation of intermediate and end results, titer values and common variables.
- *DATABASE - Overview*
  Storage of the determination data in data bases.
- *REPORT - Overview*
  Output of a report defined by a report template.
- *EXPORT - Overview*
  Export of determination data.

5.6.8.2 CALC

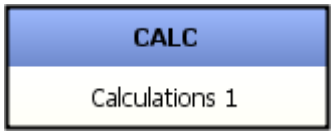
5.6.8.2.1 CALC - Overview

Dialog window: **Method ► CALC ► Properties... ► CALC - 'Command name'**

Command for the **calculation of intermediate and end results** and the assignment of titer values and common variables.

Appearance

The command has the following appearance:



Calculation overview

All defined results are displayed in a table in the properties window of the command **CALC**.

Result parameters

The parameters for the individual results are configured on the following 3 tabs:

- *Definition*
  Entering the formula, assigning the unit and switching the statistics on/ off.
- *Monitoring*
  Settings for result monitoring.
- *Options*
  Saving the result as common variable or as titer.

Command variables

The following command variables are generated in the method run by the command **CALC** and can be used in formulas under the designation **'Command name.Variable designation'**:

Designation	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

Result variables

The following result variables are defined in the **CALC** command and can be used in formulas under the designation **'RS.ResultName.Variable designation'**:

Designation	Description
.VAL	Result value, optional, i.e. **'RS.RS01'** = **'RS.RS01.VAL'**
.ASD	Absolute standard deviation for the result
.MAX	Maximum value of the result
.MIN	Minimum value of the result
.MNV	Mean value of the result

Designation	Description
.NSR	Statistics actual counter for the result
.NST	Statistics setpoint counter for the result
.OVF	Limit value violation for result; **1 = limit exceeded**, **0 = limit not exceeded**
.RSD	Relative standard deviation for the result
.STS	Statistics status for the result; **1 = Statistics on**, **0 = Statistics off**
.UNI	Result unit (**Text**)
.SLO	Slope for the linear regression (result vs. sample size)
.ITC	Axis intercept for the linear regression (result vs. sample size)
.COR	Correlation coefficient for the linear regression (result vs. sample size)

5.6.8.2.2 CALC - Calculation overview

Dialog window: **Method ► CALC ► Properties... ► CALC 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Moves the selected result upward (changes the sequence).

Moves the selected result downward (changes the sequence).

[New]

Open the dialog window **New result** in order to select a new template *(see chapter 5.6.8.2.3, page 1246)*.

[Properties]

Open the dialog window **Result - 'Result name'** in order to edit the properties of the result selected in the table *(see chapter 5.6.8.2.5.1, page 1249)*.

[Delete]

Delete the result selected in the table.

[Templates]

Open the dialog window **Manage templates** in order to delete or rename result templates *(see chapter 5.6.8.2.6.1, page 1255)*.

Table

Up to 25 results can be defined in the **CALC** command which are displayed in the calculation overview. The overview table, which cannot be directly edited , contains the following information about the results:

Result name

Name of the result.

Formula

Calculation formula of the result.

Unit

Result unit.

Decimal places

Number of decimal places of the result.

Assignment

Assignment of the result to one of the 25 result columns in the determination overview.

Statistics

Display whether the statistics calculation for the result is switched on or off.

Result monitoring

Display whether the monitoring for the result is switched on or off.

5.6.8.2.3 CALC - New result

Dialog window **Method ▶ CALC ▶ [New] ▶ New result**

A template for the new result can be selected in this dialog window.

Templates

Selection of a result template as the basis for a new result.

Selection	**'Result template'** | **Empty**
Default value	**Empty**

'Result template'
Loads a saved result template. Pressing **[Continue >>]** causes the dialog window **Formula Assistant** to open *(see chapter 5.6.8.2.4, page 1247)*.

Empty
Loads an empty result template. Pressing **[Continue >>]** causes the dialog window **Result - 'Result name'** to open afterwards *(see chapter 5.6.8.2.5.1, page 1249)*.

Description

Displaying the description of the selected result template.

5.6.8.2.4 CALC - Formula assistant

Dialog window **Method ► CALC ► [New] ► New result ► Formula assistant**

Existing calculation templates can be adapted quickly in this dialog window to the required command identifications.

Formula

Display of the calculation formula of the result. In this formula, only the variable identifications themselves will be listed for command variables, and not the command designations.

Selecting a command

All of the variables of the formula template will be listed which are generated by a command.

'Variable'

Assignment of the command to variables.

Selection	**'Command name'**

'Command name'
Selection of a command suitable for the variable which is already present in the method.

[Filling command variables]

Transfer of command names of the selected variable to all command variables. Command names that were already entered will be overwritten.

Selecting a method variable

All of the method variables of the formula template will be listed.

'Variable'

Selection of the method variable.

Selection	**'Method variable'**

'Method variable'
Selection of a method variable defined in the method.

Selecting a common variable

All of the common variables of the formula template will be listed.

'Variable'

Selection of the common variable.

Selection	**'Common variable'**

'Common variable'
Selection of one of the common variables defined in the configuration.

Selecting a global variable

All of the global variables of the formula template will be listed.

'Variable'

Selection of the global variable.

Selection	**'Global variable'**

'Global variable'
Selection of one of the global variables defined in the configuration.

Selecting a result variable

All of the result variables of the formula template will be listed.

'Variable'

Selection of the result variable.

Selection	**'Result variable'**

'Result variable'
Selection of a result variable defined in the method.

Entering a constant

All of the constants of the formula template will be listed.

'Constant'

Entering the constants.

Input range	**-1.0E99 to 1.0E99 (max. 15 places)**
Default value	**'empty'**

Open the molar mass calculator for entering molar masses *(see chapter 2.4.5, page 84)*.

5.6.8.2.5 CALC - Result properties

5.6.8.2.5.1 Result - Definition

Tab: **Method ► CALC ► Properties... ► [New] ► [Continue] ► Result - Definition**

The result calculation is defined on this tab.

Result name

Name of the result. This name will be shown in the result view as well as in the report. The result name can be used in further calculations as variable **RS.Result name.VAL**.

Entry	**50 characters**
Default value	**Res01 … Res025**

Formula

Display of the calculation formula of the result. The formula editor to enter the calculation formula is opened with a click on or by double-clicking in the window in which the formula can be entered *(see chapter 2.4, page 24)*. The result of the calculation formula defines the result type (**Number**, **Text** or **Date/time**).

Entry	**1000 characters**

Unit

Unit of the result for the output (text only). The unit can be used in further calculations as variable **'RS.Result name.UNI'**.

Entry	**16 characters**
Selection	**empty** | **ppm** | **%** | **g/L** | **mg/L** | **mg/mL** | **mg/100 g** | **mol/L** | **mmol/L** | **mL** | **µL** | **g** | **mg** | **µg** | **°C** | **s** | **mV** | **µA** | **S/cm** | **mS/cm** | **µS/cm** | **µL/min** | **nm**
Default value	**empty**

Decimal places

Number of decimal places for the output of the calculated result. This parameter is ignored for results of the type **text** or **date/time**.

Input range	**0 to 5**
Default value	**2**

Assignment

Assigns the result to one of the 25 possible result columns **RS01 … RS25** in the determination overview in which the result is entered.

Selection	**RS01 … RS25** | **first unallocated result variable** | **none**
Default value	**first unallocated result variable**

none
The result will be assigned to no result column and displayed only in the subwindow **Results** .

NOTICE

The assignments **RS01 … RS25** can be used repeatedly in various **CALC** commands. If this is the case, then only the last result calculated will be entered in the assigned result column. By doing this it is possible either to display alternative results calculated in different **CALC** commands in the same result column or to use the same report template.

CAUTION

If the same **Assignment** is reused in several CALC commands with different **Result names**, then only the most recently calculated result will be saved in the determination. All other results are either no longer available or invalid if used in other formulas!

Statistics

on | off (Default value: **on**)

Mean value, absolute and relative standard deviations are calculated for the result if this option is enabled. Statistical calculations are only carried out if statistics is also activated in the **START** command and in the Run window.

Description

Freely selectable entry of a description of the result.

Entry	**1024 characters**

[Save as template]

Open the dialog window **Save result template** in order to save the result parameters as template for the creation of new results *(see chapter 5.6.8.2.6.2, page 1255)*.

5.6.8.2.5.2 Result - Monitoring

Tab: **Method ► CALC ► Properties... ► [New] ► [Continue] ► Result - Overview**

The parameters for monitoring the result are defined on this tab.

Result monitoring

Result monitoring

on | off (Default value: **off**)

The question of whether the result is within the defined limit values is monitored while calculating the result during the determination if this option is enabled.

Lower limit

Lower limit for the result.

Entry	**10 digits**

Upper limit

Upper limit for the result.

Entry	**10 digits**

Message

Message

The message defined here can be put out to different targets if the upper limit is exceeded or if the lower limit is not reached. The text editor for entering or changing the message is opened with or by double-clicking into the text field *(see chapter 2.5.2, page 85)*. The formula editor can also be called up inside the text field *(see chapter 2.4, page 24)*.

Entry	**Text (unlimited)**

Display message

on | off (Default value: **on**)

If this option is enabled, all active tracks are stopped and the message defined in the text box will be displayed in the event that the limits are exceeded. You can select whether you want to continue the stopped tracks with **[Continue]** or - if defined - to execute the **Action** listed below.

Record message

on | off (Default value: **on**)

If this option is enabled, the message defined in the text box will be documented in the determination if the limits are exceeded. The run will not be stopped.

Message by E-mail

on | off (Default value: **off**)

If this option is enabled, the message defined in the text box will be sent to the address defined under **[E-mail]** in the event that the result limits are exceeded.

[E-mail]

Opens the dialog window Send E-mail for defining the E-mail parameters *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above when a limit is exceeded.

Action

Action

on | off (Default value: **off**)

If this option is enabled, one of the following actions will be executed in the event that limit values are exceeded.

Selection	**Cancel determination** | **Stop determination and series**
Default value	**Cancel determination**

Cancel determination
The determination is stopped and the next determination of the series is started.

Stop determination and series
Both the determination and the series are stopped.

[Save as template]

Open the dialog window **Save result template** in order to save the result parameters as template for the creation of new results *(see chapter 5.6.8.2.6.2, page 1255)*.

5.6.8.2.5.3 Result - Options

Tab: **Method ► CALC ► Properties... ► [New] ► [Continue] ► Result - Options**

The assignment of the result to a common variable, a global variable or a titer can be activated on this tab.

Save result as common variable

on | off (Default value: **off**)

The result will be saved under the selected name as common variable if this option is activated *(see chapter 6.9.1, page 1448)*. In all cases, only the single value for this result will be saved as a common variable, even if the statistics are enabled for this result.

Common variable

The result is saved as new value for this common variable.

Selection	**List of all the common variables defined**

NOTICE

As long as no common variable has been defined, the list box will be empty. The creation of common variables is described in the configuration *(see chapter 6.9.1, page 1448)*.

NOTICE

If common variables are used in a **CALC** command, then they will only be requested at the start of the determination. This means that it is not possible to write Common variables during a determination and then use the modified value in a different formula. For this you should use Method variables *(see chapter 2.4.3.2, page 28)*.

Save result as titer

on | off (Default value: **off**)

If this option is enabled, then the result will be saved as a titer under the selected name. If statistics is activated for this result, then the current mean for this result will automatically be saved as titer.

Solution name

Name of the solution for which the result is to be saved as titer.

Selection	**List of all the solutions defined**

NOTICE

If no solutions have been defined, then the selection box will be empty. The creation of solutions is described in the configuration *(see chapter 6.6.1, page 1386)*.

Save result as global variable

on | off (Default value: **off**)

The result will be saved under the selected name as global variable if this option is activated *(see chapter 6.10, page 1457)*. In all cases, only the single value for this result will be saved as a global variable, even if the statistics are enabled for this result.

Global variable

The result is saved as new value for this global variable.

Selection	**List of all the global variables defined**

NOTICE

If no global variables have been defined, then the selection box will be empty. The creation of global variables is described in the configuration *(see chapter 6.10, page 1457)*.

NOTICE

For global variables which are newly calculated during a determination in a **CALC** command and which are saved in the configuration, the current values are available for additional calculations in the same determinations from this instant. This is not the case for determinations running at the same time on other workplaces; here, the values available at the start of the determination are applied.

[Save as template]

Open the dialog window **Save result template** in order to save the result parameters as template for the creation of new results *(see chapter 5.6.8.2.6.2, page 1255)*.

5.6.8.2.6 CALC - Result templates

5.6.8.2.6.1 Manage result templates

Dialog window: **Method ► CALC ► Properties... ► [Templates]**

Result templates can be renamed and deleted in the **Managing templates** dialog window.

Templates

A result template can be renamed or deleted.

Selection	**'Result templates'** | **'empty'**
Default value	**'empty'**

Description

Displaying the description of the selected result template.

[Rename]

Renames the selected result template.

[Delete]

Deletes the selected result template.

5.6.8.2.6.2 Save result template

Dialog window: **Method ► CALC ► Properties... ► [New] ► [Continue] ► [Save as template] ► Save result template**

Name of result template

The result template is saved under this name in the configuration database.

Entry	**100 characters**
Default value	**'Result name'**

Description

Freely definable description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

Entry	**1000 characters**

5.6.8.2.6.3 Rename result template

Dialog window: **Method ► CALC ► Properties... ► [Templates] ► [Rename] ► Rename result template**

Name of result template

New name under which the result template is saved globally in the configuration database.

Entry	**100 characters**
Default value	**'Name of result template'**

Description

Freely definable description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

Entry	**1000 characters**

5.6.8.3 DATABASE

5.6.8.3.1 DATABASE - Overview

Dialog window: **Method ▶ DATABASE ▶ Properties... ▶ DATABASE - 'Command name'**

Command for the storage of determination data in one or more **databases**.

NOTICE

Several **DATABASE** commands can be inserted in a method, but only one **DATABASE** command may be processed in a determination, otherwise the determination will be stopped.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **DATABASE** are configured in the following dialog window:

- *DATABASE - Properties*
  All the defined databases in the list of databases are displayed in the properties window of the command **DATABASE**.

Command variables

The following command variables are generated in the method run by the command **DATABASE** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.8.3.2 DATABASE - Properties

Dialog window: **Method ► DATABASE ► Properties... ► DATABASE - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

List of databases

A **DATABASE** command can define more than one database in which the determination data are stored which are available for the execution of the DATABASE command. If several databases are defined, the determination is stored with the same determination ID in each database.

Database

Name of the database in which the determination data is stored.

[New]

Opens the dialog window **Database - New** for the selection of a new database.

[Properties]

The dialog window **Database - 'Database name'** in which a different database can be selected.

[Delete]

Deletes the database selected in the list.

NOTICE

The **DATABASE** command has to be executed at the end of the method sequence in order to guarantee that all data of a determination are stored. If the method contains an exit track, it would be best to insert the **DATABASE** command at the end of this track.

5.6.8.4 REPORT

5.6.8.4.1 REPORT - Overview

Dialog window: **Method ► REPORT ► Properties... ► REPORT - 'Command name'**

Command for the **output of determination data**.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **REPORT** are configured in the following dialog window:

- *REPORT - Properties*

NOTICE

A **REPORT** command must always be placed before a **DATABASE** command, because otherwise the command data (e.g., the report template used) will not be stored and no reprocessing will be possible .

Command variables

The following command variables are generated in the method run by the command **REPORT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Designation	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.8.4.2 REPORT - Properties

Dialog window: **Method ► REPORT ► Properties... ► REPORT - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Report template

Report template

Selection of the predefined report template with which the report should be generated.

Selection	**'Report templates'**

Report output

Printer

on | off (Default value: **on**)

The report is printed on the selected printer if this option is activated.

Selection	**'Printer name'** | **Default printer**
Default value	**Default printer** The report will be printed on the default printer defined for the client.

PDF file

on | off (Default value: **off**)

The report is stored as PDF file in the directory selected if this option is activated. A click on ... opens the dialog window **Save**, in which the desired directory is selected and a name for the PDF file can be entered.

Send E-mail

on | off (Default value: **off**)

The PDF file is additionally sent to the E-mail address defined under **[E-mail...]** if this option is activated.

[E-mail...]

Open the window **Send E-mail** for defining the E-mail parameters *(see chapter 2.6.1, page 87)*.

5.6.8.5 EXPORT

5.6.8.5.1 EXPORT - Overview

Dialog window: **Method ► EXPORT ► Properties... ► EXPORT - 'Command name'**

Command for the **Exporting determination data**.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **EXPORT** are configured in the following dialog window:

- *EXPORT - Properties*

Command variables

The following command variables are generated in the method run by the command **EXPORT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.8.5.2 EXPORT - Properties

Dialog window: **Method ► EXPORT ► Properties... ► EXPORT - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Export template

Export template

List box with saved export templates with which the determination data is to be exported *(see chapter 4.4.4.1, page 254)*.

Selection	**'Export template'**

5.6.9 Communications commands

5.6.9.1 Communications commands - Overview

Menu item: **Method ► Paste ► New command... ► Communication**

Commands for communications within the program or with external devices.

The following Communications commands can be selected:

- *CTRL*
  Setting remote output lines.
- *SCAN*
  Scanning remote input lines.
- *SEND*
  Sending event messages
- *RECEIVE*
  Waiting for event messages or status messages.
- *TRANSFER*
  Data transfer via RS-232 to external devices.
- *WEIGH*
  Call up of a weight from a balance.

5.6.9.2 CTRL

5.6.9.2.1 CTRL - Overview

Dialog window: **Method ► CTRL ► Properties... ► CTRL - 'Command name'**

Command for **Setting remote output lines**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 702*, 716*, 718*, 719*, 720*, 721*, 736*, 751, 758, 784, 785, 794*, 795, 798, 799 (* devices with only 3 output lines)

Dosing Interface: 846

Titrotherm: 859

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Spectrometer: Avantes

Appearance

The command has the following appearance:

Parameters

The parameters for the command **CTRL** are configured in the following dialog window:

- *5.6.9.2.2CTRL - Properties*

Command variables

The following command variables are generated in the method run by the command **CTRL** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.9.2.2 CTRL - Properties

Dialog window: **Method ► CTRL ► Properties... ► CTRL - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Remote box

Selection of a remote box attached to the device.

Titrando, 855, 856, 867, 814, 815, 864, 874

Selection	**1** | **2** | **3** | **4**
Default value	**1**

Set lines

Output signal

Input of the binary pattern for the output signal or selecting a predefined signal pattern.

It is possible to enter the following characters:

0 = line inactive

1 = line active

***** = any line status

p = set pulse (pulse length = 200 ms). If an impulse with a different length is to be emitted, a corresponding template must be defined.

Titrando, 855, 856, 867, 751, 756, 758, 784, 785, 795, 798, 799, 831, Sample Processor

Selection	**Bit-pattern with exactly 14 characters (0, 1, *, p)** | ****************** | **Signal pattern**
Default value	******************

702, 716, 718, 719, 720, 721, 736, 794

Selection	**Bit-pattern with exactly 8 characters (0, 1, *, p)** | ************ | **Signal pattern**
Default value	************

Spectrometer	
Selection	**Bit-pattern with exactly 10 characters (0, 1, *, p) | ********** | Signal pattern**
Default value	**********

The bits are numbered from right to left:

Output	13 12 11 10 9 8 7 6 5 4 3 2 1 0
Bit	13 12 11 10 9 8 7 6 5 4 3 2 1 0

Example:

**************1*** sets the output line 1 to enabled (= set), which would result in a stop command for a connected Titrino, for example.
**************0*** sets the line to inactive.

NOTICE

We recommend masking the irrelevant output lines with an asterisk ***** so as not to modify these line conditions.

NOTICE

For Titrinos with 3 output lines: only the first 3 characters are used.

5.6.9.3 SCAN

5.6.9.3.1 SCAN - Overview

Dialog window: **Method ▶ SCAN ▶ Properties... ▶ SCAN - 'Command name'**

Command for **scanning remote input lines**.

Devices

This command can be executed only with the following devices:

Titrando: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Dosing Interface: 846

Titrotherm: 859

Coulometer: 756, 831

Conductometer: 856

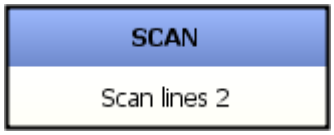
pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SCAN** are configured in the following dialog window:

- *SCAN - Properties*

Command variables

The following command variables are generated in the method run by the command **SCAN** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.TOU	Timeout status: **1 = Timeout expired**; **0 = Timeout not expired**

5.6.9.3.2 SCAN - Properties

Tab: **Method ▶ SCAN ▶ Properties... ▶ SCAN - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **Titrando**
Default value	**Titrando**

Remote Box

Selection of the Remote Box at which the lines are to be scanned.

Titrando, 856, 867, 814, 815, 855, 864, 874

Selection	**1** | **2** | **3** | **4**
Default value	**1**

Scan lines

Input signal

Input of the binary pattern for the expected input signal or selecting a pre-defined signal pattern.

It is possible to enter the following characters:

0 = line inactive

1 = line active

***** = any line status

Selection	**Bit-pattern with 8 characters (0, 1, *)** | ************ | **Signal pattern**
Default value	************

The bits are numbered from right to left:

Input	7 6 5 4 3 2 1 0
Bit	7 6 5 4 3 2 1 0

Example:

*********1** expects an active input line 0 (**1** = set). For example, this line is set by a Titrino after a titration has been completed and the Titrino can accept a start signal again.

NOTICE

Input lines that are of no interest or for which no defined condition can be predicted should also be masked with an asterisk *****.

Max. waiting time

on | off (Default value: **off**)

If this option is activated, then a maximum waiting time can be entered for the input signal.

Input range	**0.0 to 9999.9**
Default value	**10.0**

Selection	**min** | **s**
Default value	**min**

NOTICE

If the option **Max. waiting time** is not activated, it is being waited endlessly for the input signal.

5.6.9.4 SEND

5.6.9.4.1 SEND - Overview

Dialog window: **Method ▶ SEND ▶ Properties... ▶ SEND - 'Command name'**

Command for **Sending event messages** to commands, tracks or to *tiamo*.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **SEND** are configured in the following dialog window:

- *SEND - Properties*

Command variables

The following command variables are generated in the method run by the command **SEND** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.9.4.2 SEND - Properties

Dialog window: **Method ▶ SEND ▶ Properties... ▶ SEND - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

All the Event messages listed in the table are sent simultaneously. The table cannot be edited directly.

NOTICE

A maximum of 10 event messages can be entered.

[New]

Opens the dialog window **Send event message** for entering a new event message *(see chapter 5.6.9.4.3, page 1269)*.

[Properties]

Opens the dialog window **Send event message** to edit the event message selected in the table *(see chapter 5.6.9.4.3, page 1269)*.

[Delete]

Deletes the selected event message.

5.6.9.4.3 SEND - Send event message

Dialog window: **Method ► SEND ► Properties... ► [New]/ [Properties] ► Send event message**

Receiver

Selection of the type of receiver.

Selection	**System** | **Command**
Default value	**System**

Selection

Selection of the receiver address. All of the command names already defined in the method are available for **Receiver** = **Command**. This field is empty and cannot be edited for **Receiver** = **System**.

Selection	**'Command name'** | **'empty'**
Default value	**'empty'**

Event message

Selection of the event message to be sent. The following event messages can be selected depending on the type of receiver:

System

Selection	**Quit** | **Hold** | **Stop**
Default value	**Quit**

Command

Selection	**Quit** | **Hold** | **Continue** | **Start Titration**
Default value	**Quit**

Receiver	Selection	Event message	Significance
System	-	**Hold**	Hold determination (all tracks). This corresponds to the **[Hold]** button in the dialog window **Run** in the program part **Workplace**.
System	-	**Quit**	Cancel determination (Series continues).
System	-	**Stop**	Stop determination and series. This corresponds to the **[Stop]** button in the dialog window **Run** in the program part **Workplace**.

Receiver	Selection	Event message	Significance
Command	All track commands	**Hold**	Hold selected track.
Command	All track commands	**Continue**	Continue selected track.
Command	All track commands	**Quit**	Cancel selected track. If the selected track contains a command being conditioned, conditioning is only stopped if the option **Automatic conditioning** is disabled in the command **START**.
Command	All commands	**Hold**	Hold selected command. Also valid for conditioning.
Command	All commands	**Continue**	Continue selected command. Also valid for conditioning.
Command	All commands	**Quit**	Cancel selected command. If the selected command is being conditioned, conditioning is only stopped if the option **Automatic conditioning** is disabled in the command **START**.
Command	SET, KFT, KFC	**Start Titration**	Start titration. For this, the option **Only start titration by a start command from a SEND command** must be enabled on the **Conditioning** tab for the titration command (Example: **KFT**).

NOTICE

In order that the event message from the **SEND** command can be handled by the **RECEIVE** command, the RECEIVE command must be running and at the same time be able to process the message being sent. If, for example, a **SEND** command in track A should start a **KFT** command in track B by means of **Start titration**, then track B must be running and the conditioning in the **KFT** command must already be finished (= **Cond ok**) at the time that the **SEND** command is being executed. Otherwise the command **Start titration** would be discarded without a message.

Comment

Comment on the event message

Entry	**Text (unlimited)**
Default value	**'empty'**

5.6.9.5 RECEIVE

5.6.9.5.1 RECEIVE - Overview

Dialog window: **Method ► RECEIVE ► Properties... ► RECEIVE - 'Command name'**

Command for **awaiting event messages or status messages** produced by commands.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **RECEIVE** are configured in the following dialog window:

- *RECEIVE - Properties*

Command variables

The following command variables are generated in the method run by the command **RECEIVE** and can be used in formulas under the designation **'Command name.Variable designation'**:

Designation	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) = Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**
.TOU	Timeout status: **1 = Timeout expired**; **0 = Timeout not expired**

5.6.9.5.2 RECEIVE - Properties

Dialog window: **Method ▶ RECEIVE ▶ Properties... ▶ RECEIVE - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Wait for event/status

Selection	**Wait until all conditions are met** | **Wait until one of the conditions is met**
Default value	**Wait until all conditions are met**

Wait until all conditions are met
Waits until **all** conditions listed in the table are fulfilled.

Wait until one of the conditions is met
Waits until **one** of the conditions listed in the table is fulfilled.

[New]

Open the dialog window **Wait for event/status** for entering a new event message which is to be waited for *(see chapter 5.6.9.5.3, page 1273)*.

NOTICE

A maximum of 10 event messages can be entered.

[Properties]

Open the dialog window **Wait for event/status** to edit the event message selected in the table which is to be waited for *(see chapter 5.6.9.5.3, page 1273)*.

[Delete]

Delete the selected event message.

Max. waiting time

on | off (Default value: **off**)

If this option is activated, then a maximum waiting time for event messages can be entered. If none of the conditions defined above are fulfilled after this time period, the command is canceled and the next command in the sequence is executed.

Value

Input range	**0 to 9999.9**
Default value	**0**

Unit

Selection	**s** | **min**
Default value	**min**

Message

This message is displayed in the live window while waiting for the condition defined above. The text editor for entering or changing the message is opened with or by double-clicking into the text field.

5.6.9.5.3 RECEIVE - Wait for event/status

Dialog window: **Method ► RECEIVE ► Properties... ► [New]/[Properties] ► Wait for event/status**

Command

Name of the command whose event message or status is to be waited for.

Selection	**Command**

Event message

Selection of the event message to be waited for, or of the status to be waited for. The following event messages and statuses can be selected.

Selection	**Event message** | **Start**
Default value	**Start**

The following event messages and statuses can be selected:

Event/ Status	Type	Significance	Commands
Start	Event	The command has just now been started.	All
End	Event	The command has just now been ended.	All

Event/ Status	Type	Significance	Com-mands
Dosing	Event	The dosing of the titration has just now been started.	**DET**, **MET**
Measure	Event	The measurement of the titration has just now been started.	**DET**, **MET**
Busy	Status	System is in status **BUSY**, **HOLD** or **ERROR**.	All
Finished	Status	The command is ended. In the event that the command is run through several times (e.g. within a LOOP), the status **FINISHED** will be set already after the first time the command is ended.	All
Cond	Status	The command is currently in Conditioning status (**COND BUSY** or **COND HOLD**); the **Start drift** has not yet been reached.	**SET**, **KFT**, **KFC**
Condok	Status	System is in Conditioning status (**COND READY**); the **Start drift** has been reached.	**SET**, **KFT**, **KFC**

NOTICE

An event can only be received as such if the **RECEIVE** command has been activated at the time of the event, i.e. it must have been started prior to the respective event. The occurrence of an event is sent as a system message, only "listeners" who are already active will receive this, because it is not saved. A **status**, on the other hand, can be queried at any time.

Comment

Comment on the event message

Entry	**Text (unlimited)**
Default value	**'empty'**

5.6.9.6 TRANSFER

5.6.9.6.1 TRANSFER - Overview

Dialog window: **Method ► TRANSFER ► Properties... ► TRANSFER - 'Command name'**

Command for **data transfer via RS-232** to external devices.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **TRANSFER** are configured in the following dialog window:

- *TRANSFER - Properties*

Command variables

The following command variables are generated in the method run by the command **TRANSFER** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.TOU	Timeout status: **1 = Max. waiting time expired**; **0 = Max. waiting time not expired**

5.6.9.6.2 TRANSFER - Properties

Dialog window: **Method ► TRANSFER ► Properties... ► TRANSFER - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**Device types** | **RS-232 device**
Default value	**RS-232 device**

Transfer commands

The **Transfer commands** defined in the dialog window are sent in the sequence in which they are listed. The table cannot be edited directly.

NOTICE

10 transfer commands can be entered at maximum.

Moves the selected command up (changes the sequence).

Moves the selected command down (changes the sequence).

[New]

Opens the dialog window **Transfer command** for entering a new transfer command *(see chapter 5.6.9.6.3, page 1277)*.

[Properties]

Opens the dialog window **Transfer command** for editing the transfer command selected in the table *(see chapter 5.6.9.6.3, page 1277)*.

[Delete]

Deletes the selected transfer command.

Timeout

on | off (Default value: **off**)

If this option is activated, then a maximum waiting time can be entered. If not all transfer commands have finished after this time period, the command is canceled and the next command is started.

Input range	**0 to 9999.9**
Default value	**1**

Selection	**min** | **s**
Default value	**s**

5.6.9.6.3 TRANSFER - Transfer command

Dialog window: **Method ► TRANSFER ► Properties... ► Transfer command**

Name

Freely definable name for the transfer command.

Entry	**50 characters**

Action

Selection	**Read** | **Write** | **Wait for** | **Poll**
Default value	**Read**

Read
The character string defined in **Command** (optional) will be sent to the device and the answer of the device is expected within the **Timeout** defined for the device settings and evaluated.

Write
The character string defined in **Command** (optional) will be sent to the device.

Wait for
The character string defined in **Command** (optional) will be sent to the device, after which there is a waiting period until a received character string corresponds to the regular expression in **Comparison**. If this answer is not received within the **Timeout** defined in the command, then the command is canceled.

Poll
The character string defined in **Command** (optional) will be sent to the device; an answer is expected from the device and evaluated within the **Timeout** defined for the device settings. This action will be repeated until the answer of the device is identical to the regular expression in **Comparison**. If this answer is not received within the **Max. waiting time** defined in the command, then the command is canceled.

Command

Character string to be sent to the device. Details can be obtained from the documentation for the respective device.

Entry	**250 characters**

NOTICE

All ASCII characters can be entered with its two-digit hex code after backslash (e.g. **\1B** = **Escape**).

Variable

Selection of an available method variable under which the received data for the **Actions Read**, **Wait for** and **Scan** will be saved. Method variables must be defined in the **START** command for this purpose which are not permitted to be assigned to any system variables.

Selection	**Method variables**

NOTICE

It is also possible to create several indexed variables (e.g. **Input1**, **Input2**, …) in order to save the character substrings produced by regular expressions directly in the different variables.

Example

Variable = **MV.Input1**

Comparison = **(\d+\.\d+),(\d+\.\d+)**

Two measured values separated by a semicolon are filtered out of a random, received character string and saved in the two variables **MV.Input1** and **MV.Input2**.

Comparison

Entry of a character string which should be compared to the data received by one of the **Actions Read**, **Wait for** and **Scan**. In this field so-called

Regular Expressions can be entered. You can use these exactly defined search patterns to interpret the received character strings and save contents from this strings in a method variable. Regular Expressions are widely used in computer science (operating systems UNIX or LINUX, script languages PERL, etc.) and are standardized to a great extent. *tiamo* uses **Extended Regular Expressions** in accordance with **Java** to their full extent (for details, see e.g. *http://en.wikipedia.org/wiki/Regular_expression*).

Entry	**100 characters**

Examples for Regular Expressions:

Expression	Significance	Example
[abc]	OR function for single characters	receive **a** or **b** or **c**
[a-z0-9]	one character in the specified range	**m** or **5**
(hallo)	substring	string contains **hallo**
^hallo	start of line	**hallo** is at start of line
hallo$	end of line	**hallo** is at end of line
.	any single character	**a** or **4** or **-** or …
\.	point	**.**
\d	one digit	**3**
\d+	several digits	**324567**
\d{4}	four digits	**3143**
\D	not one digit	**A** or **!** or …
\w	a digit or a letter	**a** or **3**
\W	neither digit nor letter	**!** or **.**
.*	any character string	**abcd** or **41** or **-$=$** or …

Any combination of regular expressions is possible.

NOTICE

Open and close brackets must be set in the field **Comparison** in any case in order to save the received data in a variable. Therefore, to save a complete character string in a variable, the expression **(.*)** must be entered in the field Comparison.

5.6.9.7 WEIGH

5.6.9.7.1 WEIGH - Overview

Dialog window: **Method ▶ WEIGH ▶ Properties... ▶ WEIGH - 'Command name'**

Command for **calling up the weight from a balance**.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **WEIGH** are configured in the following dialog window:

- *WEIGH - Properties*

Command variables

The following command variables are generated in the method run by the command **WEIGH** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.TOU	Timeout status: **1 = Max. waiting time expired**; **0 = Max. waiting time not expired**

5.6.9.7.2 WEIGH - Properties

Dialog window: **Method ▶ WEIGH ▶ Properties... ▶ WEIGH - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	**'Device name'** | **not defined**
Default value	**not defined**

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	**AND** | **Mettler** | **Ohaus** | **Precisa** | **Sartorius** | **Shimadzu**
Default value	**Precisa**

Weighing command

Instructions

Character string that is sent via the RS-232 interface.

AND

Entry	**S**

Mettler

Entry	**S**

Ohaus

Entry	**1S**

Precisa

Entry	**P1**

Sartorius

Entry	**\1bP**

Shimadzu	
Entry	**ID08**

Max. waiting time

Maximum time during which the balance data is waited for.

Value

Input range	**0.0 to 9999.9**
Default value	**1**

Device

Selection	**min** | **s**
Default value	**min**

5.6.10 Various commands

5.6.10.1 Various commands - Overview

Menu item: **Method ▶ Insert ▶ New command...**

Various commands that can be used independently of the connected instruments.

The following commands can be selected:

- *REQUEST*
  Scans sample data.
- *CALL*
  Calling tracks (subprograms).
- *LOOP*
  Multiple execution of a command sequence.
- *WAIT*
  Stops the method run.
- *SEQUENCE*
  Combines several commands to one command.

5.6.10.2 REQUEST

5.6.10.2.1 REQUEST - Overview

Dialog window: **Method ▶ REQUEST ▶ Properties... ▶ REQUEST - 'Command name'**

Command for **requesting sample data** during the method run. The data can either be entered manually or sent by a peripheral device (balance, barcode reader).

Appearance

The command has the following appearance:

Parameters

The parameters for the command **REQUEST** are configured in the following dialog window:

- *REQUEST*

Command variables

The following command variables are generated in the method run by the command **REQUEST** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.10.2.2 REQUEST - Properties

Dialog window: **Method ► REQUEST ► Properties... ► REQUEST - Data input #**

Command name

Name of the command.

Entry	**25 characters**

Sample data request

The sample types that are not to be entered until after the determination starts can be selected In the dialog window **REQUEST - Data input #**. The dialog window **Sample data request,**, in which the sample parameters selected in the command are to be queried, appears in the method run during the execution of the command. The run is stopped until the input is confirmed.

NOTICE

If the **run should not be stopped** (for example for back-weighing in KF titrations), the **REQUEST** command must be inserted in a track other than the one with the titration command with the option **Return immediately**.

Sample position

on | off (Default value: **off**)

If this option is enabled, then the position of the sample on the rack will be queried.

ID1 ... ID16

on | off (Default value: **off**)

If this option is enabled, then the sample identifications **ID1 ... ID16** will be requested. If other names were assigned to this variables in the **START** command, these these names will be displayed in the dialog window **Sample data request**.

NOTICE

Text is selected as type in the default settings for the sample identifications **ID1 ... ID16**. If you wish to enter numbers for these method variables for use in later calculations, then these variables must be switched in the dialog window **Method variable - Sample position** to the type **number**. **START ► Properties... ► Method variables ► [Properties] ► Method variables - Sample position**

Sample size

on | off (Default value: **off**)

If this option is switched on, then the sample size will be queried.

Sample size unit

on | off (Default value: **off**)

If this option is switched on, then the sample size unit will be queried.

Message

on | off (Default value: **off**)

If this option is enabled, then the message defined here will appear in the dialog window **Sample data request** in which the sample data is quer-

ied during the method run *(see chapter 5.6.10.2.3, page 1285)*. The text editor for entering or changing the message is opened with T or by double-clicking into the text field *(see chapter 2.5.2, page 85)*.

Entry	**Text (unlimited)**

NOTICE

In the event the option **Comments on modification of sample data (live)** is enabled in the **Security settings**, the dialog window **Modification comment sample data** will be displayed after the sample data is entered, where a **Comment** and a **Reason** for the modification must be entered.

5.6.10.2.3 REQUEST - Sample data request

Dialog window: **Workplace ► [START] ► Sample data request**

Message

Displaying the message defined in the command **REQUEST**.

Sample position

Position of the sample on the Sample Processor rack. This number can be used for moving to a sample position with the command **MOVE** when **Target position** = **Sample position**.

Input range	**1 to 999**
Default value	**1**

ID1 ... ID16

Sample identifications.

Type = Number

Input range	**-1.0E-99 to 1.0E99**

Type = Text

Entry	**max. 100 characters**

Type = Date/Time

Selection	**'YYYY-MM-DD' or 'YYYY-MM-DD hh:mm:ss'**

NOTICE

If the sample identifications are still invalid at the start of the method and are not entered until the time of the **REQUEST** command during the run, then the option **Check at start** in the **START** command must be **switched off** for these method variables.

Sample size

Sample size (initial weight).

Entry	**1 ... 10 digits.**
Default value	**1**

Device

Unit of sample size.

Selection	**g** | **mg** | **µg** | **mL** | **µL** | **pcs**
Default value	**g**

NOTICE

Sample data can be loaded directly from a **balance** or a **barcode reader**. The **data import** must be enabled for this purpose in the Run window in which the determination is started (**Single determination** or **Determination series**) and the corresponding devices must be defined. The dialog window **Sample data request** will be closed automatically after the data has been received from these devices.

NOTICE

In the event the option **Comments on modification of sample data (live)** is enabled in the **Security settings**, the dialog window **Modification comment sample data** will be displayed after the sample data is entered, where a **Comment** and a **Reason** for the modification must be entered.

5.6.10.3 CALL

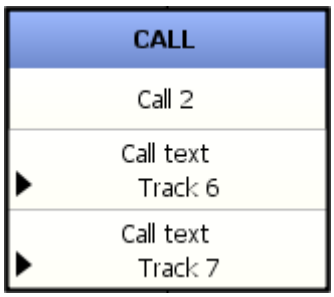
5.6.10.3.1 CALL - Overview

Dialog window: **Method ► CALL ► Properties.. ► CALL - 'Command name'**

Command for **calling tracks**. Optionally a condition can be defined which needs to be fulfilled in order to execute the **CALL** command.

Appearance

The command has the following appearance:



Each command can include to 10 call-ups.

Parameters

The parameters for the command **CALL** are configured in the following dialog window:

- *CALL*

Command variables

The following command variables are generated in the method run by the command **CALL** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.10.3.2 CALL - Properties

Dialog window: **Method ▶ CALL ▶ Properties... ▶ CALL - Call #**

Command name

Name of the command.

Entry	**25 characters**

Call table

All the defined calls listed in the table are carried out simultaneously. The table cannot be edited directly.

NOTICE

The **CALL** command waits for either the end of the tracks called or the acknowledgement signal of them. If the completion of a track is not to be waited for, the option **Return immediately** must be activated in the corresponding track command *(see chapter 5.6.2, page 437)*.

[New]

Opens the dialog window **Call** to enter a new call *(see chapter 5.6.10.3.3, page 1288)*.

NOTICE

10 calls can be defined at maximum.

[Properties]

Opens the dialog window **Call** to edit the call selected in the table *(see chapter 5.6.10.3.3, page 1288)*.

[Delete]

Deletes the selected call.

5.6.10.3.3 CALL - Call

Dialog window: **Method ▶ CALL ▶ Properties... ▶ [New]**

Call text

Text (can be edited to suit) for designating the call that is shown in the command presentation.

Entry	**50 characters**
Default value	**'empty'**

Track name

Selecting the track to be called. All the normal tracks defined in the method can be selected (with the exception of the main track).

Selection	**'Track name'** | **'empty'**
Default value	**'empty'**

Condition

on | off (Default value: **off**)

Expression for the condition(s) which can be created or edited with the formula editor after pressing on or double-clicking in the text field *(see chapter 2.4, page 24)*.

If this check box is activated, then the call will be carried out only if the evaluation of the condition gives the result **1** (= true).

Entry	**1000 characters**
Default value	**'empty'**

5.6.10.4 LOOP

5.6.10.4.1 LOOP - Overview

Dialog window: **Method ► LOOP ► Properties.. ► LOOP - 'Command name'**

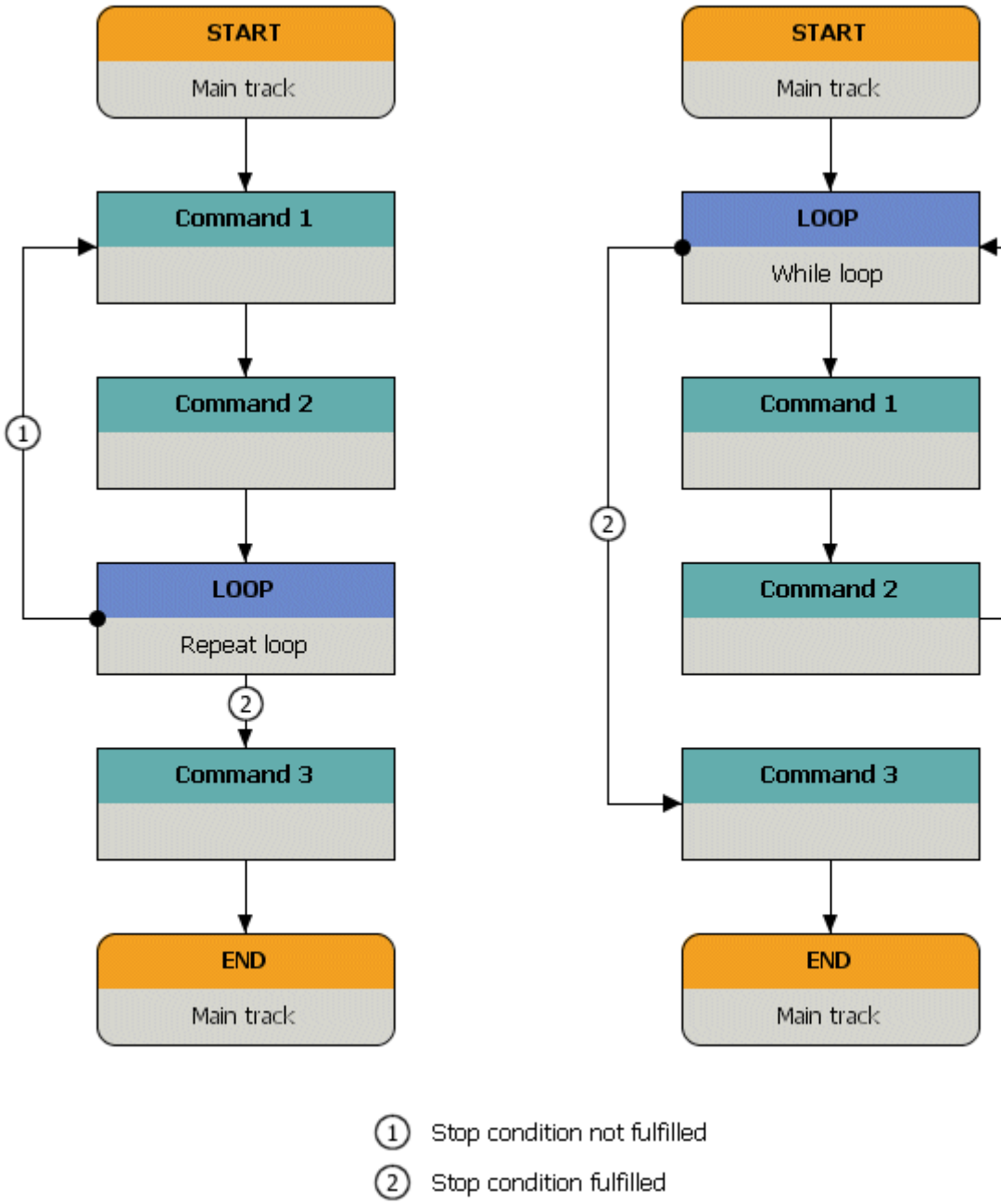
Command for the **repeated execution of a command sequence**. The loop can be terminated after fulfilling various stop conditions.

Appearance

The command has the following appearance:

A LOOP command just inserted has an arrow on the left-hand side with which a loop can be created by using the mouse to drag this arrow to the desired command in the same track. **Two different types of loops** will result, depending on whether the arrow has been dragged upward or downward:

Repeat loop **While loop**



The LOOP command is at the end of the loop for **Repeat loops**. As soon as one stop condition is fulfilled (case 2), the command after the LOOP command is carried out. If no stop condition is fulfilled (case 1), the loop is run through again. In either case, the loop is run through at least once.

The LOOP command is at the beginning of the loop for **While loops**. If the arrow has been dragged to a command after the LOOP command, another arrow is automatically set from the previous command back to the LOOP command. As soon as one stop condition is fulfilled (case 2), the command after the loop is carried out. If no stop condition is fulfilled,

(case 1), the loop is run through. It is possible with certain stop conditions that the loop is never run through.

NOTICE

Nested and overlapping loops are not allowed.

Parameters

The parameters for the command **LOOP** are configured in the following dialog window:

- *LOOP*

Command variables

The following command variables are generated in the method run by the command **LOOP** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**
.LCO	Loop counter = current quantity of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (**Date/Time**)

5.6.10.4.2 LOOP - Properties

Dialog window: **Method ► LOOP ► Properties... ► LOOP - Loop #**

Command name

Name of the command.

Entry	**25 characters**

Stop conditions

Definition of three possible stop conditions. The first stop condition to be fulfilled will stop the loop.

Maximum run number

on | off (Default value: **on**)

If this option is enabled, then the maximum number of runs will be used as stop condition by repeat and while loops. If the maximum number of runs is reached, the loop will be canceled at the time the LOOP command is started again.

Input range	**0 to 999**
Default value	**1**

Maximum run time

on | off (Default value: **off**)

If this option is enabled, then the maximum run time will be used as stop condition by repeat and while loops. The starting point for the run time is the first start of the loop command, which means that the run time for While loops is started only after the loop has been run through once. If the maximum run time is reached, the loop will be canceled at the time the LOOP command is started again.

Input range	**0 to 999.9**
Selection	**min** | **s**
Default value	**min**

NOTICE

The run time is paused if the method is stopped with **[HOLD]**.

Condition

on | off (Default value: **off**)

If this option is enabled, then the condition defined here will be used as stop condition by repeat and while loops.

The input field contains the expression for the condition(s) which can be created or edited with the formula editor after pressing on or double-clicking in the text field *(see chapter 2.4, page 24)*. If the condition is fulfilled (evaluation of the formula gives the result **1** = true), then the loop will be canceled when the LOOP command is called.

Entry	**1000 characters**
Default value	**'empty'**

5.6.10.5 WAIT

5.6.10.5.1 WAIT - Overview

Dialog window: **Method ► WAIT ► Properties... ► WAIT - 'Command name'**

Command for halting the method run and for output of **messages**.

Appearance

The command has the following appearance:

Parameters

The parameters for the command **WAIT** are configured in the following dialog window:

- *WAIT*

Command variables

The following command variables are generated in the method run by the command **WAIT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has not ever been started
.FIN	Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended**

5.6.10.5.2 WAIT - Properties

Dialog window: **Method ► WAIT ► Properties... ► WAIT - 'Command name'**

Command name

Name of the command.

Entry	**25 characters**

Wait

Selection of the following options:

Selection	**Stop track and waiting for [Continue]** | **Stop all tracks and waiting for [Continue]** | **Waiting time**
Default value	**Stop track and waiting for [Continue]**

Stop track and waiting for [Continue]
If this option is enabled, the track containing the **WAIT** command is stopped and a message is displayed. The method run can only be continued by pressing **[Continue]**.

Stop all tracks and waiting for [Continue]
If this option is enabled, all tracks currently running are stopped and a message is displayed. The method run can only be continued by pressing **[Continue]**.

Waiting time
If this option is enabled, the method run will be continued automatically after this waiting time. The text defined below under **Message** is displayed during the waiting time.

Waiting time

This parameter can only be edited for **Wait**= **Waiting time**

Input range	**0 to 9999.9**
Default value	**0**
Selection	**s** | **min**
Default value	**s**

Message

The message defined here is displayed while the track is stopped or during the waiting time. The text editor for entering or changing the message is opened with or by double-clicking into the text field *(see chapter 2.5.2, page 85)*. The formula editor can also be called up inside the text field *(see chapter 2.4, page 24)*.

Entry	**Text (unlimited)**

Record message

on | off (Default value: **off**)

If this option is enabled, the message defined in the text box will be documented in the determination.

Message by E-mail

on | off (Default value: **off**)

If this option is enabled, the message defined in the text box will be sent to the address defined under **[E-mail]**.

[E-mail]

Open the dialog window **Send E-mail** for defining the E-mail parameters *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above.

5.6.10.6 SEQUENCE

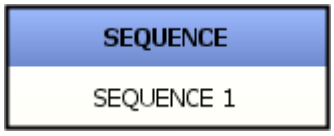
5.6.10.6.1 SEQUENCE - Overview

Dialog window: **Method ► SEQUENCE ► Properties... ► SEQUENCE - 'Command name'**

Command for combining a sequence of individual commands into a single command. This command is used only for the more readily comprehensible structuring of methods.

Appearance

The command has the following appearance:



Parameters

The parameters for the **SEQUENCE** command are configured in the following dialog window:

- *SEQUENCE*

Command variables

The following command variables are generated by the **SEQUENCE** command in the method run and can be used in formulas under the designation **'Command name.Variable identification'**:

Identification	Description
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started
.FIN	Command status; **1 = Command has ended at least once**, **0**, **invalid** (variable not available) **= Command has never ended**

5.6.10.6.2 SEQUENCE - Properties

Dialog window: **Method ► SEQUENCE ► Properties... ► SEQUENCE - Sequence #**

Command name

Name of the command.

Entry	**25 characters**

There is no limit to the number of commands that can be added to a **SEQUENCE** command; these are displayed in the command table. It contains information regarding **Command type** and **Command name**. The table itself cannot be edited. The individual lines of the table can be edited with a context-sensitive menu.

Moves the selected command up (changes the sequence).

Moves the selected command down (changes the sequence).

[New]

Opens the **New command** dialog window for the selection of the desired command that is to be inserted at the end of the table *(see chapter 5.2.4.2.1, page 406)*.

[Properties]

Opens the dialog window of the selected command *(see chapter 5.2.4.2.1, page 406)*.

[Delete]

Deletes the selected command.

Copy	
Cut	This context-sensitive menu item is used to delete the commands selected in the table and copy them to the clipboard.
Insert	This context-sensitive menu item is used to insert the commands that were copied to the clipboard at the end of the table.

6 Configuration

6.1 Configuration - General

6.1.1 Configuration - Definition

Program part: **Configuration**

Definition

The term **Configuration** is used in **tiamo** to refer to all comprehensive settings for devices, titrants/solutions, sensors, common variables and rack data. Included in the configuration are also methods, security settings, user management, program administration, templates and Audit Trail.

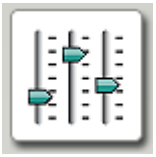
Organization

All configuration data is saved in the **Configuration database**. In the case of local server systems (**tiamo light**, **tiamo full**), these are to be found in the Programs directory of the computer on which the program was installed. In the case of client server systems (**tiamo multi**), the configuration data base is saved centrally on the server and contains all of the configuration data of all computers (Clients) which are connected to this server.

6.1.2 Configuration - Desktop

Program part: **Configuration**

Configuration symbol



Clicking on the configuration symbol in the vertical bar at the left opens the program part **Configuration** while, at the same time the configuration symbol is shown in color.

Elements

The desktop of the program part **Configuration** comprises the following elements:

- Configuration-specific menu bar.
- Configuration-specific toolbar.
- Main window in which up to 6 subwindows can be displayed.

6.1.3 Configuration - Menu bar

6.1.3.1 Configuration - Main menus

Program part: **Configuration**

The menu bar in the program part **Configuration** contains the following main items:

- *File*
  Export, import, backup, restore configuration data.
- *View*
  Change layout, load view, save view, quick access to subwindows.
- *Tools*
  User administration, security settings, program administration, Audit Trail, templates, options.
- *Help*
  Open program help, display program information.

6.1.3.2 Configuration - Menu File

Program part: **Configuration**

Export...	Export configuration data *(see chapter 6.3.1.1, page 1330)*.
Import...	Import configuration data *(see chapter 6.3.1.2, page 1333)*.
Backup ▶	
Automatically	Backup configuration data automatically *(see chapter 6.3.2.1, page 1336)*.
Manually	Backup configuration data manually *(see chapter 6.3.2.2, page 1337)*.
Print (PDF)... ▶	
User administration	Put out user administration data as PDF file *(see chapter 6.2.1.1, page 1305)*.
Security settings	Put out security settings as PDF file *(see chapter 6.2.2.1, page 1314)*.
Logout...	Logout user *(see chapter 2.2.3, page 17)*.
Exit	Exit the program.

6.1.3.3 Configuration - Menu View

Program part: **Configuration**

Change layout...	Modify layout of loaded configuration view *(see chapter 3.1.7.2, page 94)*.

Load view...	Load a saved configuration view *(see chapter 3.1.7.3, page 95)*.
Save view...	Save current configuration view *(see chapter 3.1.7.4, page 95)*.
Quick access	Open a subwindow not contained in the current configuration view.
Toolbar	Switch the toolbar display on/off.

6.1.3.4 Configuration - Menu Tools

Program part: **Configuration**

User administration...	Manage users and groups of users with access rights, signature rights and options *(see chapter 6.2.1.1, page 1305)*.
Security settings...	Options for login, password protection, Audit Trail and electronic signature *(see chapter 6.2.2.1, page 1314)*.
Program administration...	General settings for local/server and client/server settings *(see chapter 6.2.3.1, page 1325)*.
Audit Trail...	Open the Audit Trail *(see chapter 6.4, page 1355)*.
Templates ►	
Custom calibration buffers...	Definition of own buffer series which will be automatically recognized when calibrating pH electrodes *(see chapter 6.3.3.1, page 1338)*.
Input lines...	Generate templates for scanning remote lines *(see chapter 6.3.3.2.1, page 1339)*.
Output lines...	Generate templates for setting remote lines *(see chapter 6.3.3.3.1, page 1340)*.
Conductivity standard	Definition of conductivity standards used at the calibration of conductivity measuring cells *(see chapter 6.3.3.4.1, page 1342)*
E-mail templates	Generate templates for sending e-mails *(see chapter 6.3.3.5.1, page 1344)*.
Electrode types	Create electrode type templates for the electrode test
Options...	Set program options *(see chapter 6.3.4.1, page 1352)*.

6.1.3.5 Menu Help

Program parts: **Workplace / Database / Method / Configuration**

tiamo Help	Open tiamo Help.

About	Display information about the program and the installation.

6.1.4 Configuration - Toolbar

Program part: **Configuration**

Change layout...	Modify layout of loaded configuration view *(see chapter 3.1.7.2, page 94)*.
Load view...	Load a saved configuration view *(see chapter 3.1.7.3, page 95)*.
Save view	Save current configuration view *(see chapter 3.1.7.4, page 95)*.
User administration...	Manage users and groups of users with access rights, signature rights and options *(see chapter 6.2.1.1, page 1305)*.
Security settings...	Options for login, password protection, Audit Trail and electronic signature *(see chapter 6.2.2.1, page 1314)*.
Audit Trail...	Open the Audit Trail *(see chapter 6.4, page 1355)*.
Logout	Logout user *Manual logout*
tiamo Help	Open tiamo Help.

6.1.5 Configuration - Subwindows

Program part: **Configuration**

Selection

The following subwindows can be displayed in the main window:

- *Devices*
  Display of the automatically recognized and manually added devices.
- *Titrants/Solutions*
  Display of the data for the automatically recognized and manually added titrants and auxiliary solutions.
- *Sensors*
  Display of the data for all defined sensors.
- *Common variables*
  Display of the data for all defined common variables.
- *Sample solution (TC conductivity)*
  Display of the data for the calculation of the temperature coefficient of a sample solution by means of the Chebyshev function
- *Rack data*
  Display of the data for all Metrohm sample racks.

Presentation

The subwindows can be enlarged or made smaller to suit by dragging the separating bar between the windows.

By clicking on the button ❑ above at the right, the subwindows can be maximized so that only one subwindow is displayed in the main window. The original view of all subwindows is restored when the ❑ button in the maximized subwindow is clicked on again.

Via the menu item **View ► Quick access...** subwindows that are not in the current configuration view can be shown as a single window.

6.1.6 Configuration - Functions

Program part: **Configuration**

In the program part **Configuration**, the following functions can be carried out:

Views

- *Change the layout of the configuration view*
- *Load configuration view*
- *Save configuration view*
- *Rename configuration view*
- *Delete configuration view*

User administration

- *Manage user groups*
- *Access rights*
- *Signatures*
- *Options*
- *Users*

Security settings

- *Login/Password protection*
- *Audit Trail/Modifications*
- *Electronic signature*
- *Default reasons*

Program administration

- *Backup directories*
- *Clients*
- *Licenses*

Export/Import of configuration data

- *Export configuration data*
- *Import configuration data*

Backup/Restore configuration data

- *Backup configuration data automatically*
- *Backup configuration data manually*
- *Restore configuration data*

Templates

- *Custom calibration buffers*
- *Input lines*
- *Output lines*

Options

- *General program properties*

6.1.7 Views

6.1.7.1 Views - General

Program parts: **Workplace / Database / Configuration**

Definition

The term **View** defines the contents and design of the main window in the program parts **Workplace**, **Database** and **Configuration**. The following elements belong to a view:

- Number, arrangement, sequence and size of the subwindows.
- Representation within the individual subwindows, i.e. column sequence, column width, sorting and filter.

Functions

The following functions are possible for views:

- *Change layout*
  Define the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.
- *Load view*
  Load a saved view.
- *Rename view*
  Rename a saved view.
- *Delete view*
  Delete a saved view.

Automatic save

If the corresponding option is activated in the program part **Configuration** under **Tools ► Options...** on the tab **Save** under **Save on closing**, then the current view will be saved automatically when the program is closed.

Automatic load

The standard procedure is that the view saved when the program is terminated will be loaded automatically the next time that the program is opened. As an alternative a standard view can be defined for each user group that is loaded automatically the first time that the program part is opened.

The standard procedure is that the view with the following subwindow is opened with the very first program start:

- **Workplace**
  Run, **Method**, **Live display 1**, **Report**
- **Database**
  Determination overview, **Curves 1**, **Information**, **Results**
- **Configuration**
  Devices, **Titrants / Solutions**, **Sensors**, **Common Variables**

Export/Import

Views can also be exported and imported. In this way these views can be exchanged between different client / server systems.

6.1.7.2 Change layout

Dialog window: **Workplace / Database / Configuration ► View ► Change layout... ► Change layout**

The symbol or the menu item **View ► Change layout...** opens the dialog window **Change layout**.

Select layout

Selection of a graphical symbol for the number, arrangement and sequence of the subwindows.

Selection	**'Selection of the possible combinations'**

Available subwindows

Displaying the subwindows that are still available for displaying the view.

Selection	**'Selection of the subwindows'**

Displayed subwindows

Displaying the subwindows that are shown in the view.

Selection	**'Subwindows'**

Add the selected subwindow to the view.

Remove the selected subwindow from the view.

Move the selected subwindow upward (modifies sequence).

Move the selected subwindow downward (modifies sequence).

6.1.7.3 Loading a view

Dialog window: **Workplace / Database / Configuration ► View ► Load view... ► Load view**

The symbol or the menu item **View ► Load view...** opens the dialog window **Load view**.

Name

Name of the view to be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

6.1.7.4 Saving a view

Dialog window: **Workplace / Database / Configuration ► View ► Save view... ► Save view**

The symbol or the menu item **View ► Save view...** opens the dialog window **Save view**.

Name

Name under which the view is to be saved.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

Save the view under the given name. The saved views are globally valid and available for client/server systems.

6.1.7.5 Renaming a view

Dialog window: **Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view ▶ [Rename] ▶ Rename view**

To be able to rename a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Rename]** must be pressed down. Afterwards, the window **Rename view** opens.

Rename view '%1' to

Entry of a new name for the view.

Entry	**50 characters**

6.1.7.6 Deleting a view

Function: **Workplace / Database / Configuration ▶ View ▶ Load/save view… ▶ [Delete]**

To delete a view, either the dialog window **Load view** or **Save view** must be opened and the button **[Delete]** must be pressed down. The delete procedure must then be confirmed.

6.2 Administration

6.2.1 User administration

6.2.1.1 Dialog window User administration

Dialog window: **Configuration ▶ Tools ▶ User administration...**

Overview

User groups and their users can be managed in the dialog window **User administration**. For each user group, access rights can be defined for menu items and functions, signature rights and default views can be defined for individual program parts. For client/server systems, the user administration is globally valid for all connected clients (central user administration).

During installation, the three user groups **Administrators** (with the user **Admin1**), **Users** and **Removed users** (each without any users) are automatically created. All groups can be renamed; the **Administrators** group is the only group that cannot be deleted.

The user administration data can be exported and imported. In this way this data can be exchanged between different client/server systems.

With the menu item **File ▶ Print (PDF)... ▶ User administration**, the user administration data can be output as PDF file.

Structure

The dialog window **User administration** is divided into two parts, the size of which can be modified with the mouse. In the left-hand part the user groups with their assigned users are listed in tree-form, the right-hand side shows details of the selected items.

Each user group, with the exception of the **Removed users** group, contains the following items:

- *Access rights*
  Assign access rights to the four program parts and their menu bars.
- *Signatures*
  Assign signature rights for methods and determinations.
- *Options*
  Definition of the view for the individual program parts.
- *Users*
  Details of the users.

Functions

In the dialog window **User administration**, the following functions can be carried out:

- *Add user groups*
- *Copy user groups*
- *Rename user groups*
- *Delete user groups*
- *Define access rights for user groups*
- *Define signature rights for user groups*
- *Define options for user groups*
- *Add user*
- *Set start password for new user*
- *Deactivate user*
- *Activate user*
- *Remove user*

6.2.1.2 User groups

6.2.1.2.1 User groups - Details

Dialog window: **Configuration ▶ Tools ▶ User administration...**

If a user group is selected in the left-hand side of the **User administration** dialog window then details of this user group will be shown on the right-hand side together with a table containing all its members.

Group data

Group name

Display of the name of the user group.

Description

Description of the user group.

Entry	**256 characters**

[Rename group]

Rename the selected user group.

[Delete group]

Delete the selected user group.

[Copy group]

Copy the selected user group.

[Add group]

Add a new user group.

User group members

The table showing the group members contains information about all members of the selected user group. The table can neither be edited nor sorted.

User

Short name of the user.

Full name

Full name of the user.

Status

Current user status.

Selection	**enabled** | **disabled**

enabled
The user can log in as usual.

disabled
The user can no longer log in. The administrator must first assign him/her the status **enabled** and provide a new start password.

[Add user]

Add a new user to the user group.

6.2.1.2.2 User administration - Access rights

Dialog window: **Configuration ► Tools ► User administration...**

If in the left-hand part of the dialog window **User administration** the item **Access rights** is highlighted for a user group then the access rights of this group for program parts, menu items and functions will be shown in tree-form in the right-hand side of the window and can be modified

there. If one item is deactivated, then all the subitems belonging to it will also be automatically deactivated. If a subitem, e.g. the menu **Tools** is deactivated in the configuration then the box for the configuration is colored gray. Blocked functions are deactivated for the particular user, i.e. shown in gray.

Meaning of the symbols:

	Enlarge view	P	Program part
	Reduce view	M	Menu item
☑	Full access to function(s)	F	Function
☑	Limited access to function(s)		
☐	No access to function(s)		

NOTICE

In the **Administrators** group all access rights are switched on as default and cannot be modified.

6.2.1.2.3 User administration - Signatures

Dialog window: **Configuration ▶ Tools ▶ User administration...**

If in the left-hand part of the dialog window **User administration** the item **Signatures** is highlighted for a user group, then the rights of this group will be shown in the right-hand part and can be modified there.

NOTICE

For the version **tiamo light**, these rights cannot be edited as no signatures are possible.

Permissions for methods

Signature level 1

If this check box is activated, then users in this user group can electronically sign methods at level 1.

Selection	**off** | **on**
Default value	**off**

Signature level 2 (Lock)

If this check box is activated, then users in this user group can electronically sign methods at level 2 and at the same time lock them against further modifications.

Selection	**off** | **on**
Default value	**off**

Delete signatures level 2

If this check box is activated, then users in this user group can delete all signatures at level 2. The method can be edited again.

Selection	**off** | **on**
Default value	**off**

Permissions for determinations

Signature level 1

If this check box is activated, then users in this user group can electronically sign determinations at level 1.

Selection	**off** | **on**
Default value	**off**

Signature level 2 (Lock)

If this check box is activated, then users in this user group can electronically sign determinations at level 2 and at the same time lock them against further modifications.

Selection	**off** | **on**
Default value	**off**

Delete signatures level 2

If this check box is activated, then users in this user group can delete all signatures at level 2. The determination can be edited again.

Selection	**off** | **on**
Default value	**off**

Permissions for Audit Trail

Delete records

If this check box is activated, then users in this user group can confirm the deletion of Audit Trail entries with their signature.

Selection	**off** | **on**
Default value	**off**

NOTICE

In the **Administrators** group all signature rights are switched on as default, but they can also be switched off.

Executable methods

Only methods with signature level 2

If this check box is activated, then only methods with signature level 2 can be started at the workplace by users in this user group.

Selection	**off** | **on**
Default value	**off**

6.2.1.2.4 User administration - Options

Dialog window: **Configuration ► Tools ► User administration...**

If in the left-hand part of the dialog window **User administration** the item **Options** is highlighted for a user group, then options for this group will be shown in the right-hand part and can be modified there.

Default workplace view

Selection of the view that will open in the program part **Workplace** as default when the user logs in.

Selection	**Selection of the defined workplace views**

Default database view

Selection of the view that will open in the program part **Database** as default when the user logs in.

Selection	**Selection of the defined database views**

Default configuration view

Selection of the view that will open in the program part **Configuration** as default when the user logs in.

Selection	**Selection of the defined configuration views**

Default method group

Selection of the method group to be opened as default for opening and saving methods.

Selection	**Selection of the defined method groups**

6.2.1.2.5 Adding a user group

Dialog window: **Configuration ► Tools ► User administration... ► [Add group] ► Add group**

In order to add a new user group with default settings an existing group must be selected and either the context-sensitive menu item **Add group** or the **[Add group]** button must be pressed. The dialog window **Add group** is then opened.

Group name

Name of the new group.

Entry	**24 characters**

With **[OK]** a new group with default settings is created under this name; it does not contain any users. The **Description** field and the table of group members are empty.

6.2.1.2.6 Copying a user group

Dialog window: **Configuration ► Tools ► User administration... ► [Copy group] ► Copy group**

Dialog window:

In order to copy a user group and save it under a new name, an existing group must be selected and either the context-sensitive menu item **Copy group** or the **[Copy group]** button must be pressed. The dialog window **Copy group** is then opened.

Group name

Name of new group.

Entry	**24 characters**

With **[OK]** a new group is created under this name with same properties (access rights, signature rights, etc.) as the selected group; it does not contain any users. The **Description** field and the table of group members are empty.

6.2.1.2.7 Renaming a user group

Dialog window: **Configuration ► Tools ► User administration... ► [Rename group] ► Rename group**

In order to rename a selected user group either the context-sensitive menu item **Rename group** or the **[Rename group]** button must be pressed. The dialog window **Rename group** is then opened.

Group name

Entry of the new group name.

Entry	**24 characters**

6.2.1.2.8 Deleting a user group

Function: **Configuration ► Tools ► User administration... ► [Delete group]**

In order to delete a selected user group either the context-sensitive menu item **Delete group** or the **[Delete group]** button must be pressed. The group is then deleted.

NOTICE

Deleting user groups is only possible if the group no longer contains any users.

6.2.1.3 User

6.2.1.3.1 User - Details

Dialog window: **Configuration ▶ Tools ▶ User administration...**

If a user in a user group is selected in the left-hand side of the **User administration** dialog window then details of this user will be shown on the right-hand side.

User

Display of the short name of the user that must be entered at login in the field **User**. This name is defined when a new user is entered for the first time and cannot be subsequently modified.

Entry	**24 characters**

Full name

Full name of the user.

Entry	**256 characters**

Status

Display of the current status of the user. Only users of the group **Administrators** can modify the status.

Selection	**enabled** | **disabled** | **removed**

enabled
Users in the status **enabled** can log in in the normal way. An exception is the first login after the change of status from **disabled** or **removed** to **enabled**. If this is the case, then a **Start password** must be assigned with which this user can log in again.

disabled
Users in the status **disabled** can no longer log in. They will be automatically set to this status as soon as the number of login attempts defined in the **Security settings** has been exceeded.

removed
Users in the status **removed** can no longer log in. If the set status of a user is changed from **enabled** or **disabled** to **removed**, then the user will automatically be shifted to the **Removed users** group. If the status of a removed user is changed back to **enabled** or **disabled**, then a dialog window will appear for selecting the group to which the user is to be assigned.

Start password

The invisible start password is displayed with 6 ***** characters which must be entered by a new user the first time that new user logs on or after a change in status from **disabled** or **removed** to **enabled**. The administrator must assign a new start password when adding a new user or when there is a change in status to **enabled**. If the user has logged in with the start password and afterwards entered a new password, then the start password will be deleted once again.

Entry	**50 characters**

[Set start password]

Opens the dialog window **Start password**. This button is active only for users with the status **enabled**. If a user has forgotten his password, then the Administrator can assign a new start password.

User group

Current user group. The administrator can modify the group assignment of the user. The user is automatically moved to the new group. A user can also be moved to a new group with Drag&Drop.

Selection	**Selection of the defined user group**

Remarks

Possibility to enter additional information for the user (e.g. function, address).

Entry	**1000 characters**

6.2.1.3.2 Adding a user

Dialog window: **Configuration ▶ Tools ▶ User administration... ▶ [Add user] ▶ Add user**

There are two possibilities how to add a new user:

- Select a user group and then the context-sensitive menu item **Add user**.
- Select a user group and press the **[Add user]** button.

In both cases the dialog window **Add user** is then opened.

User

Short name of the new user that must be used to log in at program start. After the name has been entered a **Start password** must be issued with which the user is entered in the list of users.

Entry	**24 characters**

6.2.1.3.3 Setting a start password

Dialog window: **Configuration ► Tools ► User administration... ► [Set start password] ► Start password**

A start password can be assigned for the selected user with the button **[Set start password]** in the dialog window **User administration**. It is active only for newly created users or for those who once again have had their status set to **enabled**. The dialog window **Start password** opens.

Start password

Entry of a new start password. Password options are not used for the start password.

Entry	**50 characters**

Confirm password

Confirmation of the start password.

Entry	**50 characters**

6.2.2 Security settings

6.2.2.1 Dialog window Security settings

Dialog window: **Configuration ► Tools ► Security settings**

Overview

Parameters for login, password protection, Audit Trail and electronic signatures can be configured in the **Security settings** dialog window. They are used primarily to ensure that work is performed in accordance with the safety requirements contained in FDA Guidance 21 CFR Part 11.

NOTICE

The version **tiamo light** cannot be configured in conformance with FDA stipulations. With the exception of the **Enforce login with user name** parameter on the **Login/Password protection** tab, all of the options are inactive *(see chapter 6.2.2.2, page 1315)*.

With client/server systems, the security settings are globally valid for all connected clients.

Security settings can be exported and imported. This means that these settings can be exchanged between different client/server systems.

The security settings can be output as a PDF file with the **File ► Print (PDF)... ► Security settings** menu item.

Settings according to 21 CFR Part 11

Settings according to 21 CFR Part 11

on | off (Default value: **off**)

If this check box is activated, then the default settings pursuant to 21 CFR Part 11 will be activated on all tabs. At the same time, those check boxes which are required to be activated pursuant to 21 CFR Part 11 will be displayed against a gray background, i.e. they can no longer be edited.

NOTICE

If the **Settings according to 21 CFR Part 11** check box is activated, the **Modifying the document allowed** permission in the **Configuration ► Tools ► Options** dialog cannot be activated.

Tabs

The security settings are configured on the following tabs:

- *Login / password protection*
  Settings for login and password protection
- *Audit Trail / Modifications*
  Activation/deactivation of the Audit Trail and comments when methods, determinations or sample data are modified
- *Signatures*
  Options for electronic signatures
- *Default reasons*
  Definition of reasons for signing and modifying methods, determinations and sample data.

6.2.2.2 Login / password protection

Tab: **Configuration ► Tools ► Security settings ► Login/Password protection**

On the **Login/Password protection** tab, it is defined whether the user must log in with name only or with name and password and how the password must be monitored and constructed.

Login policies

Enforce login with user name

If this check box is **activated**, then each time the program starts the login window will appear, in which the user must enter his or her user name. If

this check box is **deactivated**, no login is necessary and the user logged in under Windows will be adopted as the user name. If this is the case, then all subsequent parameters are deactivated.

Selection	**on** | **off**
Default value	**off**
	FDA default: **on** (can no longer be edited)

Enforce login with password

If this check box is **activated**, then each time the program starts the login window will appear, in which the user must enter not only his or her user name but also a password. If this option is **disabled**, then all of the subsequent parameters will be deactivated.

Selection	**on** | **off**
Default value	**off**
	FDA default: **on** (can no longer be edited)

Password monitoring by tiamo

If this option is **enabled**, then the password will be monitored by **tiamo** in accordance with the subsequent parameters.

Selection	**on** | **off**
Default value	**off**
	FDA default: **on** (editable)

Password monitoring by Windows

If this option is **enabled**, then the password will be monitored in accordance with the parameters defined in Windows. The parameters for password protection are deactivated in this case.

Selection	**on** | **off**
Default value	**off**

CAUTION

In order to prevent an unwanted login by means of the **Guest** user category that is defined by default in Windows when performing password monitoring with Windows, it is imperative that this user also be assigned a password or (even better) be deactivated.

CAUTION

If this option is enabled, then the user names in **Windows** and **tiamo** must necessarily match, because otherwise the user will no longer be able to log in to **tiamo**. In order to ensure this, once this selection has been made, the **Test login** dialog window *(see chapter 6.2.2.3, page 1320)* appears in which the logged-in user must log in with his or her Windows password. If this test login fails, then the **Security settings** dialog window will remain open.

Maximum number of login attempts

If this check box is **activated**, then a user will be set to the **disabled** status as soon as the number of login attempts defined here has been exceeded. Signing (both methods and determinations) with a wrong password also counts as a failed login attempt. A user with the status **disabled** can no longer start the program. The counter for login attempts is reset to zero for all users with each restart.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Input range	**2 to 5**
Default value	**3**

Message by e-mail

If this check box is **activated**, then an e-mail will be sent to the address defined under **[E-mail...]** as soon as the defined number of login attempts has been exceeded.

Selection	**on** | **off**
Default value	**off**

[E-mail...]

This button opens the **Send e-mail** window *(see chapter 6.2.2.7, page 1323)* for defining the e-mail parameters.

Logout policies

New login only for same user

If this check box is **activated**, then only the same user can log in again after a manual logout. Users with administrator rights can always log in. If this option is enabled, then the following option is automatically enabled and inactive.

Selection	**on** | **off**
Default value	**off**

NOTICE

If the automatic logout is enabled (see below), then only the same user or a user with administrator rights can log on again, no matter what the setting for this option is.

No editing of workplaces in 'BUSY' status

If this check box is **activated**, then, after a user has logged out manually, a newly logged-in user can neither edit data nor trigger actions on the workplaces still open with running determinations. These workplaces will only be available again when all determinations are finished. For running determinations the old user name still applies (Audit Trail entries, Save, Export, etc.). Exceptions are the cancellation of a determination with **[Stop]** and the emergency stop, which are always possible for all running determinations and series.

If this check box is **deactivated**, then the newly logged-in user has all of the rights for the opened workplaces which he or she has on the basis of his or her group membership. The new user name is valid, effective immediately, for the ongoing determinations (Audit Trail entries, Save, Export, etc.).

Selection	**on** | **off**
Default value	**off**

Automatic logout after

If this check box is **activated**, then the user will be logged out automatically when no operating functions have been carried out with the keyboard or the mouse within this time. After this automatic logout, only a user belonging to the same user group as the previously logged-out user or a user with administrator rights can log in again.

Selection	**on** | **off**
Default value	**off**

Input range	**1 to 60 min**
Default value	**10 min**

NOTICE

The immediate stop of all ongoing determinations at all active workplaces with the **emergency stop button** remains possible even after an automatic logout.

Password policies

NOTICE

If the **Password monitoring by Windows** option is enabled, then the parameters for password protection are deactivated. Compliance with the directives pursuant to 21 CFR Part 11 must then be ensured by the administrator in Windows.

Enforce unique password

Activating this check box ensures that a user can use a given password only once.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Enforce use of special characters

Activating this check box ensures that the password must contain at least one special character (@, #, ~, etc.).

Selection	**on** | **off**
Default value	**off**

Minimum password length

Activating this check box ensures that the password must contain at least the indicated number of characters.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Input range	**1 to 10 characters**
Default value	**6 characters**

Passwords expire every

Activating this check box ensures that the user must enter a new password before the validity period expires. When a user logs in whose password will expire within the next 10 days, a corresponding message will

appear. If the validity period has expired, the user can only log in if he or she changes the password.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Input range	**1 to 999 days**
Default value	**365 days**

6.2.2.3 Test login for password monitoring by Windows

Tab: **Configuration ► Tools ► Security settings ► Login/Password protection ► Test login**

If the **Password monitoring by Windows** option *(see chapter 6.2.2.2, page 1315)* is activated, then the Windows password of the user must be entered in this dialog window. The test login is used to check whether the user name matches the Windows user name.

User

Shows the current user name.

Password

Entry of the Windows password.

Password monitoring by Windows can be used only when the test login is successful.

6.2.2.4 Audit Trail / Modifications

Tab: **Configuration ► Tools ► Security settings ► Audit Trail/Modifications**

The recording of the Audit Trail is switched on and off on the **Audit Trail/ Modifications** tab. When a method, a determination or sample data is modified, it can also be defined whether or not a reason and a comment must be given for the modification.

Audit Trail

Enable Audit Trail

If this check box is **activated**, then all program actions defined as Audit Trail actions will be automatically recorded.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Modifications

Comment on modification of methods

If this check box is **activated**, then each time that a method is modified a modification reason and a modification comment must be entered; these are saved in the method and shown in the method history. The reason and comments are also recorded in the Audit Trail.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Comment on modification of determinations

If this check box is **activated**, then each time that a determination is modified a modification reason and a modification comment must be entered; these are saved in the determination and shown in the database in the **Information** subwindow on the **Determination** tab. The reason and comments are also recorded in the Audit Trail.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Comment on modification of sample data (live)

If this check box is **activated** then each time that a determination is modified a modification reason and a modification comment must be entered; these are saved in the determination and shown in the database in the **Information** subwindow on the **Sample** tab. The reason and comments are also recorded in the Audit Trail.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

6.2.2.5 Signatures

Tab: **Configuration ► Tools ► Security settings ► Signatures**

The parameters for the electronic signature can be configured on the **Signatures** tab.

Inactivity delay

If this check box is **activated**, then the dialog window for signing will be automatically closed when the entered time limit has expired.

Selection	**on** | **off**
Default value	**off**

Input range	**1 to 60 min**
Default value	**10 min**

Remove password after signature

If this check box is **activated**, then the password must be entered again after each signature.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

Sign each determination separately

If this check box is **activated**, then each determination selected in the determination overview must be signed individually.

Selection	**on** | **off**
Default value	**off** FDA default: **on** (can no longer be edited)

6.2.2.6 Default reasons

Tab: **Configuration ▶ Tools ▶ Security settings ▶ Default reasons**

The reasons which must be entered when signing methods and determinations or when modifying methods, determinations and sample data are defined on the **Default reasons** tab.

Category

Selection of the category for which the reasons are to be defined.

Selection	**Signature level 1** | **Signature level 2** | **Modification of methods** | **Modification of determinations** | **Modification of sample data**
Default value	**Signature level 1**

Reasons

Shows the reasons defined for the selected category.

Entry	**50 characters**

Moves the text upward (modifies sequence).

Moves the text downward (modifies sequence).

[New]

Add a new reason.

[Edit]

Edit the selected reason.

[Delete]

Deletes the selected reason.

6.2.2.7 Sending e-mail

Dialog window: **Configuration ► Tools ► Security settings ► Login/Password protection ► [E-mail...] ► Send e-mail**

Mail to

E-mail address of the recipient.

Entry	**200 characters**

Subject

Title for describing the message.

Entry	**200 characters**

Message

The message defined here is sent as an e-mail when the maximum permitted number of login attempts has been exceeded.

The text editor for entering or editing the message is opened with or by double-clicking on the text field.

Selection	**Text (unlimited)**

Sender

Mail from

E-mail address of the sender.

Entry	**200 characters**

SMTP Server

Address of the SMTP mail server.

Entry	**200 characters**

Port

Port number of the SMTP mail server.

Input range	**1 to 65,536**
Default value	**25**

Authentication

on | off (Default value: **off**)

Check box for activating the authentication of the sender when sending the e-mail and for selecting the authentication method.

Selection	**SMTP** | **SMTP after POP**
Default value	**SMTP**

POP server

Address of the POP mail server.

Entry	**200 characters**

Port

Port number of the POP mail server.

Input range	**1 to 65,536**
Default value	**110**

User

Name of the user for accessing the mail server. The name need not match the Windows user name.

Entry	**200 characters**

Password

Password for accessing the mail server. This password need not match the Windows password.

Entry	**200 characters**

6.2.2.8 Printing configuration report (PDF)

Dialog window: **Configuration ► ► File ► Print (PDF)... ► Security settings/User administration ► Print configuration report (PDF)**

Orientation

Printing orientation for the configuration report.

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

6.2.3 Program administration

6.2.3.1 Dialog window Program administration

Dialog window: **Configuration ► Tools ► Program administration**

Overview

Backup directories and licenses can be managed in the **Program administration** dialog window.

Tabs

The parameters for program administration are defined on the following tabs:

- *Backup directories*
  List of the defined backup directories.
- *Clients*
  List of computers on which **tiamo** is installed.
- *Licenses*
  List of installed licenses with number of clients. This tab is only shown on the server of a client/server installation.

6.2.3.2 Backup directories

6.2.3.2.1 Backup directories

Tab: **Configuration ► Tools ► Program administration... ► Backup directories**

Table with the defined backup directories. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The directory **Default backup directory** is created during installation.

NOTICE

The following buttons are only active when **tiamo** is running on the server, they are inactive for the individual clients.

[New]

Add a new backup directory *(see chapter 6.2.3.2.2, page 1326)*.

[Edit]

Edit the selected backup directory *(see chapter 6.2.3.2.3, page 1326)*.

[Delete]

Delete the selected backup directory.

NOTICE

The **Default backup directory** cannot be deleted.

6.2.3.2.2 Creating a new backup directory

Dialog window: **Configuration ▶ Tools ▶ Program administration... ▶ Backup directories ▶ [New] ▶ New backup directory**

Name

Name for the backup directory.

Entry	**50 characters**

Directory

Entry or selection (with ...) of the path for the backup directory.

Entry	**1000 characters**

NOTICE

If the backup directory is on a network drive the saving date should be added manually to the **Backup name** because the saving date information is not available when the directory is restored.

NOTICE

Make sure that you have read and write permission on the selected directory.

6.2.3.2.3 Editing a backup directory

Dialog window: **Configuration ▶ Tools ▶ Program administration... ▶ Backup directories ▶ [Edit] ▶ Edit backup directory**

Name

Name for the backup directory.

Entry	**50 characters**

NOTICE

The **Default backup directory** created during installation cannot be renamed.

Directory

Entry or selection (with ...) of the path for the backup directory.

Entry	**1000 characters**

NOTICE

If the backup directory is on a network drive the saving date should be added manually to the **Backup name** because the saving date information is not available when the directory is restored.

NOTICE

Make sure that you have read and write permission on the selected directory.

6.2.3.3 Clients

Tab: **Configuration ► Tools ► Program administration ► Clients**

Table with information about the computers on which **tiamo** is installed. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.

Client ID

Display of the ID for the client that has been entered for the client/server installation.

Computer name

Display of the name of the computer on which the client has been installed.

Status

Display as to whether **tiamo** has been started on the client (**active**) or not (**inactive**).

NOTICE

The content of the tab **Clients** can also be displayed via the shortcut in the directory **..\Metrohm\tiamo\bin** (available only on the server) if **tiamo** is not running.

6.2.3.4 Licenses

Tab: **Configuration ► Tools ► Program administration ► Licenses**

Table with the licenses that are installed on the server (for **tiamo multi**) or on the local server (for **tiamo light** and **tiamo full**). The table cannot be edited.

NOTICE

In client/server systems, this tab is visible only on the server and only for members of the **Administrators** user group.

License code

Shows the entered license code.

Number of clients

Shows the number of clients that have been enabled with the license code.

[Add licenses]

Add new, additional licenses *(see chapter 6.2.3.5, page 1329)*.

NOTICE

Starting with Windows Vista, Microsoft has introduced the UAC (User Account Control), which permits running tasks either as a non-administrator or as an administrator (without changes of user, switching off or similar). To add additional licenses, proceed as follows:

- **For new installations**
  To enter additional licenses, you must start the program as an administrator (position the mouse on the program icon and click the right mouse button – select **Run as administrator** there). If you then add the license code for additional licenses in the usual way, then the **license.mlic** file in the **C:\Program Files\Metrohm\'Program name'\bin** directory will contain both license codes.
- **For existing installations**
  First of all, the **license.mlic** file in the **C:\Users\'User'\AppData\Local\VirtualStore\Program Files\Metrohm\'Program name'\bin** directory must be deleted. This file must not be present in the **VirtualStore** of any user – you must check to make sure of this, and any such files which may be found must be deleted. Afterwards, you must start the program as an administrator (position the mouse on the program icon and click the right mouse button – select **Run as administrator** there). If you then add the license code for additional licenses in the usual way, then the **license.mlic** file in the **C:\Program Files\Metrohm\'Program name'\bin** directory will contain both license codes.

Additional information on this topic can be found in the installation manual, which is saved in the **C:\Program Files\Metrohm\tiamo\doc** directory.

6.2.3.5 Adding licenses

Dialog window: **Configuration ▶ Tools ▶ Program administration ▶ Licenses ▶ [Add licenses] ▶ Add licenses**

The menu **Tools ▶ Program administration ▶ Licenses ▶ [Add licenses]** in the program part **Configuration** opens the dialog window **Add licenses** in which the new license code can be entered.

License code

Entry of the license code.

6.3 Configuration data

6.3.1 Export/import

6.3.1.1 Exporting configuration data

Dialog window: **Configuration ▶ File ▶ Export... ▶ Export configuration data**

File ▶ Export... opens the **Export configuration data** dialog window, in which the following parts of the configuration database can be selected for export:

Devices

on | off (Default value: **on**)

Exporting configuration data for devices *(see chapter 6.5.1, page 1381)*.

Titrants/Solutions

on | off (Default value: **on**)

Exporting configuration data for titrants and solutions *(see chapter 6.6.2.1, page 1387)*.

Sensors

on | off (Default value: **on**)

Exporting configuration data for sensors *(see chapter 6.7.2.1, page 1410)*.

Common Variables

on | off (Default value: **on**)

Exporting configuration data for common variables *(see chapter 6.9.1, page 1448)*.

Global Variables

on | off (Default value: **on**)

Exporting configuration data for global variables *(see chapter 6.10, page 1457)*.

Rack data

on | off (Default value: **on**)

Exporting configuration data for sample changer racks *(see chapter 6.12.1, page 1474)*.

Sample solutions (TC conductivity)

on | off (Default value: **on**)

Exporting configuration data for calculating the temperature coefficients of sample solutions *(see chapter 6.11.2.1, page 1467)*.

Colorimetric sensors

on | off (Default value: **on**)

Exporting configuration data for colorimetric sensors *(see chapter 6.8.2.1, page 1436)*.

Configuration views

on | off (Default value: **on**)

Exporting saved configuration views *(see chapter 3.1.7, page 93)*.

Workplace views

on | off (Default value: **on**)

Exporting saved workplace views *(see chapter 3.1.7.1, page 93)*.

Database views

on | off (Default value: **on**)

Exporting saved database views *(see chapter 3.1.7, page 93)*.

Result templates

on | off (Default value: **on**)

Exporting saved result templates *(see chapter 5.6.8.2.6.1, page 1255)*.

Export templates

on | off (Default value: **on**)

Exporting saved export templates *(see chapter 4.4.4.1, page 254)*.

Control chart templates

on | off (Default value: **on**)

Exporting saved control chart templates *(see chapter 4.4.2.1, page 244)*.

Overlay curve templates

on | off (Default value: **on**)

Exporting saved curve overlay templates *(see chapter 4.4.3.1, page 248)*.

Buffer data

on | off (Default value: **on**)

Exporting configuration data for custom buffers *(see "Buffer table", page 1338)*.

Conductivity standards

on | off (Default value: **on**)

Exporting configuration data for conductivity standards *(see chapter 6.3.3.4.1, page 1342)*.

E-mail templates

on | off (Default value: **on**)

Exporting saved e-mail templates *(see chapter 6.3.3.5, page 1344)*.

Text templates

on | off (Default value: **on**)

Exporting saved text templates *(see chapter 3.5, page 121)*.

Sample assignment table

on | off (Default value: **on**)

Exporting the saved sample assignment table *(see chapter 3.4, page 119)*.

Electrode type templates

on | off (Default value: **on**)

Exporting saved electrode type templates *(see chapter 6.3.3.6.1, page 1346)*.

Security settings

on | off (Default value: **on**)

Exporting security settings *(see chapter 6.2.2.1, page 1314)*.

User administration

on | off (Default value: **on**)

Exporting user administration *(see chapter 6.2.1.1, page 1305)*.

[OK]

The **Save** dialog window for saving data, in which the name and directory for the export file must be entered, opens. The selected configuration data is then saved in a file with the extension **.mcfg**.

6.3.1.2 Importing configuration data

Dialog window: **Configuration ▶ File ▶ Import… ▶ Import configuration data**

With **File ▶ Import…** and after selection of the ***.mcfg** file to be imported, the **Import configuration data** dialog window opens, in which the following parts of the configuration database can be selected for import:

NOTICE

Data that is not present in the export file cannot be selected.

Devices

on | off (Default value: **on**)

Importing configuration data for devices *(see chapter 6.5.1, page 1381)*.

Titrants/Solutions

on | off (Default value: **on**)

Importing configuration data for titrants and solutions *(see chapter 6.6.2.1, page 1387)*.

Sensors

on | off (Default value: **on**)

Importing configuration data for sensors *(see chapter 6.7.2.1, page 1410)*.

Common Variables

on | off (Default value: **on**)

Importing configuration data for common variables *(see chapter 6.9.1, page 1448)*.

Global Variables

on | off (Default value: **on**)

Importing configuration data for global variables *(see chapter 6.10, page 1457)*.

Rack data

on | off (Default value: **on**)

Importing configuration data for sample changer racks *(see chapter 6.12.1, page 1474)*.

Sample solutions (TC conductivity)

on | off (Default value: **on**)

Importing configuration data for calculating the temperature coefficients of sample solutions *(see chapter 6.11.2, page 1467)*.

Colorimetric sensors

on | off (Default value: **on**)

Importing configuration data for colorimetric sensors *(see chapter 6.8.2, page 1436)*.

Configuration views

on | off (Default value: **on**)

Importing saved configuration views *(see chapter 3.1.7, page 93)*.

Workplace views

on | off (Default value: **on**)

Importing saved workplace views *(see chapter 3.1.7.1, page 93)*.

Database views

on | off (Default value: **on**)

Importing saved database views *(see chapter 3.1.7, page 93)*.

Result templates

on | off (Default value: **on**)

Importing saved result templates *(see chapter 5.6.8.2.6.1, page 1255)*.

Export templates

on | off (Default value: **on**)

Importing saved export templates *(see chapter 4.4.4.1, page 254)*.

Control chart templates

on | off (Default value: **on**)

Importing saved control chart templates *(see chapter 4.4.2.1, page 244)*.

Overlay curve templates

on | off (Default value: **on**)

Importing saved curve overlay templates *(see chapter 4.4.3.1, page 248)*.

Buffer data

on | off (Default value: **on**)

Importing configuration data for custom buffers *(see "Buffer table", page 1338)*.

Conductivity standards

on | off (Default value: **on**)

Importing configuration data for conductivity standards *(see chapter 6.3.3.4.1, page 1342)*.

E-mail templates

on | off (Default value: **on**)

Importing saved e-mail templates *(see chapter 6.3.3.5, page 1344)*.

Text templates

on | off (Default value: **on**)

Importing saved text templates *(see chapter 3.5, page 121)*.

Sample assignment table

on | off (Default value: **on**)

Importing a saved sample assignment table *(see chapter 3.4, page 119)*.

Electrode type templates

on | off (Default value: **on**)

Importing saved electrode type templates *(see chapter 6.3.3.6.1, page 1346)*.

Security settings

on | off (Default value: **on**)

Importing security settings *(see chapter 6.2.2.1, page 1314)*.

User administration

on | off (Default value: **on**)

Importing user administration *(see chapter 6.2.1.1, page 1305)*.

[OK]

The selected data is imported.

6.3.2 Backing up/restoring

6.3.2.1 Backing up configuration data automatically

Dialog window: **Configuration ► File ► Backup ► Automatically ► Backup configuration data automatically**

Automatic backup

on | off (Default value: **off**)

If this check box is **activated**, then the configuration database is saved automatically to the defined backup directory at the desired time interval. The entire configuration database (including method groups and methods) is saved at this time.

If this check box is **deactivated**, then the following parameters cannot be edited.

Last backup

Shows date and time of the last configuration data backup.

Next backup

Date and time at which the next backup is to be carried out. … opens the **Next backup** window to select the date *(see chapter 2.5.1, page 84)*.

Default value	**Last backup + 1 month**

Interval

Entry of the time interval after which an automatic backup will take place. With each automatic or manual backup, the interval entered here will be added to the date of the **Last backup** and shown in the **Next backup** field.

Input range	**1 to 999**
Default value	**1**
Selection	**day(s)** | **week(s)** | **month(s)** | **year(s)**
Default value	**month(s)**

Backup directory

Selection of a predefined backup directory *(see chapter 6.2.3.2.1, page 1325)*.

NOTICE

Make sure that you have read and write permission for the selected directory.

6.3.2.2 Backing up configuration data manually

Dialog window: **Configuration ▶ File ▶ Backup ▶ Manually ▶ Backup configuration data manually**

Backup target

Backup directory

Selection of a predefined backup directory *(see chapter 6.2.3.2.1, page 1325)*.

NOTICE

Make sure that you have read and write permission for the selected directory.

Backup name

Selection of an already existing name or entry of a new name for the backup file. If an existing backup file is selected, it will be overwritten.

Entry	**50 characters**
Selection	**'Backup name'**

NOTICE

If the backup directory is on a network drive, then the date of the backup should be added to the **Backup name**, because the backup date information is not available when the data is restored.

[Start]

Starts the manual backup of the complete configuration database (including method groups and methods).

6.3.2.3 Restoring configuration data

Dialog window: **Restore configuration data**

Dialog window "Restore configuration data"

Backup directory

Selection of a directory predefined in the program administration that contains the backed-up configuration database.

Selection	**'Backup directories'**

Backup name

Selection of a backup file.

Selection	**'Backup files'**

Backup date

Shows the time at which the configuration database was backed up. This information is not available if the backup file is located on a network drive.

Database name

Shows the name of the configuration database. This information is not available if the backup file is located on a network drive.

Size

Shows the size of the configuration database in KB.

Save as

Shows the name under which the configuration database will be restored.

[Start]

Starts restoration of the configuration database. After the start, a progress bar appears in the window. The dialog window closes automatically once the backup has been completed.

6.3.3 Templates

6.3.3.1 Templates - Custom calibration buffers

6.3.3.1.1 Managing templates for custom calibration buffers

Dialog window: **Configuration ► Tools ► Templates ► Custom calibration buffer**

You can define 9 of your own calibration buffers for pH calibration with automatic buffer recognition in the dialog window **Custom calibration buffers**. This buffer series is globally valid and can be selected as buffer type **Custom** in the command **CAL LOOP pH**.

Buffer table

The buffer table shows the defined pH values for the calibration buffers in 5 °C increments. The table can neither be edited nor sorted.

[Edit]

The dialog window **Change pH value** opens.

[Delete all]

All the pH values of the selected buffer will be set to **off**.

6.3.3.1.2 Editing custom calibration buffers

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Custom calibration buffer ▶ [Edit] ▶ Change pH value**

In the dialog window **Change pH values** you can edit the pH values for the buffer selected in the buffer table.

Temperature

Selection of the temperature for which the pH value is to be edited.

Input range	**0 to 95 °C**

pH value

pH value of the buffer for the selected temperature.

Input range	**-20.000 to 20.000**
Selection	**off**
Default value	**off**

NOTICE

For your own calibration buffers you should enter the pH values for the temperature range in which your pH calibration and pH measurement will later be carried out. If you do not know the pH values at individual temperatures, they will be calculated automatically by linear interpolation.

6.3.3.2 Templates - Input lines

6.3.3.2.1 Managing templates for input lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Input lines ▶ Templates for input lines**

In the dialog window **Templates for input lines**, client-specific bit patterns for scanning remote input signals can be defined which can be selected with the command **SCAN** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

[New]

Create a new template *(see chapter 6.3.3.2.2, page 1340)*.

[Edit]

Edit the selected template *(see chapter 6.3.3.2.2, page 1340)*.

[Delete]

Delete the selected template.

6.3.3.2.2 Editing templates for input lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Input lines ▶ Templates for input lines ▶ [New] / [Edit] ▶ New template / Edit template**

With **[New]** or **[Edit]** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Signal name

Name of the pattern for the input signal.

Entry	**25 characters**

Input signal

Entry of the bit pattern for the input signal with exactly 8 characters. It is possible to enter the characters

0 = Line inactive,

1 = Line active and

***** = Any line status.

Selection	**Bit pattern with 8 characters (0, 1, *) | **********
Default value	************

The input lines and bits are numbered from right to left:

Input	7 6 5 4 3 2 1 0
Bit	7 6 5 4 3 2 1 0

Example: *******1 expects an active input line 0 (**1** = set). For example, this line is set by a Titrino after a titration has been completed and the Titrino can accept a start signal again.

NOTICE

Input lines that are of no interest or for which no defined condition can be predicted should also be masked with an asterisk *****.

6.3.3.3 Templates - Output lines

6.3.3.3.1 Managing templates for output lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Output lines... ▶ Templates for output lines**

The client-specific bit pattern for setting remote output signals can be defined in the dialog window **Templates for output lines**; these can be selected with the command **CTRL** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted accord-

ing to the selected column in increasing or decreasing sequence by clicking on the column title

[New]

Create a new template *(see chapter 6.3.3.3.2, page 1341)*.

[Edit]

Edit the selected template *(see chapter 6.3.3.3.2, page 1341)*.

[Delete]

Delete the selected template.

6.3.3.3.2 Editing templates for output lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Output lines ▶ Templates for output lines ▶ [New] / [Edit] ▶ New template / Edit template**

With **[New]** or **[Edit]** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Creating new template or editing template

With **<New>** or **<Edit>** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Signal name

Name of the pattern for the output signal.

Entry	**25 characters**

Output signal

Entry of the bit pattern for the output signal with exactly 14 characters.

It is possible to enter the characters

0 = Line inactive,

1 = Line active,

***** = Any line status and

p = Set pulse

Selection	**Bit pattern with exactly 14 characters (0, 1, *, p) | ****************
Default value	******************

The output lines are numbered from right to left:

Output	13 12 11 10 9 8 7 6 5 4 3 2 1 0
Bit	13 12 11 10 9 8 7 6 5 4 3 2 1 0

Example: *********1*** sets the output line 1 to active (= set), which would result in a Stop command for a connected Titrino, for example. **********0*** sets the line to inactive.

NOTICE

We recommend masking the irrelevant output lines with an asterisk * so as not to modify these line conditions.

Pulse length

Duration of the transmitted pulse.

Input range	**100 to 1000 ms**
Default value	**200 ms**

Examples for 765 Dosimat

Parameters	Binary pattern	Function
Start Dos1	*********p********	Starts Dosimat 1 (Titrino via "activate")
Start Dos2	*******p**********	Starts Dosimat 2 (Titrino via "activate")
Start Dos*	*******p*p********	Starts Dosimat 1 and 2 (Titrino via "activate")

6.3.3.4 Templates - Conductivity standards

6.3.3.4.1 Manage conductivity standards

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Conductivity standards ▶ Conductivity standards**

Conductivity standards can be defined in the dialog window, which can be selected with the command **CAL Cond**. The table cannot be edited.

[New]

Creation of a new conductivity standard. The window **Edit conductivity standard** opens, in which a new conductivity standard can be defined *(see chapter 6.3.3.4.2, page 1343)*.

[Properties]

Edits the selected conductivity standard. The window **Edit conductivity standard** opens, in which the conductivity standard can be edited *(see chapter 6.3.3.4.2, page 1343)*.

[Delete]

Deletes the selected conductivity standard.

[Copy]

Copies the selected conductivity standard, which is saved under the name **Copy of....**.

6.3.3.4.2 Edit conductivity standard

Dialog window: **Configuration ► Tools ► Templates ► Conductivity standards ► Conductivity standards ► Edit conductivity standard**

With **[New]** or **[Properties]** in the dialog window **Conductivity standards**, the dialog window **Edit conductivity standard** opens for entering a new conductivity standard or for editing an existing conductivity standard.

Name

Name of the conductivity standard.

Entry	**25 characters**

Comment

Comment on the conductivity standard.

Entry	**1000 characters**

Measured observational pairs

Table with the value pairs for **Temperature** and **Conductivity**, which were determined for the conductivity standard. The table cannot be edited, but with a click on the column title the temperature can be sorted according to either increasing or decreasing sequence.

[New]

Creation of a new value pair. The window **Edit value pair** opens, in which a new value pair can be entered *(see chapter 6.3.3.4.3, page 1344)*.

[Edit]

Edits the selected value pair. The window **Edit value pair** opens, in which the value pair can be edited *(see chapter 6.3.3.4.3, page 1344)*.

[Delete]

Deletes the selected value pair.

6.3.3.4.3 Edit observational pair

Dialog window: **Configuration ► Tools ► Templates ► Conductivity standards ► Conductivity standards ► Edit conductivity standard ► Edit observational pair**

With **[New]** or **[Edit]** in the **Edit conductivity standards** dialog window, the dialog window **Edit value pair** opens for entering a new value pair or for editing an existing value pair.

Temperature

Temperature at which the conductivity was determined.

Input range	**-20 to 150 °C**

Conductivity

Conductivity for the specified temperature (6 significant places).

Input range	**0.00000 to 2000.00 mS/cm**

6.3.3.5 Templates - E-mail

6.3.3.5.1 Managing e-mail templates

Dialog window: **Configuration ► Tools ► Templates ► E-mail templates... ► E-mail templates**

The saved e-mail templates are displayed in a table in the dialog window **E-mail templates**. The table cannot be edited, but with a click on the column title the table can be sorted according to the selected column in either increasing or decreasing order.

[New]

Create a new template. The **Edit e-mail template** window opens in which a new template can be defined *(see chapter 6.3.3.5.2, page 1345)*.

[Edit]

Edit the selected template. The **Edit e-mail template** window opens in which the template can be edited *(see chapter 6.3.3.5.2, page 1345)*.

[Delete]

Delete the selected template.

[Copy]

Copy the selected template which is saved under the name **Copy of %1**.

6.3.3.5.2 Editing e-mail templates

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ E-mail templates... ▶ E-mail templates ▶ [New] / [Properties] ▶ Edit e-mail template**

With **[New]** or **[Edit]** in the dialog window **E-mail templates**, the dialog window **Edit e-mail template** opens for entering a new template or for editing an existing template.

E-mail template

Name of the e-mail template.

Entry	**1 … 16 characters**

Recipient

E-mail address

E-mail address of the recipient.

Entry	**1 … 200 characters**

Sender

E-mail address

E-mail address of the sender.

Entry	**1 … 200 characters**

SMTP server

Address of the SMTP mail server.

Entry	**1 … 200 characters**

Port

Port number of the SMTP mail server.

Input range	**1 to 1 … 65536**
Default value	**25**

Authentication

on | off (Default value: **off**)

Check box for activating the authentication of the sender when sending the e-mail or selection of the authentication method.

Selection	**SMTP** | **SMTP after POP**
Default value	**SMTP**

POP server

Address of the POP mail server.

Entry	**3 … 200 characters**

Port

Port number of the POP mail server.

Input range	**1 to 1 … 65536**
Default value	**110**

User

Name of the user for access to mail server. The name need not agree with the Windows user name.

Entry	**2 … 50 characters**

Password

Password for the access to the mail server. This password does not necessarily have to be identical to the Windows password.

Entry	**0 … 50 characters**

6.3.3.6 Templates - Electrode types

6.3.3.6.1 Managing templates for electrode types

Dialog window: **Configuration ► Tools ► Templates ► Electrode types... ► Electrode type templates**

Electrode type templates for the evaluation of the test of pH electrodes are globally valid and can be selected in the command **ELT LOOP**.

The saved electrode templates are displayed in a table in the dialog window **Electrode type templates**. The table cannot be edited, but with a click on the column title the table can be sorted according to the selected column in either increasing or decreasing order.

[New]

Create a new template. The window **Edit electrode type template** opens, in which a new template can be defined.

[Edit]

Edit the properties of the selected template. The window **Edit electrode type template**, in which the template can be edited.

[Delete]

Delete the selected template.

[Copy]

Copy the selected template and save it under the name **Copy of ...**.

6.3.3.6.2 Editing electrode types

Dialog window: **Configuration ▶ Extras ▶ Templates ▶ Electrode types... ▶ [Properties] ▶ Edit electrode type template**

The quality of an electrode is defined by the determination of limit values for various parameters. The values for the minimum and maximum offset voltage apply thereby for all evaluations.

The limit values are entered in the dialog window **Edit electrode type template** on the following tabs:

- *Excellent electrode*
  Limit values for an excellent electrode.
- *Good electrode*
  Limit values for a good electrode.
- *Usable electrode*
  Limit values for a usable electrode.

6.3.3.6.3 Excellent electrode

Tab: **Configuration ▶ Tools ▶ Templates ▶ Electrode types... ▶ [Properties] ▶ Excellent electrode**

Max. streaming potential

Maximum permitted flow potential (difference of the measured voltages in stirred and non-stirred solution).

Input range	**0.0 to 999.9 mV**
Default value	**2.5 mV**

Max. drift

Maximum permitted drift in stirred solution.

Input range	**0.1 to 9.9 mV/min**
Default value	**2.0 mV/min**

Min. slope

Minimum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**96.5 %**

Max. slope

Maximum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**101.0 %**

Max. response time

Maximum permitted response time of the pH electrode. The voltage measured after three minutes in stirred solution is used as a comparison value for determining the response time. The response time is the time after which the measured voltage has reached this comparison value except for ±1 mV.

Input range	**0 to 999 s**
Default value	**45 s**

Min. offset potential

Minimum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**-20 (Gel), -50 (Non-aqueous), -15 (Standard) mV**

Max. offset potential

Maximum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**20 (Gel), 100 (Non-aqueous), 15 (Standard) mV**

6.3.3.6.4 Good electrode

Tab: **Configuration ► Tools ► Templates ► Electrode types... ► [Properties] ► Good electrode**

Max. streaming potential

Maximum permitted flow potential (difference of the measured voltages in stirred and non-stirred solution).

Input range	**0.0 to 999.9 mV**
Default value	**3.0 mV**

Max. drift

Maximum permitted drift in stirred solution.

Input range	**0.1 to 9.9 mV/min**
Default value	**2.5 mV/min**

Min. slope

Minimum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**96.0 %**

Max. slope

Maximum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**102.0 %**

Max. response time

Maximum permitted response time of the pH electrode. The voltage measured after three minutes in stirred solution is used as a comparison value for determining the response time. The response time is the time after which the measured voltage has reached this comparison value except for ±1 mV.

Input range	**0 to 999 s**
Default value	**50 s**

Min. offset potential

Minimum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**-15 mV**

Max. offset potential

Maximum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**15 mV**

6.3.3.6.5 Usable electrode

Tab: **Configuration ▶ Tools ▶ Templates ▶ Electrode types... ▶ [Properties] ▶ Usable electrode**

Max. streaming potential

Maximum permitted flow potential (difference of the measured voltages in stirred and non-stirred solution).

Input range	**0.0 to 999.9 mV**
Default value	**4.0 mV**

Max. drift

Maximum permitted drift in stirred solution.

Input range	**0.1 to 9.9 mV/min**
Default value	**3.0 mV/min**

Min. slope

Minimum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**95.0 %**

Max. slope

Maximum permitted slope of the pH electrode.

Input range	**-999.9 to 999.9 %**
Default value	**103.0 %**

Max. response time

Maximum permitted response time of the pH electrode. The voltage measured after three minutes in stirred solution is used as a comparison value for determining the response time. The response time is the time after which the measured voltage has reached this comparison value except for ±1 mV.

Input range	**0 to 999 s**
Default value	**60 s**

Min. offset potential

Minimum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**-15 mV**

Max. offset potential

Maximum permitted offset voltage (voltage at pH = 7.0). This value applies for all evaluations.

Input range	**-999 to 999 mV**
Default value	**15 mV**

6.3.3.6.6 Data for specified electrode types

Tab: **Configuration ► Extras ► Templates ► Electrode types... ► [Properties] ► Very good electrode / Good electrode / Usable electrode**

The three predefined electrode types **Standard**, **Gel** and **Non-aqueous** are always present in the table and be neither edited nor deleted. The following limit values are defined for the evaluation of the electrodes of these electrode types:

Electrode type "Standard"

Parameters	Excellent electrode	Good electrode	Usable electrode
Max. streaming potential (mV)	2.5	3.0	4.0
Max. drift (mV/min)	2.0	2.5	3.0
Min. slope (%)	96.5	96.0	95.0
Max. slope (%)	101.0	102.0	103.0
Max. response time (s)	45	50	60
Min. offset potential (mV)	-15	-15	-15
Max. offset potential (mV)	15	15	15

Electrode type "Gel"

Parameters	Excellent electrode	Good electrode	Usable electrode
Max. streaming potential (mV)	3.0	3.5	4.5
Max. drift (mV/min)	2.5	3.0	4.0
Min. slope (%)	96.5	96.0	95.0
Max. slope (%)	101.0	102.0	103.0
Max. response time (s)	60	75	90
Min. offset potential (mV)	-20	-20	-20
Max. offset potential (mV)	20	20	20

Electrode type "Non-aqueous"

Parameters	Excellent electrode	Good electrode	Usable electrode
Max. streaming potential (mV)	3.0	4.5	6.0
Max. drift (mV/min)	5.0	7.0	9.0
Min. slope (%)	88.0	80.0	70.0
Max. slope (%)	120.0	130.0	140.0
Max. response time (s)	60	75	90
Min. offset potential (mV)	-50	-50	-50

Parameters	Excellent electrode	Good electrode	Usable electrode
Max. offset potential (mV)	100	100	100

6.3.4 Options

6.3.4.1 Options - Overview

Dialog window: **Configuration ▶ Tools ▶ Options... ▶ Options**

General program properties can be set on the following tabs under **Tools ▶ Options...**:

- *General*
  Selection of the dialog language and activating/deactivating the emergency stop button.
- *Save*
  Settings for saving on exiting the program.
- *PDF*
  Settings for PDF files.

6.3.4.2 Options - General

Tab: **Configuration ▶ Tools ▶ Options... ▶ Options ▶ General**

Dialog language

Dialog language

Selection of the dialog language.

Selection	**German** | **English** | **Additional languages (dependent on installed language patches)**
Default value	**English**

NOTICE

The program must be restarted for the modified setting to become effective.

Emergency stop button

Options for the display of the **Emergency stop tiamo** button.

Selection	**On** | **Off**
Default value	**Off**

On
The button is displayed in all program parts.

Off
The button is not displayed.

The button can be moved to any position with the left mouse button pressed down and is always shown at the very top of the screen both in the program window and outside it on the Windows desktop. A mouse click on this button immediately stops all running determinations on all active workplaces. When this happens, all devices are stopped (including pumps; any device commands that may have been started will be completed, e.g. **PREP** with Dosino) and the exit track will be started. The emergency stop is effective even if no user is logged in, e.g. when the user has been logged out automatically.

The emergency stop has no effect on actions that may still be ongoing in the manual control, each of which must therefore be stopped with **<Stop>**.

6.3.4.3 Options - Save

Tab: **Configuration ▶ Tools ▶ Options... ▶ Options ▶ Save**

Save on closing

It can be defined here which settings are to be saved when the program is exited. If the option is **enabled**, the current view with its settings will be saved automatically when the program is exited. If the option is **disabled**, then any modifications that may have been made to the view will not be saved and the original, manually saved view will be loaded the next time that the program is started.

Configuration settings

on | off (Default value: **off**)

Activates/deactivates the saving of the configuration view when exiting.

Workplace settings

on | off (Default value: **off**)

Activates/deactivates the saving of the workplace view when exiting.

Database settings

on | off (Default value: **off**)

Activates/deactivates the saving of the database view when exiting.

6.3.4.4 Options - PDF

Tab: **Configuration ► Tools ► Options... ► Options ► PDF**

Security permissions for PDF files

Content copying or extraction allowed

on | off (Default value: **on**)

If this check box is **deactivated**, then content cannot be copied or taken from the PDF file.

Printing allowed

on | off (Default value: **on**)

If this check box is **deactivated**, then the PDF file cannot be printed.

Adding or changing comments allowed

on | off (Default value: **on**)

If this check box is **deactivated**, then comments and form fields can neither be added nor changed.

Modifying the document allowed

on | off (Default value: **on**)

If this check box is **deactivated**, then no changes can be made to the PDF file. The check box can only be activated if the **Adding or changing comments allowed** is also activated. If the check box is activated, then all other safety permissions for PDF files will also be activated.

In order to merge several PDF files into one PDF file, this permission must be activated.

NOTICE

The **Modifying the document allowed** permission can only be activated if the **Settings according to 21 CFR Part 11** check box in the **Configuration ► Tools ► Security settings...** dialog is **not** activated.

6.4 Audit Trail

6.4.1 Audit Trail - General

6.4.1.1 Audit Trail - Definition

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Definition

The term **Audit Trail** means the FDA-compliant protocolling of all user actions with which in **tiamo** data is generated, modified or deleted. Each of these actions is saved as a line in the Audit Trail table together with the date, time and name of the logged-in user.

Organisation

All the Audit Trail data is saved in the configuration database and can be backed up and restored together with this database. In the **local server systems** (**tiamo light**, **tiamo full**) these are stored in the program directory of the computer on which the program has been installed. In the **client/server systems** (**tiamo multi**) the Audit Trail data is stored centrally on the server and contains all the actions taking place on all the computers (clients) that are connected to this server.

Configuration

Recording the Audit Trail actions can be switched on and off in the Security settings *(see chapter 6.2.2.4, page 1320)*.

6.4.1.2 Audit Trail - Desktop

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Elements

The desktop of the program window **Audit Trail** comprises the following elements:

- *Menu bar*
- *Toolbar*
- *Filter selection*
- *Audit Trail table*
- *Navigation bar*

6.4.1.3 Audit Trail - Menu bar

6.4.1.3.1 Audit Trail - Main menus

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

The menu bar in the program window **Audit Trail** contains the following main items:

- *File*
  Print, export, archive, delete Audit Trail
- *View*
  Update table, define column display.
- *Filter*
  Define and use special filters and quick filters.
- *Tools*
  Monitor Audit Trail
- *Help*
  Open program help, display program information.

6.4.1.3.2 Audit Trail - Menu File

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Print (PDF)...	Put out Audit Trail data sets as PDF file *(see chapter 6.4.2.8, page 1369)*.
Export...	Export Audit Trail data sets *(see chapter 6.4.2.5, page 1367)*.
Archive...	Archive Audit Trail data sets *(see chapter 6.4.2.6, page 1368)*.
Delete	Delete archived Audit Trail data sets *(see chapter 6.4.2.7, page 1368)*.
Close	Close the Audit Trail window.

6.4.1.3.3 Audit Trail - Menu View

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Update	Update Audit Trail table *(see chapter 6.4.2.4, page 1367)*.
Column display...	Define the columns for the Audit Trail table *(see chapter 6.4.2.2, page 1361)*.

6.4.1.3.4 Audit Trail - Menu Filter

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Last filter	Apply the last quick or special filter again *(see chapter 6.4.2.3.2, page 1362)*.
Quick filter	Apply the quick filter *(see chapter 6.4.2.3.3, page 1362)*.

Special filter...	Define and apply a special filter *(see chapter 6.4.2.3.4.1, page 1363)*.
Remove filter	Remove the current filter *(see chapter 6.4.2.3.5, page 1367)*.

6.4.1.3.5 Audit Trail - Menu Tools

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

Monitoring	Define Audit Trail table monitoring *(see chapter 6.4.2.9, page 1370)*.
Installation Log	Open the folder with the log files of the installation. The installation log file is saved under the name **InstallLog-YYYYMMDD-hhmmss.txt** in the directory **...\bin\InstallLog** for each installation process and can also be printed from there.
Verify export / archive	Check the checksum of an exported or stored Audit Trail file *(see chapter 6.4.2.10, page 1370)*.

6.4.1.3.6 Audit Trail - Menu Help

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

tiamo Help	Open tiamo Help.
About	Display information about the program and the installation.

6.4.1.4 Audit Trail - Toolbar

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

Print (PDF)...	Put out Audit Trail data sets as PDF file *(see chapter 6.4.1.3.2, page 1356)*.
Last filter	Apply the last quick or special filter again *(see chapter 6.4.2.3.2, page 1362)*.
Quick filter	Apply the quick filter *(see chapter 6.4.2.3.3, page 1362)*.
Special filter...	Define and apply a special filter *(see chapter 6.4.2.3.4.1, page 1363)*.
Remove filter	Remove the current filter *(see chapter 6.4.2.3.5, page 1367)*.
Update	Update Audit Trail table *(see chapter 6.4.2.4, page 1367)*.
tiamo Help	Open Program Help.

6.4.1.5 Audit Trail - Filter selection

Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**

Filter

Selection of the filter with which the Audit Trail table is to be filtered:

Selection	**All entries** | **Quick filter** | **Temporary filter** | **Filter name**
Default value	**All entries**

All entries
The table is shown unfiltered.

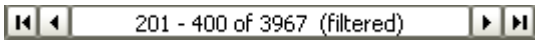
Quick filter
The table is filtered according to the last defined quick filter *(see chapter 6.4.2.3.3, page 1362)*.

Temporary filter
The table is filtered according to the last defined, not saved special filter *(see chapter 6.4.2.3.4.1, page 1363)*.

Filter name
The table is filtered according to the selected and saved special filter *(see chapter 6.4.2.3.4.1, page 1363)*.

6.4.1.6 Audit Trail - Navigation bar

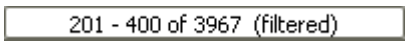
Program window: **Configuration ► Tools ► Audit Trail... ► Audit Trail**



The navigation bar shown beneath the Audit Trail table is used for navigating through extensive tables in which not all the entries can be shown at the same time. It contains the following elements:

Jumps to first set of entries in the Audit Trail table.

Returns to previous set of entries in the Audit Trail table.



Display of the selected set **#### - ####** of entries in the Audit Trail table. If the table has not been filtered then the total number of entries will also appear. If the table has been filtered then the total number of filtered entries will appear with the info **(filtered)**.

Moves to next set of entries in the Audit Trail table.

Jumps to last set of entries in the Audit Trail table.

6.4.1.7 Audit Trail - Functions

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

In the **Audit Trail** program window the following functions can be carried out:

- *Filter Audit Trail*
- *Update Audit Trail*
- *Export Audit Trail*
- *Archive Audit Trail*
- *Delete Audit Trail*
- *Print Audit Trail*

6.4.2 Audit Trail table

6.4.2.1 Audit-Trail - Table

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

Open

The Audit-Trail table is opened with **Tools ▶ Audit Trail...** or with the symbol in the **Configuration** program part.

NOTICE

The table can be opened only if the option **Enable Audit Trail** is switched on in the security settings *(see chapter 6.2.2.4, page 1320)*.

Contents

In the Audit Trail table, the following information regarding user actions is displayed in the default settings:

Type

Symbol for characterizing the action:

Information about the action, which is neither relevant to the security nor has modified any data.

Information about the action, which is either relevant to the security or has modified any data.

Information about errors or incorrect actions. These actions are additionally shown with a red background to their line numbers.

Date

Date, time and time zone of the action.

User

Short name of the logged-in user.

Full name

Full name of the logged-in user.

Client

Name of the Client on which the action was carried out or which is affected by the action.

Category

Program part to which the action belonged.

Action

Short description of the action.

Details

Detailed information about the action.

Archived

Shows whether the action has already been archived or not (only archived actions can be deleted).

Unwanted columns can be removed with the menu item **View ▶ Column display...**.

Table view

The Audit Trail table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The following functions can be carried out:

- *Filter Audit Trail*
- *Update Audit Trail*
- *Export Audit Trail*
- *Archive Audit Trail*
- *Delete Audit Trail*
- *Print Audit Trail*
- *Monitor Audit Trail*
- *Verify Audit Trail*

6.4.2.2 Audit Trail - Column display

Dialog window: **Audit Trail ► View ► Column display... ► Column display**

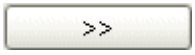
Use **View ► Column display...** to open the dialog window **Column display**. Here the columns can be defined which are to be displayed in the Audit Trail table.

Columns available

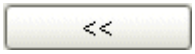
Shows all the fields that can be displayed as columns in the Audit Trail table.

Columns displayed

Shows all the fields that are displayed as columns in the Audit Trail table. All available columns are shown as the default.



Add the selected column to the table.



Remove the selected column from the table.

Modify the sequence of displayed columns by moving the selected column up.

Modify the sequence of displayed columns by moving the selected column down.

6.4.2.3 Filtering the Audit Trail

6.4.2.3.1 Filter Audit Trail

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

The following possibilities exist for filtering entries in the Audit Trail table:

- *Filter selection in filter bar*
- *Quick filter*
- *Special filter*
- *Last filter*
- *Remove filter*

6.4.2.3.2 Audit Trail - Last filter

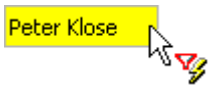
Menu item: **Audit Trail ▶ Filter ▶ Last filter**

The most recently applied filter is reactivated with the **Filter ▶ Last filter** menu item or with the icon in the **Audit Trail** program window.

6.4.2.3.3 Audit Trail - Quick filter

Menu item: **Audit Trail ▶ Filter ▶ Quick filter**

A quick filtration can be carried out in accordance with the content of the selected table field using the **Filter ▶ Quick filter** menu item or the icon in the **Audit Trail** program window. After this function has been selected, the field in which the cursor is located will have a colored background when navigating within the Audit Trail table. At the same time, the following special filter icon appears:



Double-clicking with the left mouse button on the field selected in the table will cause its contents to be set as the filter criterion, and this filter will be applied directly to the table.

NOTICE

The quick filter can be applied again within the filtered table, so that the number of entries can be limited step by step.

6.4.2.3.4 Audit Trail - Special filter

6.4.2.3.4.1 Special filter table

Dialog window: **Audit Trail ► Filter ► Special filter... ► Special filter - Database 'ConfigDB'**

The **Filter ► Special filter...** menu item or the icon in the **Audit Trail** program window is used to open the **Special filter - Database 'ConfigDB'** dialog window for the definition of user-specific filters.

Filter

Selection of the filter to be loaded for editing. An empty table with the name **New filter** is loaded per default.

Selection	**'Filter name'** | **New filter**
Default value	**New filter**

[Save filter]

Opens the **Save filter** dialog window in which the filter criteria entered in the table can be saved as a special filter under the required name *(see chapter 6.4.2.3.4.3, page 1366)*.

[Delete filter]

The currently loaded special filter is deleted.

Table view

The overview table shows all the defined filter criteria and cannot be directly edited. The table view can be adapted with the left mouse button as follows:

- **Dragging the margin between column titles:**
  Sets the column width
- **Double-clicking on the margin between column titles:**
  Sets the optimal column width

If the content of a field is larger than the column width, then the entire content will be shown as a tooltip if the mouse cursor hovers over the field.

For the meaning of the columns, see *Edit filter criterion*.

Functions

The **[Edit]** menu beneath the filter table contains the following menu items:

Edit line	Open the **Edit filter criterion %1** dialog window, in which the filter conditions of the line selected in the table can be edited *(see chapter 6.4.2.3.4.2, page 1364)*.

Insert new line	Inserts a new, empty line above the line selected in the table. The **Edit filter criterion** dialog window then opens automatically *(see chapter 6.4.2.3.4.2, page 1364)*.
Cut lines	Transfers the selected lines to the clipboard.
Copy lines	Copies the selected lines to the clipboard.
Paste lines	Pastes lines from the clipboard above the selected line.
Delete lines	Deletes the selected lines.

[Apply filter]

Apply the filter conditions to the Audit Trail table.

6.4.2.3.4.2 Special filter - Editing filter criteria

Dialog window: **Audit Trail ► Filter ► Special filter... ► Special filter - Database 'ConfigDB' ► [Edit] ► Edit line ► Edit filter criterion %1**

[Edit] ► Edit line is used to open the dialog window **Edit filter criterion %1** in which the filter condition selected in the filter table can be edited.

Link

Selection of the type of link (logical operator) with the preceding filter criterion.

Selection	**AND** | **OR**
Default value	**AND**

Field

Selection of the field according to which the filtering is to be carried out.

Selection	**Last 10 selected fields**

[More...]

Opens the **Filter - Field selection** dialog window in which all fields according to which filtration can be performed are listed in the form of a tree. A field can be applied in the filter condition by highlighting it and closing the dialog window with **[OK]**.

Condition

Type

Selection of the type of format for columns in which several types are possible. In the case of columns with a fixed type, this will only be indicated.

Selection	**Text** | **Number** | **Date**
Default value	**Text**

Operator

Selection of the comparison operator for the filter criterion.

NOTICE

Some operators are available only for specific fields.

for fields of the 'Text' type

Selection	**=** | **<>** | **empty** | **not empty**
Default value	**=**

for fields of the 'Date' type

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **out of limits** | **Today**
Default value	**=**

for fields of the 'Number' type

Selection	**=** | **<>** | **<** | **<=** | **>** | **>=** | **empty** | **not empty** | **invalid** | **out of limits**
Default value	**=**

NOTICE

If selection is made for the **Date** column of the **Operator Today**, then filtration will be carried out in accordance with the current date. A range in days (**-9,999 - 9,999**) can also be defined in the **Comparative value** field, according to which filtration should be carried out starting from the current date.

Comparative value

Selection or entry of the comparative value for the filter criterion.

for fields of the 'Text' type

Entry	**250 characters** **^*** can be used as a wildcard for any strings.

for fields of the 'Number' type

Entry	**Numerical value**

for fields of the 'Date' type

... opens the **Select date** window to select the date *(see chapter 2.5.1, page 84)*.

for fields of type 'Date' and 'Operator = Today'

Input range	**-9,999 to 9,999**
Default value	**0**

Match case

on | off (Default value: **off**)

If this option is activated, then upper/lower case will be differentiated when filtering fields with **Type** = **Text**.

Use asterisk (*) as wildcard

on | off (Default value: **off**)

If this option is activated, then the asterisk ***** is used as a wildcard for any strings when filtering fields for which **Type** = **Text**.

6.4.2.3.4.3 Special filter - Saving a filter

Dialog window: **Audit Trail ► Filter ► Special filter... ► Special filter - Database 'ConfigDB' ► [Save filter] ► Save filter**

The **[Save filter]** button is used to open the **Save filter** dialog window for saving a special filter.

Filter name

Name under which the special filter is to be saved.

Entry	**50 characters**

[Save]

Saves the filter under the given name.

NOTICE

The filters are saved globally in the configuration database and are therefore available for all clients.

6.4.2.3.5 Audit Trail - Removing a filter

Menu item: **Audit Trail ▶ Filter ▶ Remove filter**

The most recently applied filter is removed again with the **Filter ▶ Remove filter** menu item or with the icon in the **Audit Trail** program window and all entries are displayed.

6.4.2.4 Updating Audit Trail

Menu item: **Audit Trail ▶ View ▶ Update**

The Audit Trail table is updated with the menu item **View ▶ Update** or with the symbol .

NOTICE

The Audit Trail table is automatically updated when it is opened, but not afterwards.

6.4.2.5 Exporting Audit Trail

Dialog window: **Audit Trail ▶ File ▶ Export... ▶ Export Audit Trail**

With the menu item **File ▶ Export...**, the dialog window **Export Audit Trail** opens.

Save file as

Entry or selection (with) of the complete path and the file name for saving the export file.

Entry	**1000 characters**

Selection

Selection	**All records** | **Selected records**
Default value	**All records**

All records
All the entries from the filtered Audit Trail table are exported.

Selected records
Only the entries selected in the Audit Trail table will be exported.

NOTICE

Audit Trail entries are exported in text format and cannot be imported back into the Audit Trail table. The export file contains a checksum which allow to verify whether the file has been modified later on.

6.4.2.6 Archiving Audit Trail

Dialog window: **Audit Trail ▶ File ▶ Archive... ▶ Archive Audit Trail**

With the menu item **File ▶ Archive...**, the dialog window **Archive Audit Trail** opens.

Target directory

Entry or selection (with ...) of the directory in which the Audit Trail entries are to be archived.

Entry	**1000 characters**

Selection

Selection	**All records** | **Records until**
Default value	**All records**

All records
All entries from the filtered Audit Trail table will be archived.

Records until
Only data sets from the Audit Trail table up to the selected date will be archived.

NOTICE

Archiving Audit Trail entries is identical to exporting them, i.e. the Audit Trail entries are stored in text format and cannot be imported back into the Audit Trail Table. The difference between this and exporting is that the archived entries can be marked in the column **Archived** and then deleted. The archive file contains a checksum which allows to verify whether the file has been modified later on.

6.4.2.7 Deleting Audit Trail

Dialog window: **Audit Trail ▶ File ▶ Delete ▶ Delete Audit Trail**

With the menu item **File ▶ Delete**, the dialog window **Delete Audit Trail** opens.

Selection

Selection	**All archived records** | **Archived records until**
Default value	**All archived records**

All archived records
All the archived entries will be deleted from the Audit Trail table.

Archived records until
Only the archived entries created up to the entered date will be deleted from the Audit Trail table.

User 1

User

Short name of the first user who has the right to delete Audit Trail entries.

Entry	**24 characters**

Password

Password of the first user who has the right to delete Audit Trail entries.

Entry	**24 characters**

User 2

User

Short name of the second user who has the right to delete Audit Trail entries.

Entry	**24 characters**

Password

Password of the second user who has the right to delete Audit Trail entries.

Entry	**24 characters**

6.4.2.8 Print Audit Trail

Dialog window: **Audit Trail ► File ► Print (PDF)... ► Print Audit Trail (PDF)**

With the menu item **File ► Print (PDF)...** or the symbol PDF in the program window **Audit Trail**, the dialog window **Print Audit Trail (PDF)** opens.

Selection

Selection	**All records** | **Selected records**
Default value	**Selected records**

All records
All the entries from the filtered Audit Trail table will be printed.

Selected records
Only the entries selected in the Audit Trail table will be printed.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output of the Audit Trail table in portrait format.

Landscape
Output of the Audit Trail table in landscape format.

[OK]

The Audit Trail table output is as a PDF file in the chosen format which is opened directly with Acrobat Reader; it can then be printed out or saved.

NOTICE

The Audit Trail table is automatically updated when it is opened, but not afterwards.

6.4.2.9 Monitoring Audit Trail

Dialog window: **Audit Trail ► Tools ► Monitoring ► Audit Trail monitoring**

With the menu item **Tools ► Monitoring**, the dialog window **Audit Trail monitoring** opens.

Monitor number of entries

on | off (Default value: **on**)

If this option is **activated**, then the number of entries in the Audit Trail table will be monitored.

Maximum number

Maximum number of entries allowed in the Audit Trail table. If this number is exceeded an error message appears.

Input range	**10 to 500000**
Default value	**100000**

6.4.2.10 Verifying Audit Trail

Dialog window: **Audit Trail ► Tools ► Verify export / archive ► Verify audit trail export / archive**

The menu item **Tools ► Verify export / archive** is used to open the dialog window **Verify audit trail export / archive** in which the checksum of a file which is exported from the Audit Trail or archived can be checked.

Select file

Entry or selection (with) of the file that is to be verified.

[Verify]

Trigger the checking of the selected file.

Result

The result of the checking of the checksum is displayed.

6.4.3 Audit Trail – Actions

Program window: **Configuration ▶ Tools ▶ Audit Trail... ▶ Audit Trail**

List of the actions that are recorded in the Audit Trail, listed by categories.

6.4.3.1 Program

Category	Type	Action	Details
Program		Program started	Program: "text"; build: "number"
Program		Program finished	Program: "text"; build: "number"

6.4.3.2 Security settings

Category	Type	Action	Details
Security settings		Login option modified	Modified parameter: "parameter"; old value: "old value"; new value: "new value"
Security settings		Password option modified	Modified parameter: "parameter"; old value: "old value"; new value: "new value"
Security settings		Audit Trail option modified	Modified parameter: "parameter"; old value: "old value"; new value: "new value"
Security settings		Signature option modified	Modified parameter: "parameter"; old value: "old value"; new value: "new value"
Security settings		Default reason added	Category: "category"; text: "default text"
Security settings		Default reason deleted	Category: "category"; text: "default text"
Security settings		Security settings imported	

6.4.3.3 User administration

Category	Type	Action	Details
User administration		Group copied	Old group: "group name"; new group: "group name"
User administration		Group added	Group: "group name"
User administration		Group renamed	Old name: "old group name"; new name: "new group name"
User administration		Group deleted	Group: "group name"
User administration		Access right modified	Group: "group name"; access right: "functionality (tree)"; old value: "on/off"; new value: "on/off"

Category	Type	Action	Details
User administration	⚠	Signature permission modified	Group: "group name"; signature permission: "parameter"; old value: "on/off"; new value: "on/off"
User administration	⚠	Group option modified	Group: "group name"; option: "parameter"; old value: "value"; new value: "value"
User administration	ℹ	User added	Group: "group name"; user: "user name"
User administration	ℹ	User imported	Group: "group name"; user: "user"
User administration	ℹ	User properties modified	Group: "group name"; user: "user name"; parameter: "parameter"; old value: "value"; new value: "value"
User administration	⚠	User moved	User: "user name"; old group: "group name"; new group: "group name"
User administration	⚠	User group imported	Group: "group name"
User administration	⚠	User administration imported	

6.4.3.4 Login

Category	Type	Action	Details
Login	ℹ	Logged in	User: "user name"
Login	ℹ	Logged out manually	User: "user name"
Login	ℹ	Logged out automatically	User: "user name"
Login	⚠	Password modified	User: "user name"
Login	✖	Illegal login attempt	User: "user name"; error: "error message"

6.4.3.5 Audit Trail

Category	Type	Action	Details
Audit Trail	⚠	Audit Trail exported	Number of entries: "number"; file name: "*.txt"; directory: "archive directory"
Audit Trail	⚠	Audit Trail archived	Number of entries: "number"; start: "date of first entry"; end: "date of last entry"; file name: "*.txt"; directory: "archive directory"
Audit Trail	⚠	Audit Trail deleted	Number of entries: "number"; start: "date of first entry"; end: "date of last entry"; signature 1 by: "user name"; signature 2 by: "user name"

Category	Type	Action	Details
Audit Trail		Audit Trail monitoring modified	Modified parameter: "parameter"; old value: "old value"; new value: "new value"
Audit Trail		Illegal login attempt in Audit Trail	User: "user name"; error: "error message"

6.4.3.6 Configuration

Category	Type	Action	Details
Configuration		Configuration exported	Configuration data: "designation"; "designation" *(see chapter 6.3.1.1, page 1330)*
Configuration		Configuration imported	Configuration data: "designation"; "designation" *(see chapter 6.3.1.2, page 1333)*
Configuration		Device added	Device name: "device name"; device type: "device type"; serial number: "serial number"
Configuration		Device imported	Device name: "device name"; device type: "device type"; serial number: "serial number"
Configuration		Device modified	Device name: "device name"; device type: "device type"; serial number: "serial number"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration		Device modified automatically	Device name: "name"; modified by method: "method name"; method group: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration		Dark spectrum / reference spectrum modified automatically	Device name: "name"; modified by method: "method name"; method group: "group name"
Configuration		Dark spectrum / reference spectrum / correction spectrum deleted manually	Device name: "name"
Configuration		Device deleted	Device name: "device name"; device type: "device type"; serial number: "serial number"
Configuration		Solution added	Solution: "name"; creation: "manually" or "automatically"
Configuration		Solution imported	Solution: "name"
Configuration		Solution chip repaired	Solution: "name"
Configuration		Solution modified manually	Solution: "name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration		Solution modified automatically	Solution: "name"; modified by method: "method name"; method group: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"

Category	Type	Action	Details
Configuration	⚠	Solution deleted	Solution: "name"
Configuration	⚠	Titer history deleted	Solution: "name"
Configuration	ℹ	Sensor added	Sensor: "name"; creation: "manually" or "automatically"
Configuration	ℹ	Sensor imported	Sensor: "name"
Configuration	ℹ	Sensor chip repaired	Sensor: "name"
Configuration	⚠	Sensor modified manually	Sensor: "name"; modified parameter: "parameter"; modified by system; old value: "old value"; new value: "new value"
Configuration	⚠	Sensor modified automatically	Sensor: "name"; modified by method: "method name"; method group: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Sensor modified by system	Sensor: "name"; modified parameter: "parameter"; modified by system; old value: "old value"; new value: "new value"
Configuration	⚠	Sensor deleted	Sensor: "name"
Configuration	⚠	Sensor history deleted	Sensor: "name"
Configuration	ℹ	Common Variable added	Common variable: "name"; creation: "manually" or "automatically"
Configuration	ℹ	Common Variable imported	Common variable: "name"
Configuration	⚠	Common Variable modified manually	Common variable: "name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Common Variable modified automatically	Common variable: "name"; modified by method: "method name"; method group: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Common Variable history deleted	Common variable: "name"
Configuration	⚠	Common Variable deleted	Common variable: "name"
Configuration	ℹ	Sample Solution (TC conductivity) added	Sample solution (TC conductivity): "name"; creation: "manually" or "automatically"
Configuration	ℹ	Sample Solution (TC conductivity) imported	Sample solution (TC conductivity): "name"
Configuration	⚠	Sample Solution (TC conductivity) modified manually	Sample solution (TC conductivity): "name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Sample Solution (TC conductivity) modified automatically	Sample solution (TC conductivity): "name"; modified parameter: "parameter"; modified by method: "method name"; method group: "group name"; old value: "old value"; new value: "new value"

Category	Type	Action	Details
Configuration	⚠	Sample Solution (TC conductivity) deleted	Sample solution (TC conductivity): "name"
Configuration	ℹ	Rack added	Rack name: "device name"; rack code: "rack code"; devices: "device names"
Configuration	ℹ	Rack imported	Rack name: "device name"
Configuration	⚠	Rack modified	Rack name: "device name"; rack code: "rack code"; devices: "device names"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Rack deleted	Rack name: "device name"; rack code: "rack code"; devices: "device names"
Configuration	⚠	Buffer modified	Buffer name: "buffer name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Buffer imported	Buffer name: "buffer name"
Configuration	ℹ	Conductivity standard added	Conductivity standard: "conductivity standard name"
Configuration	ℹ	Conductivity standard imported	Conductivity standard: "conductivity standard name"
Configuration	⚠	Conductivity standard modified	Conductivity standard: "conductivity standard name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Configuration	⚠	Conductivity standard deleted	Conductivity standard: "conductivity standard name"

6.4.3.7 Method

Category	Type	Action	Details
Method	ℹ	Method group created	Name: "group name"
Method	⚠	Method group deleted	Name: "group name"
Method	⚠	Method group renamed	Old name: "old group name"; new name: "new group name"
Method	⚠	Method group property modified	Name: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Method	ℹ	Method created	Name: "method name"; version: "version number"; group: "group name"
Method	ℹ	Method modified	Name: "method name"; version: "version number"; group: "group name"; modification comment: "modification comment"
Method	⚠	Method renamed	Old name: "method name"; new name: "method name"; version: "version number"; group: "group name"

Category	Type	Action	Details
Method		Method copied	Old name: "method name"; version: "version number"; new name: "method name"; version: "version number"
Method		Method moved	Name: "method name"; version: "version number"; old group: "group name"; new group: "group name"
Method		Method exported	Name: "method name"; version: "version number"; group: "group name"
Method		Method imported	Name: "method name"; version: "version number"; group: "group name"
Method		Method updated	Name: "method name"; old version: "version number"; new version: "version number"
Method		Illegal login attempt for method signing	Name: "method name"; version: "version number"; user: "user name"; error: "error message"
Method		Method signed (1)	Name: "method name"; version: "version number"; signed (1) by: "user name"; reason: "reason"; comment: "signature comment"
Method		Method signed (2)	Name: "Method name"; version: "version number"; signed (2) by: "user name"; reason: "reason"; comment: "signature comment"
Method		Signatures (2) for method deleted	Name: "method name"; version: "version number"; signatures (2) deleted by: "user name"; reason: "reason"; comment: "signature comment"
Method		Method deleted	Name: "method name"; version: "version number"; group: "group name"

6.4.3.8 Workplace

Category	Type	Action	Details
Workplace		Conditioning started	Method: "method name"; method version: "version number"; method group: "group name"
Workplace		Conditioning stopped	Method: "method name"; method version: "version number"; method group: "group name"
Workplace		Determination series started	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination started	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination started with COND BUSY	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"

Category	Type	Action	Details
Workplace	⚠	Determination interrupted	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace	⚠	Determination continued	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace	⚠	Determination series interrupted	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace	⚠	Determination series continued	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace	⚠	Parameter live modified	Method: "method name"; method version: "version number"; method group: "group name"; command: "command name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"; ID1: "ID1"; determination ID: "determination ID"; reason: "reason"; modification comment: "modification comment" The determination ID is not entered if the determination has not yet been started.
Workplace	⚠	Sample data live modified (manually)	Method: "method name"; method version: "version number"; method group: "group name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"; ID1: "ID1"; determination ID: "determination ID"; reason: "reason"; modification comment: "modification comment" The determination ID is not entered if the determination has not yet been started.
Workplace	⚠	Sample data live modified (with REQUEST)	Method: "method name"; method version: "version number"; method group: "group name"; track: "track name"; command: "command name"; modified parameter: "parameter"; old value: "old value"; new value: "new value"; ID1: "ID1"; determination ID: "determination ID"; reason: "reason"; modification comment: "modification comment"
Workplace	⚠	Command aborted	Method: "method name"; method version: "version number"; method group: "group name"; track: "track name"; command: "command name"; ID1: "ID1"; determination ID: "determination ID"
Workplace	⊗	Determination error	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"; error: "error message"
Workplace	⊗	Conditioning error	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; error: "error message"

Category	Type	Action	Details
Workplace		Start test error	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; error: "error message"
Workplace		Limit exceeded (manually)	Method: "method name"; method version: "version number"; method group: "group name"; variable name: "variable name"; variable value: "value"; upper limit value: "upper limit value"; lower limit value: "lower limit value"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Limit exceeded	Method: "method name"; method version: "version number"; method group: "group name"; track: "track name"; command: "command name"; variable name: "variable name"; variable value: "value"; upper limit value: "upper limit value"; lower limit value: "lower limit value"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Action started (manually)	Method: "method name"; method version: "version number"; method group: "group name"; track: "track name"; command: "command name"; action: "determination stopped or determination and series stopped"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Action started	Method: "method name"; method version: "version number"; method group: "group name"; action: "determination stopped or determination and series stopped"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination stopped	Method: "method name"; track: "track name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination series stopped	Method: "method name"; track: "track name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination finished	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"
Workplace		Determination series finished	Method: "method name"; method version: "version number"; method group: "group name"; ID1: "ID1"; determination ID: "determination ID"

6.4.3.9 Database

Category	Type	Action	Details
Database		Database created	Name: "database name"; directory: "database directory"
Database		Database copied	Old name: "database name"; old directory: "database directory"; new name: "database name"; new directory: "database directory"

Category	Type	Action	Details
Database		Database moved	Name: "database name"; old directory: "database directory"; new directory: "database directory"
Database		Database renamed	Old name: "database name"; new name: "database name"; directory: "database directory"
Database		Database backuped	Name: "database name"; directory: "database directory"; backup name: "backup name"; backup directory: "backup directory"
Database		Database restored	Name: "database name"; directory: "database directory"; backup name: "backup name"; backup directory: "backup directory"
Database		Configuration database restored	Name: "database name"; directory: "database directory"
Database		Database deleted	Name: "database name"; directory: "database directory"
Database		Database property modified	Name: "database name"; directory: "database directory"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Database		Database access right modified	Name: "database name"; directory: "database directory"; user group: "user group"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Database		Database backup option modified	Name: "database name"; directory: "database directory"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Database		Database monitoring option modified	Name: "database name"; directory: "database directory"; modified parameter: "parameter"; old value: "old value"; new value: "new value"
Database		Database automatically repaired	Name: "database name"; directory: "database directory"; error: "error message"
Database		Determination manually imported	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"
Database		Determination manually exported	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; format: "export format"; target directory: "directory"; file name: "file name"
Database		Determination automatically exported	Determination ID: "determination ID"; determination version: "version number"; ID1: "ID1"; method: "method name"; method version: "version number"; method group: "group name"; format: "export format"; target directory: "directory"; file name: "file name"

Category	Type	Action	Details
Database	⚠	Determination reprocessed	Old determination ID: "determination ID"; old determination version: "version number"; new determination ID: "determination ID"; new determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; modification comment: "modification comment"
Database	⚠	Determination updated	Old determination ID: "determination ID"; old determination version: "version number"; new determination ID: "determination ID"; new determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; modification comment: "modification comment"
Database	⛔	Illegal login attempt for determination signing	User: "user name"; error: "error message"
Database	⚠	Determination signed (1)B	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; signed (1) by: "user name"; reason: "reason"; comment: "signature comment"
Database	⚠	Determination signed (2)	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; signed (2) by: "user name"; reason: "reason"; comment: "signature comment"
Database	⚠	Signatures (2) for determination deleted	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ident: "ident"; method: "method name"; method version: "version number"; method group: "group name"; signatures (2) deleted by: "user name"; reason: "reason"; comment: "signature comment"
Database	⚠	Determination deleted	Determination ID: "determination ID"; determination version: "version number"; database: "database name"; directory: "database directory"; ID1: "ID1"; method: "method name"; method version: "version number"; method group: "group name"; reason: "determination deleted automatically by system" (only for remote control option)

6.5 Subwindow Devices

6.5.1 Configuration - Devices

Subwindow: **Configuration ▶ Devices**

Subwindow Devices

The subwindow **Devices** contains the device table with all automatically recognized and manually added devices and is always shown in the program part **Configuration**, i.e. it cannot be removed from the Configuration view. The subwindow can be enlarged and reduced as required; it can also be maximized.

USB devices

Devices connected to the PC via USB are automatically recognized at the start of the program and entered in the device table. If the connection between PC and device or the current supply is interrupted then the device will remain in the device table with the status **not ok**. If it is reconnected then it will be recognized automatically by its serial number and again assigned to the existing device entries. The status will change to **ok**.

Peripheral devices of USB devices

Peripheral devices connected to USB devices (e.g. dosing devices, stirrers, etc.) are also recognized automatically. If they are connected or removed while a program is running, then after confirming a corresponding message, either the device must be reinitialized, the USB connection must be interrupted and then re-established or the program must be restarted.

RS-232 devices

Devices that are connected to the PC via an RS-232 interface will not be recognized automatically. They must be added manually to the device table as new devices. If the connection between PC and device or if the current supply is interrupted, the device will nevertheless remain in the device table with the status **ok**. In order to update the status to **not ok**, the properties window of the device must be opened and then closed again. The same applies when the device is connected again or switched on.

6.5.2 Device table

6.5.2.1 Device table - Desktop

Subwindow: **Configuration ▶ Devices**

Contents

In the device table the following information about automatically recognized or manually added devices is shown per default:

Device name

Designation of the device.

Device type

Type of device.

Device serial number

Serial number of the device.

Status

Device status. A device that is ready has the status **ok** shown in green, a device that is not ready has the status **not ok** shown in red.

NOTICE

The device status is permanently monitored and updated for USB devices only. For Metrohm devices with RS-232 connection, the current status at the last access to the device is shown always. For balances, barcode readers and generic RS-232 devices, the status cannot be monitored. It will be set to **ok** after confirmation of the connection test.

Set to work

Date on which the device was added to the device table.

Next GLP test

Date on which the next GLP test is due. If GLP monitoring is switched on and the set date is before the current date (i.e. the GLP test has not yet been carried out) then the date will be shown in red.

Remarks

Remarks about the device.

NOTICE

Lines that contain red entries will also show the line number with a red background.

As soon as a determination is started all the devices or device components used in the method (dosing devices, measuring inputs) will be occupied, i.e. they can neither be used at a different workplace nor used or configured in manual control until the determination has been finished. The line for an occupied device is shown in gray letters.

Table view

The device table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width.
- **Double-click on the margin between column titles**:
  Sets the optimal column width.
- **Drag the column title**:
  Moves the column to the required location.

If the contents of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** beneath the device table contains the following menu items:

New...	Add manually a new device connected to the PC via an RS-232 interface *(see chapter 6.5.2.2, page 1383)*.
Delete	Delete the selected device. Only devices that are not connected can be deleted *(see chapter 6.5.2.3, page 1384)*.
Properties...	Edit the selected device *(see chapter 6.5.3, page 1386)*.
Column display...	Define columns for the device table *(see chapter 6.5.2.4, page 1384)*.
Print (PDF)...	Output of the device table as a PDF file *(see chapter 6.5.2.6, page 1385)*.
Ignored devices	Open the list of ignored devices *(see chapter 6.5.2.5, page 1385)*.
Initialize	Initialize the selected device (only possible for USB devices).

6.5.2.2 Adding a new device

Menu item: **Configuration ► Devices ► [Edit] ► New...**

Devices that are connected to the PC via an RS-232 interface must be added manually to the device table with **[Edit] ► New...**. This opens the dialog window **Device selection**.

The required new device must be selected from the tree-form list that is shown, which contains all the devices known to the program (arranged according to device type). When the dialog window has been closed with **[OK]** the Properties window opens automatically for entering additional device data.

After the properties window has been closed the new device with its set parameters is entered in the device table and the connection is tested. If the connection is **ok**, then the further device information is read in from the device.

6.5.2.3 Deleting a device

Menu item: **Configuration ► Devices ► [Edit] ► Delete**

With **[Edit] ► Delete**, the device selected in the device table is deleted.

NOTICE

Only devices that are not connected can be deleted.

6.5.2.4 Devices - Column display

Dialog window: **Configuration ► Devices ► [Edit] ► Column display... ► Column display**

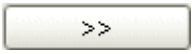
With **[Edit] ► Column display...**, the dialog window **Column display** is opened. Here you can define the columns that are to be shown in the device table.

Columns available

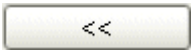
Display of all the fields that can be shown as columns in the device table.

Columns displayed

Display of all the fields that will be shown as columns in the device table. Per default, the columns **Device name**, **Device type**, **Device serial number**, **Status**, **Set to work**, **Next GLP test** and **Remarks** are displayed. The columns **Device name** and **Device type** are always present and cannot be removed.



Add the selected column to the table.



Remove the selected column from the table.

Modify the sequence of the displayed columns by moving the selected column up.

Modify the sequence of the displayed columns by moving the selected column down.

6.5.2.5 Editing ignored devices

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Ignored devices ▶ Ignored devices**

With **[Edit] ▶ Ignored devices**, the dialog window **Ignored devices** is opened. Here the list of ignored devices can be edited.

Ignored devices are devices which are recognized automatically upon connection but are ones which the user does not wish to have permanently displayed in the device table. Ignored devices will no longer be recognized automatically at the time of the next program start.

Table contents

The following information concerning the ignored devices is shown in the table:

Device type

Type of device.

Device serial number

Serial number of the device.

[Delete]

The highlighted device is removed from the list. It will be recognized automatically again at the time of the next program start and can be included in the list of devices.

6.5.2.6 Printing the device list

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Print (PDF)... ▶ Print list of devices (PDF)**

With **[Edit] ▶ Print (PDF)...**, the dialog window **Print list of devices (PDF)** is opened.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output of the device table in portrait format.

Landscape
Output of the device table in landscape format.

[OK]

The table of devices is shown in the required format as a PDF file and can be opened directly with the Acrobat Reader; it can then be printed out and/or saved.

6.5.3 Device properties

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

With the menu item **[Edit] ► Properties...** in the subwindow **Devices**, the properties window opens for the device selected in the device table in which the parameters of the device can be edited. It consists of several tabs. The tabs **General** and **GLP** are always present, the remaining tabs depend on the selected device. Properties can be set for the following devices:

- *Titrando*
- *Titrino*
- *756/831 Coulometer*
- *712 Conductometer*
- *856 Conductometer*
- *867 pH Module*
- *846 Dosing Interface*
- *730 Sample Changer*
- *774 Oven Sample Processor*
- *778/789 Sample Processor*
- *814/815 Sample Processor*
- *855 Robotic Titroprocessor*
- *864 Balance Sample Processor*
- *874 Oven Sample Processor*
- *Avantes Spectrometer*
- *RS-232 device*
- *Balance*
- *Barcode reader*

6.6 Subwindow Titrants/Solutions

6.6.1 Titrants/Solutions - General

Subwindow: **Configuration ► Titrants/Solutions**

Subwindow Titrants/Solutions

The **Titrants/Solutions** subwindow contains the solution table with all automatically recognized and manually added titrants and auxiliary solutions. It can be shown in the **Configuration** program part as a part of the configuration view or (if not present on the user interface) in a separate window with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Titrants

Titrants are used as solutions for the titration commands **DET**, **MET**, **SET**, **KFT** and **STAT**. They can be used in exchange units or dosing units.

Auxiliary solutions

Auxiliary solutions are used as solutions for the dosing commands **ADD**, **DOS** and **LQH**. They can be used in exchange units or dosing units.

Intelligent exchange units (IEU) and dosing units (IDU)

Intelligent exchange units and dosing units have a data chip with stored solution data. When mounted on intelligent devices (e.g. Titrando) they are recognized automatically and stored in the solution table.

Nonintelligent exchange units (EU) and dosing units (DU)

Nonintelligent exchange units and dosing units must be added manually to the solution table.

6.6.2 Solution table

6.6.2.1 Solution table

Subwindow: **Configuration ▶ Titrants/Solutions**

Contents

In the solution table the following information about automatically recognized or manually added solutions is shown as standard:

Solution name

Name of the solution.

Concentration

Concentration (value and unit) of the solution.

Cylinder volume

Cylinder volume of the exchange or dosing unit in mL.

Type

Type of exchange unit or dosing unit.

Dosing device

Device name and dosing connection of the device to which the exchange or dosing unit is fitted (only for intelligent exchange/dosing units).

Titer

Titer (value and unit) of the solution.

Date titer det.

Date on which the last titer determination was carried out.

Next titer determination

Date on which the next titer determination is to be carried out. If titer monitoring is switched on and the set date is before the current date (i.e. the titer determination has not yet been carried out) then the date will be shown in red.

Expiry date

Expiry date of the solution. If solution monitoring is switched on and the set date is before the current date (i.e. the expiry date has elapsed), then the date will be shown in red.

With menu item **[Edit] ► Column display...** further columns from the solution properties can be shown.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The solution table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** below the solution table contains the following menu items:

New...	Adds new solution manually *(see chapter 6.6.2.2, page 1389)*.
Delete	Deletes selected solution *(see chapter 6.6.2.3, page 1389)*.
Properties...	Edits selected solution *(see chapter 6.6.3.1, page 1390)*.

Column display…	Defines the columns for the solution table *(see chapter 6.6.2.4, page 1389)*.
Print (PDF)	Shows the solution table as a PDF file *(see chapter 6.6.2.5, page 1390)*.

6.6.2.2 Add new solution

Menu item: **Configuration ► Titrants/Solutions ► [Edit] ► New…**

Solutions in nonintelligent exchange units (EU) and dosing units (DU) without data chip must always be added manually to the solution table with **Edit ► New... ► Exchange unit** or **Edit ► New... ► Dosing unit**. The Properties window then opens automatically for editing the solution. After the Properties window has been closed, the solution will be entered in the solution table. The parameters can be altered at any time with **[Edit] ► Properties...**

NOTICE

Solutions in intelligent 806 Exchange Units (IEU) or 807 Dosing Units (IDU) with data chip need only be manually added and configured when they are fitted to devices that cannot read out the data automatically (e.g. Titrino, 700 Dosino).

6.6.2.3 Delete solution

Menu item: **Configuration ► Titrants/Solutions ► [Edit] ► Delete**

With **[Edit] ► Delete**, the solution selected in the solution table is deleted.

6.6.2.4 Solutions - Column display

Dialog window: **Configuration ► Titrants/Solutions ► [Edit] ► Column display… ► Column display**

With**[Edit] ► Column display…**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the solution table..

Columns available

Shows all the fields that can be shown as columns in the solution table.

Columns displayed

Shows all the fields that will be shown as columns in the solution table. The default situation is that the columns **Solution name**, **Concentration**, **Cylinder volume**, **Type**, **Dosing device**, **Titer**, **Date titer det.**, **Next titer determination** and **Expiry date** are shown. The column **Solution name** is always present and cannot be removed.

>>

Adds the selected column to the table.

<<

Removes the selected column from the table.

Modifies the sequence of displayed columns by moving the selected column up.

Modifies the sequence of displayed columns by moving the selected column down.

6.6.2.5 Print list of solutions

Dialog window: **Configuration ► Titrants/Solutions ► [Edit] ► Print (PDF) ... ► Print list of solutions (PDF)**

[Edit] ► Print (PDF)... opens the dialog window **Print list of solutions (PDF)**.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Prints the solution table in portrait format.

Landscape
Print the solution table in landscape format.

[OK]

The solution table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.6.3 Solution properties

6.6.3.1 Editing solution properties

Dialog window: **Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Solution - 'Name'**

The parameters for the selected solution are defined on the following tabs:

- *Solution*
  Properties of the solution and solution monitoring.

- *Titer*
  Information about the titer value and titer determination.
- *Titer history*
  Display of the last 10 titer values.
- *Exchange unit*
  Properties of the exchange unit containing the solution.
- *Dosing unit*
  Properties of the dosing unit containing the solution.
- *GLP*
  Properties of GLP test and GLP monitoring.

6.6.3.2 Properties - Solution

Tab: Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Solution - 'Name'

Solution name

Name of the solution (can be entered or selected).

Entry	**24 characters**
Selection	**Selection from predefined names**

Concentration (value)

Concentration value of the solution. This value for the concentration of a solution to be used in the titration commands **DET**, **MET**, **SET** and **KFT** is available for calculations as a variable **'Command name.CONC'**.

Input range	**0.0 to 1.0E13**
Default value	**1.000**

Concentration (unit)

Concentration unit of solution.

Entry	**10 characters**
Selection	**mol/L** | **mmol/L** | **µmol/L** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **ppm** | **%** | **mEq/L**
Default value	**mol/L**

Comment

Remarks about the solution (e.g. batch number).

Entry	**24 characters**

Production date

Date on which the solution was produced. This date can be edited only for manually added solutions by pressing ....

Selection	**Date selection**

Monitor solution

on | off (Default value: **off**)

If this option is activated, then the working life of the solution will be monitored.

Working life

Working life of the solution in days. If a value is entered here, then the **Expiry date** will be automatically adapted.

Input range	**0 to 999 days**
Default value	**999 days**

Expiry date

Expiry date of the solution. The date can be selected by clicking on ... in the **Select date** dialog window. After a date has been entered the **Working life** will be automatically adapted.

Selection	**Date selection**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is enabled, the message is sent to the address defined under **[E-mail]**. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the working life has expired then one of the following actions will be triggered automatically during the start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the working life has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued, the message that the working life has expired is automatically saved with the determination.

Cancel determination
The ongoing determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.6.3.3 Properties - Titer

Tab: **Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Titer**

Titer determination

Titer (value)

Titer value of the solution. The value for the titer of a solution used by the titration commands **DET**, **MET**, **SET** and **KFT** is available for calculations as a variable **'Command name.TITER'**.

Input range	**0.00000 to 9.99999999E9 (max. 10 digits)**
Default value	**1.000**

Titer (unit)

Titer unit of the solution.

Entry	**10 characters**
Selection	**mol/L** | **mmol/L** | **µmol/L** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **ppm** | **%** | **mEq/L**
Default value	**mol/L**

Date titer det.

Shows the date and time of last titer determination, which are automatically entered with each automatic titer determination or manual entry.

Titer method

Name of the method with which the last titer determination was carried out. If the titer has been entered manually then **manual** will be shown here.

User

Short name of the user logged in during titer determination or when the titer was entered manually. If the login function is not used, then the user logged in under Windows will be entered automatically.

Statistics

Statistics data will only be shown if the titer has been assigned by the titer method as a mean value of a multiple determination. If the titer has been determined with a single determination or entered manually then no statistics values will be shown.

Number of titer determinations (n)

Number of determinations used to determine the titer.

Abs. standard dev. (s abs)

Absolute standard deviation for the titer determination in the unit of the titer.

Rel. standard dev. (s rel)

Relative standard deviation for the titer determination in %.

Monitoring of titer validity

on | off (Default value: **off**)

If this option is activated, then the validity of the titer will be monitored.

Validity of titer

Validity of the titer in days. If a value is entered here, then the date for the **Next titer determination** will be automatically adapted.

Input range	**0 to 999 days**
Default value	**999 days**

Next titer determination

Date on which the next titer determination is to be carried out. The date can be selected by clicking on … in the **Select date** dialog window *(see chapter 2.5.1, page 84)*. After the date has been entered, the **Validity** field will be adapted automatically.

Default value	**Date titer det.+ 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is enabled, the message is sent to the address defined under **[E-mail]**. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during titer monitoring it is found that the validity period of the titer has expired, then one of the following actions will be triggered automatically during the start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued, then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The ongoing determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.6.3.4 Properties - Titer history

Tab: **Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Titer history**

History table

The table contains the last 10 titer determinations for the selected solution and can neither be edited nor sorted. The titer determinations are arranged chronologically so that the most recent determination is shown last.

Titer

Titer values are shown in the following colors:

- **Blue**, if the titer has been determined automatically by a method.
- **Black**, if the titer has been entered manually.
- **Orange**, if the titer is outside the warning limits.
- **Red**, if the titer is outside the intervention limits.

If the warning or intervention limits are breached, then the line number will also be shown with an orange or red background, respectively.

Date titer det.

Date and time of the titer determination.

Titer method

Name of the method with which the titer determination was carried out. If the titer has been entered manually then **manual** will be shown here.

NOTICE

This parameter is not saved on the data chip of intelligent exchange/ dosing units, i.e., this parameter will be empty if the data is written into the solutions table from the IEU/IDU.

User

Short name of the user logged in during titer determination or when the titer was entered manually. If the login function was not used, then the user logged in under Windows will be entered automatically.

NOTICE

This parameter is not saved on the data chip of intelligent exchange/ dosing units, i.e., this parameter will be empty if the data is written into the solutions table from the IEU/IDU.

History graph

The graph shows the last 10 titer values for the selected solution. The titer values are shown in different colors in the history table:

- **Blue**, if the titer has been determined automatically by a method.
- **Black**, if the titer has been entered manually.

If limits have been defined, then the warning limits will be shown in **orange** and the intervention limits in **red**.

NOTICE

The history graph can be copied to the clipboard with the context-sensitive **Copy** menu item.

[Limit values]

Opens the Limit values for titer dialog window, in which the warning and intervention limits can be defined for the titer *(see chapter 6.6.3.5, page 1397)*. These limits apply only to the graph, no monitoring is carried out during the titer determination.

[Delete history]

Deletes the titer history.

6.6.3.5 Titer history Limit values

Dialog window: **Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Titer history ► [Limit values] ► Limit values for titer**

Warning and intervention limits can be defined for the titer in the **Limit values for titer** dialog window. If you have defined the limits, then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. Whether these limits are observed is not monitored, i.e., if the limits are exceeded no action will be taken and these solutions can be used in determinations.

Warning limits for titer

on | off (Default value: **off**)

If this option is **activated**, then the titer value will be shown in **orange** if these limits are exceeded.

Lower limit

Lower warning limit.

Entry	**10 digits**
Default value	**0.9750**

Upper limit

Upper warning limit.

Entry	**10 digits**
Default value	**1.0250**

Intervention limits for titer

on | off (Default value: **off**)

If this option is **activated**, then the titer values will be shown in **red** if these limits are exceeded.

Lower limit

Lower intervention limit.

Entry	**10 digits**
Default value	**0.9500**

Upper limit

Upper intervention limit.

Entry	**10 digits**
Default value	**1.0500**

6.6.3.6 Properties - Exchange unit

Tab: **Configuration ► Titrants/Solutions ► [Edit] ► Properties... ► Exchange unit**

Hardware

Name

Freely definable designation for the exchange unit.

Entry	**24 characters**
Default value	**'empty'**

Type

Display of the type of exchange unit:

Selection	**EU** | **IEU**

EU
Nonintelligent exchange unit without data chip.

IEU
Intelligent 806 Exchange Unit with data chip.

Order number

Order number of exchange unit. With intelligent exchange units the order number is read out automatically and cannot be edited.

Entry	**24 characters**
Default value	**'empty'**

Serial number

Serial number of exchange unit. With intelligent exchange units the serial number is read out automatically and cannot be edited.

Entry	**10 characters**
Default value	**'empty'**

Cylinder volume

Cylinder volume of exchange unit. With intelligent exchange units the cylinder volume is read out automatically and cannot be edited. If in the method you have selected a solution in a titration or dosing command then the cylinder volume will be checked in the run.

Selection	**1 mL** | **5 mL** | **10 mL** | **20 mL** | **50 mL**
Default value	**20 mL**

Cylinder serial number

Serial number of the cylinder. It is printed on new cylinders. With intelligent exchange units it is read out automatically. It can be modified at any time, e.g. if the cylinder has to be replaced.

IEU

Entry	**8 characters**
Default value	**'empty'**

EU

Entry	**10 characters**
Default value	**'empty'**

Parameters for preparation

Configuration of the parameters which are to be used in the **PREP** command.

Volume

Volume to be dosed in during preparation.

Input range	**0.00000 to 99,999.99999 mL**
Selection	**Cylinder volume**
Default value	**Cylinder volume**

Cylinder volume
The whole contents of the cylinder will be dosed.

Cycles

Number of rinsing cycles during preparation.

Input range	**1 to 9**
Default value	**2**

Dosing rate

Rate at which the solution is to be dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out, the rate will automatically be reduced to the highest possible value.

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Filling rate

Rate at which the cylinder is to be filled. The maximum filling rate depends on the cylinder volume of the exchange unit used (see below). When the

function is carried out, the rate will automatically be reduced to the highest possible value.

Input range	**0.01 to 150.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Maximum dosing / filling rate for the exchange unit, depending on the cylinder volume:

Cylinder volume	Maximum rate
1 mL	3.0 mL/min
5 mL	15.0 mL/min
10 mL	30.0 mL/min
20 mL	60.0 mL/min
50 mL	150.0 mL/min

NOTICE

Enter lower rates for solutions of higher viscosity.

Tubing parameters

Definition of the length and diameter of the tubing connected to the exchange unit.

NOTICE

Default values have already been entered for the tubing parameters; these correspond to the dimensions of the standard tubing supplied. If you do not make any modifications to the tubing connections then you do not need to modify the tubing parameters. For information on length and diameter of other tubing see **Accessories** at *https://www.metrohm.com/en/products*.

Dosing tip

Length

Length of the tubing connecting the stopcock to the dosing tip.

Input range	**0.0 to 999.9 cm**
Default value	**40.0 cm**

Diameter

Diameter of the tubing connecting the stopcock to the dosing tip.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Cylinder

Length

Length of the tubing connecting the stopcock to the cylinder.

Input range	**0.0 to 999.9 cm**
Default value	**13.0 cm**

Diameter

Diameter of the tubing connecting the stopcock to the cylinder.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Reagent bottle

Length

Length of the tubing connecting the stopcock to the reagent bottle.

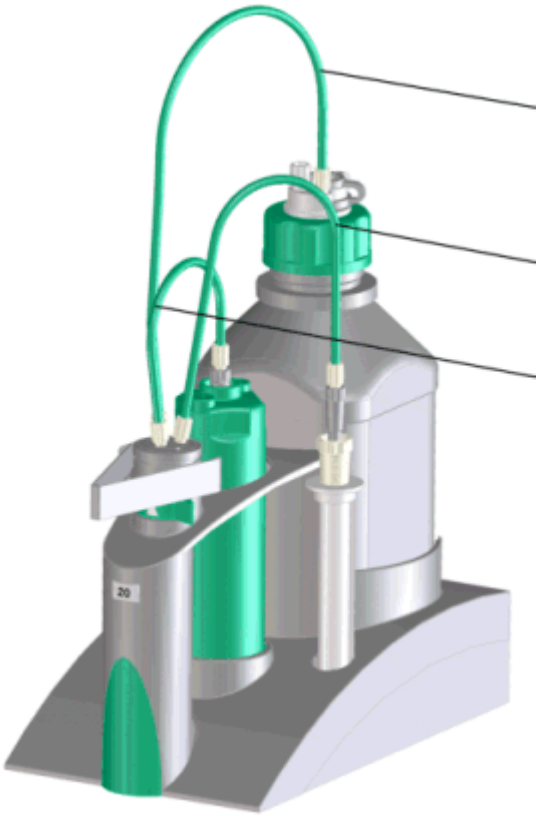
Input range	**0.0 to 999.9 cm**
Default value	**25.0 cm**

Diameter

Diameter of the tubing connecting the stopcock to the reagent bottle.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Exchange unit tubing connections



6.6.3.7 Properties - Dosing unit

Tab: **Configuration ► Titrants/Solutions ► Properties... ► Dosing unit**

Hardware

Name

Freely definable name for the dosing unit.

Entry	**24 characters**
Default value	**'empty'**

Type

Shows the type of dosing unit:

Selection	**DU** | **IDU**

DU
Non-intelligent dosing unit without data chip.

IDU
Intelligent 807 Dosing Unit with data chip.

Order number

Order number of dosing unit. With intelligent dosing units the order number is read off automatically and cannot be edited.

Entry	**24 characters**
Default value	**'empty'**

Serial number

Serial number of dosing unit. With intelligent dosing units the serial number is read off automatically and cannot be edited.

Entry	**10 characters**
Default value	**'empty'**

Cylinder volume

Cylinder volume of dosing unit. With intelligent dosing units the cylinder volume is read off automatically and cannot be edited. If in the method you have selected a solution in a titration or dosing command then the cylinder volume will be checked in the run.

Selection	**2 mL** | **5 mL** | **10 mL** | **20 mL** | **50 mL**
Default value	**20 mL**

Cylinder serial number

Serial number of cylinder. It is printed on new cylinders. With intelligent dosing units it is read off automatically. It can be altered at any time, e.g. if the cylinder has to be replaced.

Entry	**8 characters**
Default value	**'empty'**

Parameters for preparation

Configures the parameters to be used in the commands **PREP** and **EMPTY**.

Dosing port Prep/Empty

Dosing port via which the cylinder contents are to be ejected during preparation and emptying.

Selection	**Dosing port 1** | **Dosing port 2** | **Fill port** | **Special port**
Default value	**Dosing port 1**

Dosing rate Dosing port 1

Speed at which dosing is to be carried out at **Dosing port 1**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Dosing rate Dosing port 2

Speed at which dosing is to be carried out at **Dosing port 2**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Dosing rate Fill port

Speed at which dosing or filling is to be carried out at the **Fill port**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

Dosing rate Special port

Speed at which dosing is to be carried out at the **Special port**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Input range	**0.01 to 166.00 mL/min**
Selection	**maximum**
Default value	**maximum**

The maximum dosing rate depends on the cylinder volume of the dosing unit used (see below):

Cylinder volume	Maximum rate
2 mL	6.67 mL/min
5 mL	16.67 mL/min
10 mL	33.3 mL/min
20 mL	66.6 mL/min
50 mL	166.0 mL/min

NOTICE

Enter lower rates for high-viscosity liquids.

Tubing parameters

Defines the length and diameter of the tubing connected to the dosing unit. The port assignment can also be altered. These parameters are important for carrying out the dosing unit commands **PREP** and **EMPTY** correctly, as the volumes of the tubing connections have to be taken into account.

NOTICE

Default values have already been entered for the tubing parameters; these correspond to the dimensions of the standard tubing supplied. If you do not make any alterations to the tubing connections then you do not need to modify the tubing parameters. For information on length and diameter of other tubings see **Accessories** at *https://www.metrohm.com/en/products*.

Dosing port 1

Port

Port to be used as Dosing port 1.

Selection	**Port 1** | **Port 2** | **Port 3** | **Port 4**
Default value	**Port 1**

Length

Length of tubing attached to Dosing port 1.

Input range	**0.0 to 999.9 cm**
Default value	**40.0 cm**

Diameter

Diameter of tubing attached to Dosing port 1.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Dosing port 2

Port

Port to be used as Dosing port 2.

Selection	**Port 1** | **Port 2** | **Port 3** | **Port 4**
Default value	**Port 3**

Length

Length of tubing attached to Dosing port 2.

Input range	**0.0 to 999.9 cm**
Default value	**0.0 cm**

Diameter

Diameter of tubing attached to Dosing port 2.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Fill port

Port

Port to be used as Fill port for aspirating the solution.

Selection	**Port 1** | **Port 2** | **Port 3** | **Port 4**
Default value	**Port 2**

Length

Length of tubing attached to Fill port.

Input range	**0.0 to 999.9**
Default value	**25.0**

Diameter

Diameter of tubing attached to Fill port.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Special port

Port

Port to be used as special port.

Selection	**Port 1** | **Port 2** | **Port 3** | **Port 4**
Default value	**Port 4**

Length

Length of tubing attached to special port.

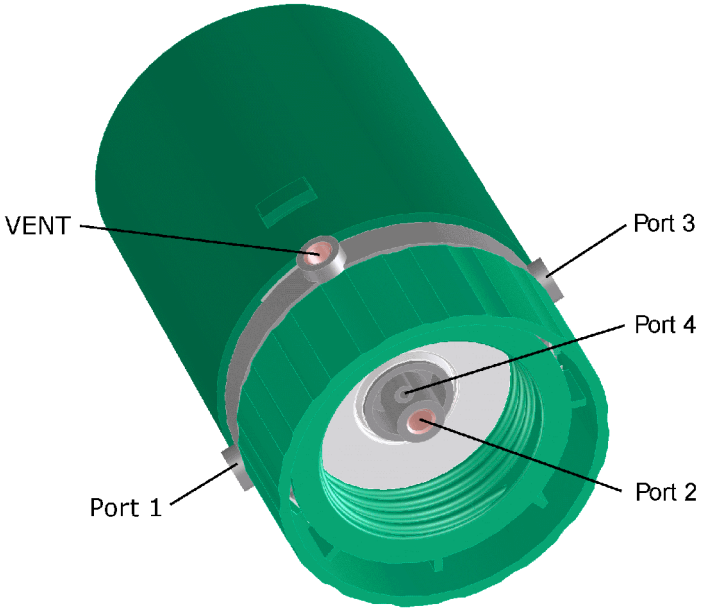
Input range	**0.0 to 999.9 cm**
Default value	**0.0 cm**

Diameter

Diameter of tubing attached to special port.

Input range	**0.0 to 9.9 mm**
Default value	**2.0 mm**

Port assignment of dosing unit:



Valve disc

Rotating direction

Specification of the shift direction of the valve disc. **Automatic** is the shift direction with the shortest distance.

Selection	**ascending** | **descending** | **automatic** | **not over**
Default value	**automatic**

Not over

Here you can choose the protected port. The protected port is the one which is not driven at during rotation.

Selection	**Port 1** | **Port 2** | **Port 3** | **Port 4**
Default value	**Port 4**

6.6.3.8 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.7 Sensors subwindow

6.7.1 Sensors - General

Subwindow: **Configuration ► Sensors**

Sensors subwindow

The **Sensors** subwindow contains the sensor table with all automatically recognized and manually added sensors. It can be shown in the **Configuration** program part as a part of the configuration view or (if not present on the user interface) in a separate window with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Intelligent sensors (IS)

Intelligent sensors have a data chip with stored sensor data. When connected to intelligent devices (e.g. 857 Titrando) via **854 iConnect**, they are recognized automatically and stored in the sensor table.

Nonintelligent sensors

Nonintelligent sensors must be added manually to the sensor table.

Optrodes

When connected to a USB connector, Optrodes are recognized automatically and stored in the sensor table.

Standard sensors

By default, the sensor table contains the following sensors; these cannot be deleted:

- **Conductivity sensor**
- **ISE electrode** (ion-selective electrode)
- **Metal electrode**
- **pH electrode**
- **Temperature sensor**

6.7.2 Sensor table

6.7.2.1 Sensor table

Subwindow: **Configuration ► Sensors**

Contents

In the sensor table the following information about the configured sensors is shown as standard:

Sensor name

Name of the sensor.

Sensor type

Type of the sensor. Intelligent sensors will be marked with **IS** and shown automatically in green.

Device

Name of device the sensor is connected to.

Measuring input

Device and measuring input the sensor is connected to. In the case of intelligent sensors, the device and the measuring input are displayed with green lettering.

Set to work

Date on which the sensor was used for the first time.

Expiry date

Expiry date of the sensor. If sensor monitoring is switched on and if the set date is before the current date (i.e. the working life has elapsed) then the date will be shown in red.

Slope

Slope of the sensor in % or mV.

pH(0)/E(0)

Electrode zero point of the sensor.

Next calibration

Date on which the next calibration is to be carried out. If calibration data monitoring is switched on and if the set date is before the current date (i.e. the calibration has not yet been carried out) then the date will be shown in red.

Additional columns from the Sensor properties can be displayed with the menu item **Edit ► Column display**.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The sensor table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increas-

ing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the content of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **Edit** beneath the sensor table contains the following menu items:

New…	Add a new sensor manually *(see chapter 6.7.2.3, page 1413)*.
Delete	Delete the selected sensor *(see chapter 6.7.2.4, page 1414)*.
Properties…	Edit the selected sensor *(see chapter 6.7.3.1, page 1415)*.
Column display…	Define columns for the sensor table *(see chapter 6.7.2.2, page 1412)*.
Print (PDF)…	PDF file output of the sensor table *(see chapter 6.7.2.5, page 1414)*.

6.7.2.2 Sensors - Column display

Dialog window: **Configuration ► Sensors ► Edit ► Column display… ► Column display**

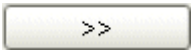
In the dialog window **[Column display]**, you can define the columns to be shown in the sensor table.

Available columns

Display of all the fields that can be shown as columns in the sensor table.

Displayed columns

Display of all the fields that will be shown as columns in the sensor table. The default situation is that the columns **Sensor name, Sensor type, Measuring input, Set to work, Expiry date, Slope, pH(0)/E(0)** and **Next calibration** will be shown. The two columns **Sensor name** and **Sensor type** are always present and cannot be removed.



Add the selected column to the table.

<<

Remove the selected column from the table.

Modify the sequence of displayed columns by moving the selected column up and down.

6.7.2.3 Adding a new sensor

Menu item: **Configuration ► Sensors ► Edit ► New**

In order to add a new nonintelligent sensor to the Sensor table, the menu item **Edit ► New** must be pressed and then one of the following possible sensor types must be selected:

- **pH electrode**
- **Metal electrode**
- **ISE electrode**
- **Temperature sensor**
- **Conductivity sensor**
- **Other sensor**

The properties window then opens automatically for the configuration of the sensor *(see chapter 6.7.3.1, page 1415)*.

Sorted by

The sensors are in the table in alphabetical order; in ascending or descending order, depending on the selection made.

The sensors can be selected in the Methods program part with the various commands. The sensors appear in alphabetical order, but only in descending sequence, in the list field **Sensor**, on the tab **General/Hardware**.

If the sensor type **ISE electrode** is selected, then the dialog window **New ISE electrode** will open first for the definition of the measuring ion.

Ion

Selection	**Ag** | **BF4** | **Br** | **Ca** | **Cd** | **Cl** | **CN** | **Cu** | **F** | **I** | **K** | **Na** | **NH4** | **NO2** | **NO3** | **Pb** | **S** | **SCN** | **SO4** | **Surfactant** | **Custom**
Default value	**F**

F

Selection of the measuring ion from the list or definition of another ion with **Custom**. The valence of the selected measuring ion will also be shown automatically.

Name

Entry of the name for the self-selected ion. This parameter is only visible if **Custom** has been selected in the field **Ion**.

Entry	**6 characters**
Default value	**'empty'**

Valence

Selection of the valence for the self-selected ion. This parameter is only visible if **Custom** has been selected in the field **Ion**.

Selection	**-4** | **-3** | **-2** | **-1** | **+1** | **+2** | **+3** | **+4**
Default value	**+2**

6.7.2.4 Deleting a sensor

Menu item: **Configuration ► Sensors ► Edit ► Delete**

With **Edit ► Delete**, the sensor selected in the sensor table is deleted.

6.7.2.5 Printing the sensor list

Dialog window: **Configuration ► Sensors ► Edit ► Print (PDF)… ► Print list of sensors (PDF)**

With **Edit ► Print (PDF)…**, the dialog window **Print list of sensors (PDF)** opens.

Orientation

Selection of the printing orientation.

Selection	**Portrait format** | **Landscape format**
Default value	**Portrait format**

Portrait format
Output of the sensor table in portrait format.

Landscape format
Output of the sensor table in landscape format.

[OK]

The sensor table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.7.3 Sensor properties

6.7.3.1 Editing the sensor properties

Dialog window: **Configuration ► Sensors ► [Edit] ► Properties... ► Sensor - 'Name'**

The parameters for the selected sensor are defined on the following tabs:

- *Sensor*
  General information about the sensor, such as sensor name, sensor type, set to work, etc.
- *Calibration data*
  Information about the calibration of the sensor.
- *Limit values*
  Definition of the limit value monitoring for slope and electrode zero point.
- *History*
  Shows the last 10 calibration values.
- *Electrode test*
  Information about the electrode test.

6.7.3.2 Properties - Sensor

Tab: **Configuration ► Sensors ► [Edit] ► Properties... ► Sensor - 'Name'**

Sensor name

Name of the sensor.

Entry	**24 characters**

NOTICE

The names of the five nondeletable standard sensors **pH electrode**, **Metal electrode**, **ISE electrode**, **Temperature sensor** and **Conductivity sensor** cannot be changed.

Sensor type

Shows the type of sensor. Intelligent sensors are additionally marked with **IS**.

Ion

Shows the ion to be measured and its valence. This parameter only appears for **ISE electrodes**.

Order number

Order number of the sensor (read-only for intelligent sensors and the Thermoprobe).

Entry	**24 characters**
Default value	**'empty'**

Sensor serial number

Serial number of the sensor (read-only for intelligent sensors and the Thermoprobe).

Entry	**10 characters**
Default value	**'empty'**

Device

For nonintelligent sensors and Optrodes it is possible to select the device to which the sensor is connected. All the devices in the device table that have a measuring input are shown in the selection list. The connection of a sensor to a particular device is not checked during the run. In the case of intelligent sensors and the Thermoprobe, the device to which the sensor is connected is shown here automatically.

Selection	**Device selection** | **'empty'**
Default value	**'empty'**

Measuring input

For nonintelligent sensors and Optrodes it is possible to select the measuring input to which the sensor is connected. The connection of a sensor to a particular measuring input is not checked during the run. This parameter only appears if a **Device** has been selected. For intelligent sensors and the Thermoprobe the measuring input to which the sensor is connected is shown here automatically.

Selection	**1** | **2**
Default value	**1**

Comment

Possibility of entering remarks about the sensor.

Entry	**24 characters**
Default value	**'empty'**

Set to work

The current date is automatically entered here for a newly added sensor. When an existing sensor is edited, the date can be selected after clicking on in the **Select date** dialog window *(see chapter 2.5.1, page 84)*.

Sensor monitoring

on | off (Default value: **off**)

If this option is activated, then the working life of the sensor will be monitored.

Working life

Working life of the sensor in days. If a value is entered here, then the **Expiry date** will be automatically adjusted.

Input range	**0 to 999 days**
Default value	**999 days**

Expiry date

Expiry date of the sensor. This date can be selected by clicking on ... in the **Select date** dialog window *(see chapter 2.5.1, page 84)*. After a date has been entered, the value for the **Working life** will be automatically adjusted.

Only editable if monitoring is switched on.

Default value	**Set to work+ 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is enabled, the message is sent to the address defined under **[E-mail...]**. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during sensor monitoring it is found that the working life has expired, then one of the following actions will be triggered automatically during the start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the working life of the sensor has expired is automatically saved in the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued, then the message that the working life of the sensor has expired will be saved automatically with the determination.

Cancel determination
The ongoing determination will be canceled automatically. The following message must be confirmed with **[OK]**.

6.7.3.3 Properties - Calibration data

Tab: **Configuration ► Sensors ► [Edit] ► Properties... ► Calibration data**

NOTICE

This tab only appears for sensors of the type **pH electrode**, **ISE electrode**, **Conductivity sensor** and **Thermoprobe**.

Specific calibration data for pH electrodes

Slope

Slope of the pH electrode. This value can be determined automatically with a calibration from the linearized calibration curve or entered manually. The slope of a pH electrode is available for calculations as the variable **'Command name.SLO**.

Input range	**–999.9 to 999.9 %**
Default value	**100.0 %**

pH(0)

Apart from the slope, **pH(0)** is the second characteristic of the calibration function **U = f(pH)**. **pH(0)** is the x-axis intercept of the calibration curve, i.e., it corresponds to the pH value at 0 mV. The electrode zero point **pH(0)** of a pH electrode is available for calculations as the variable **'Command name.ENP'**.

Input range	**–20.000 to 20.000**
Default value	**7.000**

Specific calibration data for ISE electrodes

Slope

Slope of the ISE electrode. This value can be determined automatically with a calibration from the linearized calibration curve or entered manually. The slope of an ISE electrode is available for calculations as the variable **'Command name.SLO**.

Input range	**–999.9 to 999.9 mV**
Default value	**59.2/valence mV**

E(0)

E(0) is the second characteristic of the calibration function **U = f(log c)**. **E(0)** is the y-axis intercept of the calibration curve, i.e., it corresponds to the potential at log c = 0. The electrode zero point **E(0)** of an ISE electrode is available for calculations as the variable **'Command name.ENP'**.

Input range	**–2,000.0 to 2,000.0 mV**
Default value	**0.0 mV**

c (blank)

c (blank) is the third characteristic of the calibration function **U = f(log c)**. It reflects to a certain extent the curvature of the calibration function at the lowest concentrations. This curvature is caused by the influence of so-called interfering ions. If the concentration calibration is carried out with less than 3 standards, then **c (blank)** will be set equal to zero. The **c (blank)** parameter is available for calculations as the variable **'Command name.BLV'**.

Value

Input range	**0.00 to 999,999,999**
Default value	**0.00**

Unit

Entry	**10 characters**
Default value	**'empty'**
Selection	**mol/L** | **mmol/L** | **ppm** | **%** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **µg/mL**

Specific calibration data for conductivity sensors

Cell constant

Cell constant of the conductivity sensor. This value can be determined automatically with a calibration or entered manually. The cell constant is available for calculations as the variable **'Command name.BLV'**.

Input range	**0.001 to 500 /cm**
Default value	**1 /cm**

Specific calibration data for the Thermoprobe

a - e

Display of the calibration coefficients **a** - **e**.

Shared calibration data

Calibration temperature

Temperature during the calibration. In addition, the display shows whether the temperature was measured with a Pt1000 or an NTC temperature sensor or entered manually (is not displayed for the Thermoprobe).

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

Calibration date

Date and time of last calibration that is entered automatically after each automatic calibration or manual entry (is not displayed for the Thermoprobe).

Calibration method

Name of the method with which the last calibration was carried out (is not displayed for the Thermoprobe). If the calibration data has been entered manually, then **manual** will be shown here.

User

Short name of the user who was logged in during calibration or who entered the calibration data manually (is not displayed for the Thermoprobe). If the login function is not used, then the user logged in under Windows will be entered automatically.

Measuring input

Shows the type and the serial number of the measuring input at which the sensor was connected during the calibration (only for Titrando, is not displayed for the Thermoprobe).

[Initial data]

Opens the **Initial data Sensor** dialog window *(see chapter 6.7.3.7, page 1429)*, in which the initial calibration data stored in the sensor chip is displayed (only for intelligent sensors).

Calibration data monitoring

on | off (Default value: **off**)

If this option is activated, then the validity of the calibration will be monitored (is not displayed for the Thermoprobe).

Calibration interval

Validity of the calibration in days. If a value is entered here, then the date for **Next calibration** will be automatically adapted.

NOTICE

The days are monitored, i.e., the calibration becomes invalid when the date changes and not at the time when the calibration took place.

Only editable if monitoring is switched on.

Input range	**0 to 999 days**
Default value	**7 days**

Next calibration

Date on which the next calibration is to be carried out. This date can be selected by clicking on … in the **Select date** dialog window *(see chapter 2.5.1, page 84)*. After the date has been entered, the value for **Calibration interval** will be automatically adjusted.

Only editable if monitoring is switched on.

Default value	**Calibration date+ 7 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is enabled, the message is sent to the address defined under **[E-mail]**. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during calibration monitoring it is found that its validity has expired then one of the following actions will be triggered automatically during the start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity of the calibration has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued, then the message that the validity of the calibration has expired will be saved automatically with the determination.

Cancel determination
The ongoing determination will be canceled automatically. The following message must be confirmed with **[OK]**.

6.7.3.4 Properties - Limit values

Tab: **Configuration ► Sensors ► [Edit] ► Properties... ► Limit values**

NOTICE

This tab only appears for sensors of the type **pH electrode**, **ISE electrode** or **Conductivity sensor**.

Slope monitoring (for pH and ISE electrodes only)

on | off (Default value: **off**)

If this option is activated, then a check will be made to see whether the **Slope** determined during calibration is within the defined limit values. If it is outside them, a corresponding message appears and you can select whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit value for the slope.

for pH electrode

Input range	**–2.147E9 to 2.147E9 %**
Default value	**96.0 %**

for ISE (+1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**55.0 mV**

for ISE (–1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–61.0 mV**

for ISE (+2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**25.0 mV**

for ISE (–2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–31.0 mV**

for ISE (+3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**16.0 mV**

for ISE (–3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–23.0 mV**

for ISE (+4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**12.0 mV**

for ISE (–4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–17.0 mV**

Upper limit

Upper limit value for the slope.

for pH electrode	
Input range	**–2.147E9 to 2.147E9 %**
Default value	**101.0 %**

for ISE (+1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**61.0 mV**

for ISE (–1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–55.0 mV**

for ISE (+2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**31.0 mV**

for ISE (–2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–25.0 mV**

for ISE (+3)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**23.0 mV**

for ISE (–3)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–16.0 mV**

for ISE (+4)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**17.0 mV**

for ISE (–4)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–12.0 mV**

pH(0) monitoring (for pH electrodes only)

on | off (Default value: **off**)

If this option is activated, then a check will be made to see whether the electrode zero point **pH(0)** determined during the calibration of a pH electrode is within the defined limit values. If it is outside them, a corresponding message appears and you can select whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit value for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**6.750**

Upper limit

Upper limit value for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**7.250**

E(0) monitoring (for ISE electrodes only)

on | off (Default value: **off**)

If this option is activated, then a check will be made to see whether the electrode zero point **E(0)** determined during the calibration of an ISE electrode is within the defined limit values. If it is outside them, a corresponding message appears and you can select whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit value for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–2,000.0 mV**

Upper limit

Upper limit value for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**2,000.0 mV**

Cell constant monitoring (for conductivity sensors only)

on | off (Default value: **off**)

If this option is activated, then a check will be made to see whether the value determined during the determination of the **Cell constant** of a conductivity sensor is within the defined limit values. If it is outside them, a corresponding message appears and you can select whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit value for cell constant.

Input range	**0.001 to 500 /cm**
Default value	**0.001 /cm**

Upper limit

Upper limit value for cell constant.

Input range	**0.001 to 500 /cm**
Default value	**500 /cm**

6.7.3.5 Properties - History

Tab: **Configuration ▶ Sensors ▶ [Edit] ▶ History**

NOTICE

This tab only appears for pH and ISE electrodes.

History table

The table contains the last 10 calibrations for the selected sensor and cannot be edited or sorted. The individual calibrations are sorted according to date in such a way that the most recent determination is listed last. For pH electrodes, the **Slope** and the **pH(0)** are displayed, for ISE electrodes the **Slope**, **E(0)** and **c (blank)**, and for conductivity sensors the **Cell constant**.

Slope, pH(0), E(0), c (blank), Cell constant

The values are shown in the following colors:

- **Blue**, if the values have been determined automatically by a method.
- **Black**, if the values have been entered manually.
- **Orange**, if the values are outside the warning limits.
- **Red**, if the values are outside the intervention limits.

If the warning or intervention limits are breached, then the line number will also be shown with an orange or red background, respectively.

Calibration date

Date and time of the calibration.

Calibration method

Name of the method with which the calibration was carried out. If the calibration data has been entered manually, then **manual** will be shown here.

NOTICE

This parameter is not saved on the data chip of intelligent sensors, i.e., this parameter will be empty if the data from the sensor is written into the sensor table.

User

Short name of the user who was logged in during calibration or who entered the calibration data manually. If the login function was not used, then the user logged in under Windows will be entered automatically.

NOTICE

This parameter is not saved on the data chip of intelligent sensors, i.e., this parameter will be empty if the data from the sensor is written into the sensor table.

History graph

On the two tabs **Slope** and **pH(0)** or **E(0)** the last 10 values are shown for the selected sensor. As in the history table, the values are shown in different colors:

- **Blue**, if the values have been determined automatically by a method.
- **Black**, if the values have been entered manually.

If limits have been defined, then the warning limits are shown in **orange** and the intervention limits in **red**.

NOTICE

The history graph can be copied to the clipboard with the context-sensitive **Copy** menu item.

[Limit values]

Opens the **Limit values for sensor** dialog window, in which the warning and intervention limits for the calibration data can be defined. These limits only apply to the graph, no monitoring will take place during calibration. The limits set on the **Limit values** tab apply for the monitoring during the calibration.

[Delete history]

Deletes the sensor history.

6.7.3.6 Properties - Electrode test

Dialog window: **Configuration ► Sensors ► [Edit] ► Properties... ► Electrode test**

Date ELT

Date of the last electrode test. This date is used for the electrode test monitoring (**Date ELT** + **ELT interval** = **Next ELT test**).

Result

Indicates the quality of the tested electrode.

Selection	**No data available** | **Short circuit** | **Excessive start drift** | **Wrong buffer** | **Problems with the diaphragm** | **Reference system defective** | **No buffer values for the temperature or excessive deviation between buffers** | **Partial short circuit** | **Glass defective** | **Poor electrode** | **Usable electrode** | **Good electrode** | **Excellent electrode**
Default value	**No data available**

Monitoring ELT validity

on | off (Default value: **off**)

If this check box is activated, then the time interval for the electrode test is monitored.

ELT interval

Time interval to next electrode test. If a value is entered here, then the date in the **Next ELT test** field will be adjusted automatically.

Only editable for **Monitoring ELT validity** = **on**, otherwise inactive.

Input range	**1 to 999 days**
Default value	**999 days**

Next ELT test

Date on which the next electrode test is to be carried out. The date can be selected by clicking on … in the **Select date** dialog window. After the date has been entered, the **ELT interval** field will be adjusted automatically.

Only editable for **Monitoring ELT validity** = **on**, otherwise inactive.

Default value	**Date ELT+ 999 days**

Message

Message by e-mail

on | off (Default value: **off**)

If this check box is activated, the message is sent to the address defined under **[E-Mail...]**. The message is sent in text format.

Only editable for **Monitoring ELT validity** = **on**, otherwise inactive.

[E-mail...]

Opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Only active if **Message by e-mail** = **on**, otherwise inactive.

Acoustic signal

on | off (Default value: **off**)

If this check box is activated, an acoustic signal will be emitted in addition to the message.

Only editable for **Monitoring ELT validity** = **on**, otherwise inactive.

Action

If it is found during monitoring that the validity period has expired, then one of the following actions will be triggered automatically during the start test:

Only editable for **Monitoring ELT validity** = **on**, otherwise inactive.

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued, then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The ongoing determination will be canceled automatically. The following message must be confirmed with **[OK]**.

6.7.3.7 Initial sensor data

Dialog window: **Configuration ▶ Sensors ▶ [Edit] ▶ Properties... ▶ Calibration data ▶ Initial data Sensor**

The initial calibration data for the intelligent sensor is displayed in the **Initial data Sensor** dialog window.

Slope

Shows the slope in % for the first calibration.

Uoff

Shows the offset potential U_{off} in mV during the first calibration.

Calibration temperature

Shows the temperature in °C during the first calibration.

6.7.3.8 Sensor history - Limit values

Dialog window: **Configuration ► Sensors ► [Edit] ► Properties... ► History ► [Limit values] ► Limit values for sensor**

Warning and intervention limits for the slope and pH(0) or E(0) can be defined in the **Limit values for sensor** dialog window. If limits have been defined, then these are shown in the graph in **orange** for warning limits and **red** for intervention limits. However, whether these limits are observed is not monitored, i.e., a breach of these limits does not trigger any action. For monitoring during calibration, the limits set on the **Limits** tab apply.

Warning limits for slope (for pH and ISE electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for the slope will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for the slope.

for pH electrode

Input range	**–2.147E9 to 2.147E9 %**
Default value	**97.5 %**

for ISE (+1)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**57.2 mV**

for ISE (–1)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–61.2 mV**

for ISE (+2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**27.7 mV**

for ISE (–2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–31.7 mV**

for ISE (+3)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**17.7 mV**

for ISE (–3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–21.7 mV**

for ISE (+4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**12.8 mV**

for ISE (–4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–16.8 mV**

Upper limit

Upper warning limit for the slope.

for pH electrode	
Input range	**–2.147E9 to 2.147E9 %**
Default value	**102.5 %**

for ISE (+1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**61.2 mV**

for ISE (–1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–57.2 mV**

for ISE (+2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**31.7 mV**

for ISE (–2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–27.7 mV**

for ISE (+3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**21.7 mV**

for ISE (–3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–17.7 mV**

for ISE (+4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**16.8 mV**

for ISE (–4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–12.8 mV**

Intervention limits for slope (for pH and ISE electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for the slope will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for the slope.

for pH electrode	
Input range	**–2.147E9 to 2.147E9 %**
Default value	**95 %**

for ISE (+1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**55 mV**

for ISE (–1)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–62.4 mV**

for ISE (+2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**26.7 mV**

for ISE (–2)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–32.7 mV**

for ISE (+3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**16.7 mV**

for ISE (–3)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–22.7 mV**

for ISE (+4)	
Input range	**–2.147E9 to 2.147E9 mV**
Default value	**11.8 mV**

for ISE (–4)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–17.8 mV**

Upper limit

Upper intervention limit for the slope.

for pH electrode

Input range	**–2.147E9 to 2.147E9 %**
Default value	**105.0 %**

for ISE (+1)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**62.4 mV**

for ISE (–1)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–55.0 mV**

for ISE (+2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**32.7 mV**

for ISE (–2)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–26.7 mV**

for ISE (+3)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**22.7 mV**

for ISE (–3)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–16.7 mV**

for ISE (+4)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**17.8 mV**

for ISE (–4)

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–11.8 mV**

Warning limits for pH(0) (for pH electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for pH(0) will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**6.500**

Upper limit

Upper warning limit for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**7.500**

Intervention limits for pH(0) (for pH electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for pH(0) will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**6.000**

Upper limit

Upper intervention limit for pH(0).

Input range	**–2.147E9 to 2.147E9**
Default value	**8.000**

Warning limits for E(0) (for ISE electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for E(0) will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–15 mV**

Upper limit

Upper warning limit for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**15 mV**

Intervention limits for E(0) (for ISE electrodes only)

on | off (Default value: **off**)

If this option is **activated**, then the values for E(0) will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**–30 mV**

Upper limit

Upper intervention limit for E(0).

Input range	**–2.147E9 to 2.147E9 mV**
Default value	**30 mV**

Warning limits for cell constant (for conductivity sensors only)

on | off (Default value: **off**)

If this option is **activated**, then the values for the cell constant will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for the cell constant.

Input range	**0.001 to 500 /cm**
Default value	**2.0 /cm**

Upper limit

Upper warning limit for the cell constant.

Input range	**0.001 to 500 /cm**
Default value	**400 /cm**

Intervention limits for cell constant (for conductivity sensors only)

on | off (Default value: **off**)

If this option is **activated**, then the values for the cell constant will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for the cell constant.

Input range	**0.001 to 500 /cm**
Default value	**0.001 /cm**

Upper limit

Upper intervention limit for the cell constant.

Input range	**0.001 to 500 /cm**
Default value	**500 /cm**

6.8 Subwindow Colorimetric sensors

6.8.1 Colorimetric sensors - General

Subwindow: **Configuration ► Colorimetric sensors**

The subwindow **Colorimetric sensors** contains the data for colorimetric sensors in tabular form. It can be displayed in the program part **Configuration** as a component part of the Configuration view or (if not present on the desktop) in a separate window with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

6.8.2 Table - Colorimetric sensors

6.8.2.1 Table - Colorimetric sensors

Subwindow: **Configuration ► Colorimetric sensors**

Contents

In the table the following information about the colorimetric sensors is shown as standard:

Name

Name of the colorimetric sensor.

Calibration date

Display of date and time of the last calibration entered after each automatic calibration or manual entry.

Wavelength

Wavelength at which the calibration of the instrument has been carried out.

Coefficient of determination

Display of the coefficient of determination $\mathbf{R^2}$, which is calculated on the basis of the calibration function and the confidence interval and which is between 0 and 1. 5 decimal places are displayed.

Confidence interval

Display of the confidence interval within which the measured values for the determination of the calibration curve must lie.

c0

Calibration coefficient of zero order.

c1

Calibration coefficient first-order.

c2

Calibration coefficient second-order.

c3

Calibration coefficient third-order.

Additional columns from the properties of the colorimetric sensors can be displayed with the menu item **Edit ► Column display...**.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The table of the colorimetric sensors cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **Edit** beneath the table of the colorimetric sensors contains the following menu items:

New...	Add a new colorimetric sensor to the table *(see chapter 6.8.2.3, page 1439)*.
Delete	Delete the selected colorimetric sensor *(see chapter 6.8.2.4, page 1439)*.
Properties...	Edit the properties of the selected colorimetric sensor *(see chapter 6.8.3.1, page 1440)*
Column display...	Define the columns for the table of the colorimetric sensors *(see chapter 6.8.2.2, page 1438)*
Print (PDF)...	Printout of the colorimetric sensor table as PDF file *(see chapter 6.8.2.5, page 1439)*

6.8.2.2 Colorimetric sensors - Column display

Dialog window: **Configuration ► Colorimetric sensors ► Edit ► Column display... ► Column display**

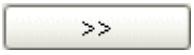
The columns which are to be displayed in the table of the colorimetric sensors can be defined in the dialog window **Column display**.

Columns available

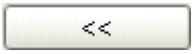
Display of all the fields that can be shown as columns in the sensor table.

Columns displayed

Display of all fields which are displayed as columns in the overview table for the colorimetric sensors. In the default settings, the columns **Name**, **Calibration date**, **Wavelength**, **c0**, **c1**, **c2**, **c3**, **Confidence interval**, **Outlier** and **Coefficient of determination** are displayed in this sequence. **Name** is fixed and cannot be removed.



Add the selected column to the table.



Remove the selected column from the table.

Modify the sequence of displayed columns by moving the selected column up and down.

6.8.2.3 Adding a new colorimetric sensor

Menu item: **Configuration ► Colorimetric sensors ► Edit ► New...**

New colorimetric sensors are entered in the table using the menu item **Edit ► New...**.

The properties window then opens automatically for the configuration of the colorimetric sensor *(see chapter 6.8.3.1, page 1440)*.

Sorted by

The colorimetric sensors are in alphabetical order in the table. In ascending or descending order, depending on the selection made.

The colorimetric sensors can be selected in the Methods part with the various commands. The colorimetric sensors appear in alphabetical order, but only in descending sequence, in the list field **Colorimetric Sensor**, on the tab **General/Hardware**.

6.8.2.4 Deleting a colorimetric sensor

Menu item: **Configuration ► Colorimetric sensors ► Edit ► Delete**

With **Edit ► Delete**, the colorimetric sensor selected in the sensor table is deleted.

6.8.2.5 Printing the list of colorimetric sensors

Dialog window: **Configuration ► Colorimetric sensors ► Edit ► Print (PDF)... ► Print list of colorimetric sensors (PDF)**

With **Edit ► Print (PDF)...**, the dialog window **Print list of colorimetric sensors (PDF)** is opened.

Orientation

Selection of the printing orientation.

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Output in portrait format.

Landscape
Output in landscape format.

[OK]

The sensor table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.8.3 Properties - Colorimetric sensor

6.8.3.1 Editing the sensor properties

Dialog window: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► Colorimetric sensor - %1**

The Properties window for the colorimetric sensor selected in the Sensor table in which the parameters of the colorimetric sensor can be edited is opened with the menu item **Edit ► Properties...** in the subwindow **Colorimetric sensors**. It consists of the following tabs:

- *Colorimetric sensor*
  General information regarding the colorimetric sensor, e.g. name, device used and comment.
- *Calibration data*
  Information about the calibration of the colorimetric sensor.
- *Limit values*
  Definition of the limit value monitoring for outliers and the coefficient of determination.
- *History*
  Display of the last 10 calibration values.

6.8.3.2 Properties - Colorimetric sensors

Tab: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► Colorimetric sensor**

Name

Name of the sensor.

Entry	**24 characters**

Comment

Possibility to enter remarks about the sensor.

Entry	**24 characters**
Default value	**'empty'**

6.8.3.3 Properties - Calibration data

Tab: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► Calibration data**

Wavelength

Wavelength at which the calibration of the instrument has been carried out.

Input range	**100.0 to 2000.0 nm**
Default value	**400.0 nm**

c0

Calibration coefficient of zero order.

Input range	**-1.0E99 to 1.0E99 (max. 10 significant places)**
Default value	**0**

c1

Calibration coefficient first-order.

Input range	**-1.0E99 to 1.0E99 (max. 10 significant places)**
Default value	**0**

c2

Calibration coefficient second-order.

Input range	**-1.0E99 to 1.0E99 (max. 10 significant places)**
Default value	**0**

c3

Calibration coefficient third-order.

Input range	**-1.0E99 to 1.0E99 (max. 10 significant places)**
Default value	**0**

NOTICE

If the **Wavelength** and/or the coefficients **c0** to**c3** have been entered manually, then the following parameters will be reset to the default value or updated, respectively:

- Confidence interval = **off**
- Number of outliers = **0**
- Coefficient of determination = **invalid**
- Calibration method = **manual**
- Calibration range = **invalid**
- Calibration date is updated
- Determination ID is deleted
- User is updated
- Audit Trail entry ensues

Confidence interval

Display of the confidence interval within which the measured values for the determination of the calibration curve must lie. Values outside this range are called outliers, they are not integrated in the calculation of the calibration coefficient. If the **Wavelength** and/or the coefficients **c0** to**c3** were entered manually, then **off** will be displayed.

Number of outliers

Total number of outliers (values outside the confidence interval). If the wavelength and the coefficients c0 to c3 were entered manually, then **0** will be displayed.

Coefficient of determination

Display of the coefficient of determination (R^2), which is calculated on the basis of the calibration function and the confidence interval. If the **Wavelength** and/or the coefficients **c0** to **c3** have been entered manually, then **invalid** will be displayed here.

R^2 defines the size of the statistical spread of y (absorbance), which can be explained by x (concentration). It lies between **0** and **1**. The closer R^2 is to 1, the more likely there is a linear dependency between x and y. If $R^2 = 0$, then there is no connection. 5 decimal places are displayed.

Calibration range

Minimum and maximum concentration of the calibration solutions. In this range, the calibration curve depicts a monotonously ascending or descending function. The value cannot be modified. It is defined from the method and corresponds to the range between the first and last calibration points used.

Calibration temperature

Temperature at which the calibration is carried out. In addition, the display shows whether the temperature was measured with a Pt1000 or an NTC temperature sensor or entered manually.

Input range	**-20.0 to 150.0 °C**
Default value	**25.0 °C**

NOTICE

If the **Calibration temperature** has been entered manually, then the following parameters will be reset to the default value or updated, respectively:

- Calibration temperature = **manual**
- Calibration date is updated.
- Calibration method = **manual**
- Determination ID is deleted
- User is updated
- Audit Trail entry ensues

Calibration date

Display of date and time of the last calibration entered after each automatic calibration or manual entry.

Calibration method

Display of the method name with which the last calibration has been carried out. If the calibration data has been entered manually, then **manual** will appear.

Determination ID

Identification of the determination.

The determination ID can be copied and pasted into another field.

User

Display of the short name of the user logged in during the calibration or who entered the calibration data manually. If work is not carried out using login, then the user logged in under Windows will be entered automatically.

Calibration data monitoring

on | off (Default value: **off**)

If this check box is activated, then the validity of the calibration is monitored.

Calibration interval

Validity of the calibration in days. If a value is entered here then the date for **the next calibration** will be adapted automatically. The days are monitored, e.g. the calibration becomes invalid when the date changes and not at the time time of day that calibration took place.

Only editable for **Calibration data monitoring** = **on**, otherwise inactive.

Input range	**0 to 999 Days**
Default value	**999 Days**

Next calibration

Date on which the next calibration is to be carried out. The date can be selected by pressing … in the dialog window **Select date**. After the date has been entered the value for **Calibration interval** will be automatically adapted.

Only editable for **Calibration data monitoring** = **on**, otherwise inactive.

Default value **Calibration date+ 999 days**

Message

Message by e-mail

on | off (Default value: **off**)

The message is additionally sent to the address defined under **[E-mail...]** if this check box is activated.

Editable only if **Calibration data monitoring** = **on**, otherwise inactive.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Active only if **Message by e-mail** = **on**.

Acoustic signal

on | off (Default value: **off**)

If this check box is activated, an acoustic signal will be emitted in addition to the message defined above.

Editable only if **Calibration data monitoring** = **on**, otherwise inactive.

Action

If during calibration data monitoring it is found that its validity has expired, then one of the following actions will be triggered automatically at start test:

Editable only if **Calibration data monitoring** = **on**, otherwise inactive.

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity of the calibration has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether the run is to be continued or canceled. If the run is continued then the message that the validity of the calibration has expired will be saved automatically with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.8.3.4 Properties - Limit value

Tab: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► Limit values**

Monitoring number of outliers

on | off (Default value: **off**)

If this check box is activated, then the number of outliers during a new calibration is monitored. If this number exceeds the defined limit value, then a corresponding message will appear and one can decide whether the calibration should nevertheless be applied or if the previous calibration data should be retained.

Upper limit

Maximum number of permitted outliers.

Only editable for **Monitoring number of outliers** = **on**, otherwise inactive.

Input range	**0 to 9**
Default value	**1**

Monitoring coefficient of determination

on | off (Default value: **off**)

If this check box is activated, then the coefficient of determination (R^2) calculated from the calibration data will be monitored after a new calibration. If this number lies outside the defined range, then a corresponding message will appear and one can decide whether the calibration should nevertheless be applied or if the previous calibration data should be retained.

Lower limit

Lower limit value for the coefficient of determination.

Only editable for **Monitoring coefficient of determination** = **on**, otherwise inactive.

Input range	**0.00000 to 1.00000**
Default value	**0.95000**

6.8.3.5 Properties - History

Tab: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► History**

History table

The table contains the last 10 calibrations for the selected colorimetric sensor and can be neither edited nor sorted. The individual calibrations are sorted according to date in such a way that the most recent determination is listed last. The table contains the following columns:

Coefficient of determination

The values are shown in the following colors:

- **Blue**, if the value has been assigned automatically by a method.
- **Black**, if the values have been entered manually.
- **Orange**, if the values are outside the warning limits.
- **Red**, if the values are outside the intervention limits.

If the warning or intervention limits are exceeded then the line number will also be shown with an orange and red background respectively.

Confidence interval

Display of the confidence interval within which the measured values for the determination of the calibration curve must lie. Values outside this range are called outliers, they are not integrated in the calculation of the calibration coefficient.

Outlier

Total number of outliers (values outside the confidence interval).

Calibration date

Date and time of the calibration.

Calibration method

Name of the method with which the calibration was carried out. If the calibration data has been entered manually, then **manual** will appear here.

User

Short name of the user logged in during calibration or when the calibration data was entered manually. If work is not carried out using login then the user logged in under Windows will be entered automatically.

History graph

The 10 last values for the selected colorimetric sensor are displayed in each case on the tab **Coefficient of determination**. The values are presented in different colors, the same as with the History table:

- **blue**, if the value has been assigned automatically by a method.
- **black**, if the values have been entered manually.

If a limit value is defined, then the warning limits are shown in **orange** and intervention limits in **red**. **1** is always displayed thereby as the upper warning and intervention limit.

[Limit values]

Opening the dialog window **Limits for colorimetric sensor - 'Sensor name'** for the quantity selected in the graph in which the warning and intervention limits for the coefficient of determination can be defined *(see chapter 6.8.3.6, page 1447)*. These limits apply only for the graph. No monitoring takes placed during the calibration. The limits set on the tab **Limit values** apply for the monitoring during the calibration *(see chapter 6.8.3.4, page 1445)*.

[Delete history]

Delete the history for the colorimetric sensors.

6.8.3.6 Colorimetric sensor history - Limits

Dialog window: **Configuration ► Colorimetric sensors ► Edit ► Properties... ► History ► [Limit values] ► Limits for colorimetric sensor - 'Sensor name'**

In the dialog window **Limits for colorimetric sensor - 'Sensor name'** you can define warning and intervention limits for the coefficient of determination. If you have defined limits then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. However, whether these limits are observed is not monitored, i.e. exceeding these limits does not trigger any action. For monitoring during calibration, the limits set on the **Limit values** tab apply.

Warning limits for coefficient of determination

on | off (Default value: **off**)

If this option is **activated**, then the values for the coefficient of determination will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for the coefficient of determination.

Input range	**0.00000 to 1.00000**
Default value	**0.98000**

Upper limit

Upper warning limit for the coefficient of determination.

Input range	**0.00000 to 1.00000**
Default value	**1.00000**

Intervention limits for coefficient of determination

on | off (Default value: **off**)

If this option is **activated**, then the values for the coefficient of determination will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for the coefficient of determination.

Input range	**0.00000 to 1.00000**
Default value	**0.96000**

Upper limit

Upper intervention limit for the coefficient of determination.

Input range	**0.00000 to 1.00000**
Default value	**1.00000**

6.9 Subwindow Global variables

6.9.1 Configuration - Common variables

Subwindow: **Configuration ► Common variables**

Subwindow Global variables

The subwindow **Common variables** contains the table with the configured common variables. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Using common variables

Common variables are cross-method variables that are stored per client and can be used in formulas under the designation **'CV.Name'**. They are either entered manually in the configuration or assigned in the method run by a **CALC** command.

NOTICE

For common variables which are newly calculated during a determination in a **CALC** command and which are saved in the configuration, the current values are available for additional calculations in the same determinations from this point in time. This is not the case for determinations running at the same time on other workplaces; here, the values available at the start of the determination are applied.

6.9.2 Table of common variables

6.9.2.1 Table of common variables

Subwindow: **Configuration ► Common variables**

Contents

The table of common variables shows the following information about the common variables as standard:

Name

Name of common variable.

Type

Type of common variables (**Number**, **Text** or **Date/Time**).

Value

Value of common variables.

Unit

Unit of the common variables.

Assignment date

Date of the last value assignment for the common variable.

Assignment method

Name of the method used to assign the value.

User

Short name of the user logged in during value assignment.

Next assignment

Date on which the next value assignment is to be carried out. If monitoring the common variable is switched on and the set date is before the current date (i.e. the value assignment has not yet been carried out) then the date will be shown in red.

Additional columns can be shown from the properties of the common variables with the menu item **[Edit] ► Column display**.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The table of common variables cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** beneath the table of common variables contains the following menu items:

New…	Adds new common variable manually *(see chapter 6.9.2.2, page 1450)*.
Delete	Deletes the selected common variable *(see chapter 6.9.2.3, page 1451)*.
Properties…	Edits the selected common variable *(see chapter 6.9.3.1, page 1452)*.
Column display…	Defines the columns of the table of Common variables *(see chapter 6.9.2.4, page 1451)*.
Print (PDF)…	Outputs the table of common variables as a PDF file *(see chapter 6.9.2.5, page 1451)*.

6.9.2.2 Add new common variable

Menu item: **Configuration ► Common variables ► [Edit] ► New…**

With **[Edit] ► New...** a new common variable is added manually to the table of common variables. The Properties window then opens automatically for editing the common variable. After the Properties window has been closed the common variable will be entered in the table of common variables. The parameters can be altered at any time with **[Edit] ► Properties...**

6.9.2.3 Delete common variable

Menu item: **Configuration ▶ Common variables ▶ [Edit] ▶ Delete**

With **[Edit] ▶ Delete** the common variable selected in the table is deleted.

6.9.2.4 Common variables - Column display

Dialog window: **Configuration ▶ Common variables ▶ [Edit] ▶ Column display… ▶ Column display**

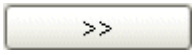
With **[Edit] ▶ Column display…** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the Common variables table.

Columns available

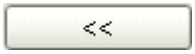
Shows all the fields that can be displayed as columns in the table of common variables.

Columns displayed

Shows all the fields that will be displayed as columns in the table of common variables. The default situation shows the columns **Name**, **Type**, **Value**, **Unit**, **Assignment date**, **Assignment method**, **User** and **Next assignment**. The three columns **Name**, **Type** and **Value** are always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.

Modifies the sequence of displayed columns by moving the selected column up.

Modifies the sequence of displayed columns by moving the selected column down.

6.9.2.5 Print list of common variables

Dialog window: **Configuration ▶ Common variables ▶ [Edit] ▶ Print (PDF) … ▶ Print list of common variables (PDF)**

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Prints table of common variables in portrait format.

Landscape
Prints table of common variables in landscape format.

[OK]

The table of common variables is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.9.3 Common variable properties

6.9.3.1 Editing properties of common variables

Dialog window: **Configuration ► Common variables ► [Edit] ► Properties… ► Common variable 'Name'**

With menu item **[Edit] ► Properties…** in the subwindow **Common variables** the properties window for the common variable selected in the table opens, in which the parameters of the common variables can be edited. It consists of the following tabs:

- *Common variable*
  Information about common variables such as name, type, value, etc.
- *History*
  Display of the last 10 values.

6.9.3.2 Properties - Common variable

Tab: **Configuration ► Common variables ► [Edit] ► Properties... ► Common variable - 'Name' ► Common variable**

Name

Name of common variables.

Entry	**50 characters**

Type

Selection of the type for a new common variable. For existing common variables, the type will only be shown; it cannot be edited.

Selection	**Number** | **Text** | **Date/Time**
Default value	**Number**

Value

Value of common variables. This value can be assigned in a method by a **CALC** command or entered manually. For methods that use the common variable it is available as the variable **'CV.Name.VAL'** or **'CV.Name'** (short form) for calculations.

For type **Date/Time** variables, the date can be selected by pressing … in the dialog window **Select date**.

Type = Number	
Input range	**-1.0E99 to 1.0E99 (max. 15 places)**

Type = Text	
Entry	**256 characters**

Type = Date/Time	
Selection	**Date selection**

Value (unit)

Designation of the unit. If a value is assigned automatically then the unit will be automatically entered here. It is available for methods that use the common variable as variable **'CV.Name.UNI'** for calculations.

Entry	**20 characters**
Selection	**'empty'** | **mol/L** | **mmol/L** | **µmol/mL** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **ppm** | **%** | **mEq/L** | **mL** | **µg** | **µS/cm**
Default value	**mol/L**

Comment

Possibility to enter remarks about the common variable.

Entry	**256 characters**

Assignment date

Date and time at which the last value was assigned; this is entered automatically each time that a value is assigned automatically or manually.

NOTICE

In contrast to automatic value assignment, when assigning the value manually the date is only entered if the value has really been changed.

Assignment method

Name of the method with which the last value assignment was carried out. If the value has been entered manually then **manual** will be shown here.

User

Short name of the user who was logged in during value assignment or who entered the value manually. If work is not carried out using login, then the user logged in under Windows will be entered automatically.

Common variable monitoring

on | off (Default value: **off**)

If this option is enabled then the validity of the common variables will be monitored.

Validity

Validity period of the common variable in days. If a value is entered here then the field **Next assignment** will be adapted automatically.

Input range	**0 to 999 Days**
Default value	**999 Days**

Next assignment

Date on which the next value assignment must take place. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After a date has been entered, the value for the **Validity** will be automatically adapted.

Selection	**Date selection**

Message

The message options can only be edited if monitoring for common variables is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-mail] opens the **Send E-mail** window.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring for common variables is switched on.

If, during common variable monitoring, it is found that the validity period has expired, then one of the following actions will be triggered automatically at the start of the test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued then the message that the validity period of the common variable has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.9.3.3 Properties - History

Tab: **Configuration ► Common variables ► [Edit] ► Properties ► Common variable - 'Name' ► History**

History table

The table contains the last 10 values for the selected common variable and cannot be edited or sorted. The individual values are sorted according to date so that the most up-to-date assignment is shown last.

Value

The values are shown in the following colors:

- **Blue**, if the value has been assigned automatically by a method.
- **Black**, if the values have been entered manually.
- **Orange**, if the values are outside the warning limits.
- **Red**, if the values are outside the intervention limits.

If the warning or intervention limits are exceeded then the line number will also be shown with an orange and red background respectively.

Assignment date

Date and time of value assignment.

Assignment method

Name of the method with which the value assignment was carried out. If the values have been entered manually then **manual** will appear here.

User

Short name of the user who was logged in during value assignment or who entered the values manually. If work is not carried out using login, then the user logged in under Windows will be entered automatically.

History graph

The graph shows the last 10 values for the selected common variable. The values are presented in different colors, the same as with the History table:

- **Blue**, if the value has been determined automatically by a method.
- **Black**, if the value has been entered manually.

If limits have been defined, then the warning limits will be shown in **orange** and the intervention limits in **red**.

NOTICE

The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

[Limits]

Opens the dialog window **Limits for common variable** in which the warning and action limits can be defined for the common variables. These limits apply only to the graph; no monitoring takes place during value assignment.

[Delete history]

Deletes the history.

6.9.3.4 History - Limits

Dialog window: **Configuration ► Common variables ► [Edit] ► Properties ► Common variable - 'Name' ► History ► [Limit value] ► Limits for Common variable - 'Name'**

In the dialog window **Limits for common variable** both warning and intervention limits can be defined for the values of the common variables. If you have defined limits then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. However, whether these limits are observed is not monitored, i.e. exceeding these limits does not trigger any action.

Warning limits for common variable

on | off (Default value: **off**)

If this option is **enabled** then the values of the common variables will be shown in **orange** if these limits are exceeded.

Lower limit

Lower warning limit for common variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

Upper limit

Upper warning limit for common variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

Intervention limits for common variable

on | off (Default value: **off**)

If this option is **enabled** then the values of the common variables will be shown in **red** if these limits are exceeded.

Lower limit

Lower warning limit for common variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

Upper limit

Upper warning limit for common variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

6.10 Subwindow Global variables

6.10.1 Configuration - Global variables

Subwindow: **Configuration ► Global variables**

Subwindow Global variables

The subwindow **Global variables** contains the table with the configured global variables. It can be shown in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) in a separate window with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Using global variables

Global variables are method-embracing variables that are stored overall clients and can be used in formulas under the designation **'GV.Name'**. They

are either entered manually in the configuration or assigned in the method run by a **CALC** command.

NOTICE

For global variables which are newly calculated during a determination in a **CALC** command and which are saved in the configuration, the current values are available for additional calculations in the same determinations from this instant. This is not the case for determinations running at the same time on other workplaces; here, the values available at the start of the determination are applied.

6.10.2 Table of global variables

6.10.2.1 Table of global variables

Subwindow: **Configuration ► Global variables**

Contents

The table of global variables shows the following information about the global variables as standard:

Name

Name of global variable.

Type

Type of global variable (**Number**, **Text** or **Date/Time**).

Value

Value of the global variable.

Unit

Unit of global variable.

Assignment date

Date of the last value assignment to global variable.

Assignment method

Name of the method used to assign the value.

User

Short name of the user logged in during value assignment.

Client ID

Identification of the client (client ID) on which the value assignment has taken place.

Next assignment

Date on which the next value assignment is to be carried out. If monitoring the global variable is switched on and the set date is before the current date (i.e. the value assignment has not yet been carried out) then the date will be shown in red.

With menu item **[Edit] ► Column display** further columns can be shown from the properties of the global variables.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The table of global variables cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
  Sets the column width
- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a Tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** beneath the table of global variables contains the following menu items:

New…	Adds new global variable manually *(see chapter 6.10.2.2, page 1460)*.
Delete	Deletes the selected global variable *(see chapter 6.10.2.3, page 1460)*.
Properties…	Edits the selected global variable *(see chapter 6.10.3, page 1461)*.
Column display…	Defines the columns of the table of global variables *(see chapter 6.10.2.4, page 1460)*.
Print (PDF)…	Outputs the table of global variables as a PDF file *(see chapter 6.10.2.5, page 1461)*.

6.10.2.2 Add new global variable

Menu item: **Configuration ► Global variables ► [Edit] ► New…**

With **[Edit] ► New...** a new global variable is added manually to the table of global variables. The Properties window then opens automatically for editing the global variable. After the properties window has been closed the global variable will be entered in the table of global variables. The parameters can be modified at any time with **[Edit] ► Properties...**.

6.10.2.3 Delete global variable

Menu item: **Configuration ► Global variables ► [Edit] ► Delete**

With **[Edit] ► Delete** the global variable selected in the table is deleted.

6.10.2.4 Global variables - Column display

Dialog window: **Configuration ► Global variables ► [Edit] ► Column display… ► Column display**

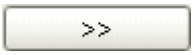
With **[Edit] ► Column display…** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the global variables table.

Available columns

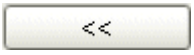
Shows all the fields that can be displayed as columns in the table of global variables.

Displayed columns

Shows all the fields that will be displayed as columns in the table of global variables. The default situation shows the columns **Name**, **Type**, **Value**, **Unit**, **Assignment date**, **Assignment method**, **User** and **Next assignment**. The three columns **Name**, **Type** and **Value** are always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.

Modifies the sequence of displayed columns by moving the selected column up.

Modifies the sequence of displayed columns by moving the selected column down.

6.10.2.5 Print list of global variables

Dialog window: **Configuration ► Global variables ► [Edit] ► Print (PDF)… ► Print list of global variables (PDF)**

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Print table of global variables in portrait format.

Landscape
Print table of global variables in landscape format.

[OK]

The table of global variables is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.10.3 Properties Global variables

6.10.3.1 Edit properties of global variables

Dialog window: **Configuration ► Global variables ► [Edit] ► Properties… ► Global variable 'Name'**

With menu item **[Edit] ► Properties…** in the subwindow **Global variables** the properties window for the global variable selected in the table opens, in which the parameters of the global variables can be edited. It consists of the following tabs:

- *Global variables*
  Information about global variables such as name, type, value, etc.
- *History*
  Displays last 10 values.

6.10.3.2 Properties - Global variable

Tab: **Configuration ► Global variables ► [Edit] ► Properties... ► Global variable - 'Name' ► Global variable**

Name

Name of global variable.

Entry	**50 characters**

Type

Selection of the type for a new global variable. For existing global variables the type will only be shown; it cannot be edited.

Selection	**Number** | **Text** | **Date/Time**
Default value	**Number**

Value

Value of the global variable. This value can be assigned in a method by a **CALC** command or entered manually. For methods that use the global variable it is available as the variable **'GV.Name.VAL'** or **'GV.Name'** (short form) for calculations.

For type **Date/Time** variables, the date can be selected by pressing … in the dialog window **Select date**.

Type = Number

Input range	**-1.0E99 to 1.0E99 (max. 15 places)**

Type = Text

Entry	**256 characters**

Type = Date/Time

Selection	**Date selection**

Value (unit)

Designation of the unit. If a value is assigned automatically then the unit will be automatically entered here. It is available for methods that use the global variable as variable **'GV.Name.UNI'** for calculations.

Entry	**20 characters**
Selection	**'empty'** | **mol/L** | **mmol/L** | **µmol/mL** | **g/L** | **mg/L** | **µg/L** | **mg/mL** | **ppm** | **%** | **mEq/L** | **mL** | **µg**
Default value	**mol/L**

Comment

It is possible to enter remarks about the global variable.

Entry	**256 characters**

Assignment date

Date and time at which the last value was assigned; this is entered automatically each time that a value is assigned automatically or manually.

NOTICE

In contrast to automatic value assignment, when assigning the value manually the date is only entered if the value has really been changed.

Assignment method

Name of the method with which the last value assignment was carried out. If the value was entered manually then **manual** will be shown here.

User

Short name of the user who was logged in during value assignment or who entered the value manually. If work is not carried out using log in, then the user logged in under Windows will be entered automatically.

Computer name

Name of the computer with which the last value assignment was carried out.

Monitoring the global variable

on | off (Default value: **off**)

If this option is enabled then the validity of the global variable will be monitored.

Validity

Validity period of the global variable in days. If a value is entered here then the field **Next assignment** will be adapted automatically.

Input range	**0 to 999 days**
Default value	**999 days**

Next assignment

Date on which the next value assignment must take place. The date can be selected by pressing in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After a date has been entered, the value for the **Validity** will be automatically adapted.

Selection	**Date selection**

Message

The message options can only be edited if monitoring for global variables is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the E-mail address defined under **[E-mail...]** if this option is activated. The message is sent in text format.

[E-mail...]

[E-Mail] opens the **Send E-mail** window.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring for global variables is enabled.

If during global variable monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Document message** | **Display message** | **Cancel determination**
Default value	**Display message**

Document message
The message that the validity period of the global variable has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued then the message that the validity period of the global variable has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.10.3.3 Properties - History

Tab: **Configuration ► Global variables ► [Edit] ► Properties ► Global variable - 'Name' ► History**

History table

The table contains the last 10 values for the selected global variable and cannot be edited or sorted. The individual values are sorted according to date so that the most up-to-date assignment is shown last.

Value

The values are shown in the following colors:

- **Blue**, if the value has been assigned automatically by a method.
- **Black**, when the values have been entered manually.
- **Orange**, when the values are outside the warning limits.
- **Red**, when the values are outside the intervention limits.

If the warning or intervention limits are exceeded then the line number will also be shown with an orange and red background respectively.

Assignment date

Date and time of value assignment.

Assignment method

Name of the method with which the value assignment was carried out. If the values were entered manually then **manual** will appear here.

User

Short name of the user who was logged in during value assignment or who entered the values manually. If work is not carried out using login then the user logged in under Windows will be entered automatically.

History graph

The graph shows the last 10 values for the selected global variable. As in the history table, the values are shown in different colors:

- **Blue**, if the value has been determined automatically by a method.
- **Black**, if the value has been entered manually.

If limits have been defined then the warning limits will be shown in **orange** and the intervention limits in **red**.

NOTICE

The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

[Limits]

Opens the dialog window **Limits for global variable** in which the warning and action limits can be defined for the global variables. These limits apply only to the graph; no monitoring takes place during value assignment.

[Delete history]

Deletes the history.

6.10.3.4 History - Limits

Dialog window: **Configuration ► Global variable ► [Edit] ► Properties ► Global variable - 'Name' ► History ► [Limit value] ► Limits for Global variable - 'Name'**

In the dialog window **Limits for global variable** both warning and intervention limits can be defined for the values of the global variables. If you have defined limits then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. However, whether these

limits are observed is not monitored, i.e. exceeding these limits does not trigger any action.

Warning limits for global variable

on | off (Default value: **off**)

If this option is **enabled** then the values of the global variables will be shown in **orange** if these limits are exceeded.

Lower limit

Lower warning limit for global variable.

Input range	**-1.0 E99 to 1.0E99 (max. 10 digits)**

Upper limit

Upper warning limit for global variable.

Input range	**-1.0 E99 to 1.0E99 (max. 10 digits)**

Intervention limits for global variable

on | off (Default value: **off**)

If this option is **enabled** then the values of the global variables will be shown in **red** if these limits are exceeded.

Lower limit

Lower warning limit for global variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

Upper limit

Upper warning limit for global variable.

Input range	**-1.0E99 to 1.0E99 (max. 10 digits)**

6.11 Subwindow Sample solutions (TC conductivity)

6.11.1 Sample solutions (TC conductivity) - General

Subwindow: **Configuration ► Sample solutions (TC conductivity)**

Subwindow Sample solutions (TC conductivity)

In the subwindow **Sample solutions (TC conductivity)**, the data for the calculation of the temperature coefficients of a sample solution is displayed in tabular form via Chebyshev function. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

This data can either be edited manually or determined with the help of the command **MEAS TC Cond**. A sample solution (TC conductivity) can be selected in the command **MEAS Cond**, in order to compensate for temperature deviations during the conductivity measurement.

6.11.2 Sample solutions (TC conductivity) table

6.11.2.1 Sample solutions (TC conductivity) table

Subwindow: **Configuration ► Sample solutions (TC conductivity)**

Contents

In the default settings, the following data is shown in the table for the calculation of the temperature coefficients:

Name

Name of the sample solution whose temperature coefficient was determined for conductivity.

Start temperature

Temperature at the start of the measurement.

Stop temperature

Temperature at the time of the end of the measurement.

TC min.

Minimum temperature coefficient in the temperature interval of the Chebyshev function, with reference to a **temperature** of **25 °C**.

TC max.

Maximum temperature coefficient in the temperature interval of the Chebyshev function, with reference to a **temperature** of **25 °C**.

c0 ... c4

Coefficients of the Chebyshev polynomial for the calculation of the function.

Assignment date

Moment at which the data for the calculation of the temperature coefficient was entered or determined.

Assignment method

Name of the method with which the automatic value assignment took place. If the value has been entered manually then **manual** will be shown.

User

Short name of the user who was logged in during value assignment or who entered the value manually.

Measuring input

Type and serial number of the measuring input the conductivity sensor was connected to.

Determination ID

Unambiguous identification for the determination with which the determination of the TC data was carried out.

The determination ID can be copied and pasted into another field.

Comment

Comment which can be entered by the user.

With menu item **[Edit] ► Column display...** further columns from the solution properties can be shown.

NOTICE

Lines that contain red entries will also show the line number with a red background.

Table view

The table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles**:
  Sets the column width

- **Double-click on the margin between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** beneath the table contains the following menu items:

New…	Add manually a new line *(see chapter 6.11.2.2, page 1469)*.
Delete	Delete the selected line *(see chapter 6.11.2.3, page 1469)*.
Properties…	Edit the selected line *(see chapter 6.6.3.1, page 1390)*.
Column display…	Define the columns for the table *(see chapter 6.11.2.4, page 1469)*.
Print (PDF)	Output of the table as a PDF file *(see chapter 6.11.2.5, page 1470)*.

6.11.2.2 Adding a new line

Menu item: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► New…**

A new line with the data for calculating the temperature coefficient for a sample solution is added manually to the table with **[Edit] ► New…**. The properties window then opens automatically for editing the data. After the properties window has been closed, the line will be entered in the solution table. The parameters can be modified at any time with **[Edit] ► Properties...**.

6.11.2.3 Deleting a line

Menu item: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Delete**

With **[Edit] ► Delete**, the selected line in the table is deleted.

6.11.2.4 Sample solutions (TC conductivity) - Column display

Dialog window: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Column display… ► Column display**

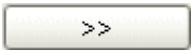
With **[Edit] ► Column display…**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the table.

Available columns

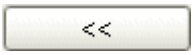
Display of all the fields that can be displayed as columns in the table.

Displayed columns

Display of all the fields that are displayed as columns in the table. The default situation shows the columns **Name**, **TC min.**, **TC max.**, **Assignment date**, **Assignment method** and **User**. The columns **Name**, **TC min.** and **TC max.** are always present and cannot be removed.



Add the selected column to the table.



Remove the selected column from the table.

Modify the sequence of the displayed columns by moving the selected column up.

Modify the sequence of the displayed columns by moving the selected column down.

6.11.2.5 Printing the solution list

Dialog window: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Print (PDF)… ► Print list of sample solutions (TC conductivity) (PDF)**

[Edit] ► Print (PDF)… opens the dialog window **Print list of solutions (PDF)**.

Orientation

Selection	**Portrait format** | **Landscape format**
Default value	**Portrait format**

Portrait format
Output of the table in portrait format.

Landscape format
Output of the table in landscape format.

[OK]

The table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed and/or saved.

6.11.3 Sample solutions (TC conductivity) properties

6.11.3.1 Editing properties

Dialog window: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Properties… ► Sample solution (TC conductivity)**

The parameters for the selected line are defined on the following tabs:

- *General*
  General properties.
- *TC data*
  Data for TC determination and monitoring.

6.11.3.2 Properties - General

Tab: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Properties... ► Sample solution (TC conductivity) ► General**

Name

Name of the measuring solution for which the temperature coefficient for conductivity is determined.

Entry	**50 characters**
Default value	**'empty'**

Comment

Comments on the measuring solution.

Entry	**500 characters**
Default value	**'empty'**

6.11.3.3 Properties - TC data

Tab: **Configuration ► Sample solutions (TC conductivity) ► [Edit] ► Properties... ► Sample solution (TC conductivity) ► TC data**

Start temperature

Temperature at the start of the measurement.

Input range	**-20.0 to 150.0 °C**
Default value	**20.0 °C**

Stop temperature

Temperature at end of the measurement.

Input range	**-20.0 to 150.0 °C**
Default value	**40.0 °C**

TC min.

Minimum temperature coefficient in the temperature interval of the Chebyshev function, with reference to a **temperature** of **25 °C**.

Input range	**-1.0E8 to 1.0E8**
Default value	**1.0**

TC max.

Maximum temperature coefficient in the temperature interval of the Chebyshev function, with reference to a **temperature** of **25 °C**.

Input range	**-1.0E8 to 1.0E8**
Default value	**1.0**

c0 ... c4

Coefficients of the Chebyshev polynomial for the calculation of the function.

Input range	**-1.0E8 to 1.0E8**
Default value	**0.0**

Assignment date

Display of the moment at which the data for the calculation of the temperature coefficient was entered or determined. This value is entered automatically by **tiamo**.

Assignment method

Name of the method with which the automatic value assignment took place. If the value has been entered manually then **manual** will be shown.

User

Short name of the user who was logged in during value assignment or who entered the value manually. If work is not carried out using login, then the user logged in under Windows will be entered automatically.

Measuring input

Type and serial number of the measuring input the conductivity sensor was connected to.

Determination ID

Unambiguous identification for the determination with which the determination of the TC data was carried out.

The determination ID can be copied and pasted into another field.

Monitoring TC data

on | off (Default value: **off**)

If this option is activated, then the validity period of the data will be monitored.

Validity

Validity period of the data in days. If a value is entered here, then the date in the field **Next assignment** will be adapted automatically.

Input range	**0 to 999 Days**
Default value	**999 Days**

Next assignment

Date on which the next assignment is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After a date has been entered, the value for the **Validity** will be automatically adapted.

Selection	**Date selection**

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send E-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted additionally to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test.

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.12 Subwindow Rack data

6.12.1 Configuration - Rack data

Subwindow: **Configuration ► Rack data**

Rack data subwindow

The subwindow **Rack data** contains the Rack table with all the sample racks for Metrohm sample changers defined for the client. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Display of sample racks

The rack table is empty in the default settings. Sample racks which are placed on sample processors, are recognized automatically and included in the rack table. Additional racks can be imported manually.

6.12.2 Rack table

6.12.2.1 Rack table

Subwindow: **Configuration ► Rack data**

Contents

The rack data table shows the following information about the racks configured as standard:

Rack name

Name of the rack.

Rack code

Rack code of the rack.

Number of positions

Number of sample positions on the rack.

Beaker radius samples

Radius of the beakers on the rack.

Beaker sensor

Defines the beaker sensors for the rack.

Device

Shows the devices to which the rack is attached.

Table view

The rack table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left mouse button as follows:

- **Drag the border between column titles**:
  Sets the column width
- **Double-click on the border between column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a Tooltip if the mouse cursor is kept on the field.

With sample racks that are placed on a Sample Processor and are recognized automatically the corresponding device name will be shown in the **Instrument** column. In addition the line number will be shown with a green background.

If a rack is reserved for a running determination or for manual control then the line will be shown in gray and the rack cannot be edited until the determination has been finished.

Functions

The menu **[Edit]** beneath the rack table contains the following menu items:

New…	Adds new rack manually *(see chapter 6.12.2.2, page 1476)*.
Delete	Deletes the selected rack *(see chapter 6.12.2.3, page 1476)*.
Properties…	Edits the selected rack *(see chapter 6.12.3.1, page 1477)*.
Print (PDF)…	Outputs the rack table as a PDF file .*(see chapter 6.12.2.4, page 1476)*

6.12.2.2 Adding new rack

Dialog window: **Configuration ► Rack data ► [Edit] ► New… ► New rack**

A new rack can only be generated as a copy of an already existing rack under a new rack name and with a new rack code. **[Edit] ► New…** opens the dialog window **New rack**.

Template

Selection of the rack to be used as a template for the new rack.

Selection	**All existing racks**

Rack name

Name for the new rack. The selected name must not already exist.

Entry	**25 characters**

Rack code

Code of the new rack. The selected rack code must not already exist.

Entry	**6-figure binary pattern made up of 0 and 1**

6.12.2.3 Deleting rack

Menu item: **Configuration ► Rack data ► [Edit] ► Delete**

With **[Edit] ► Delete** the rack selected in the rack list will be deleted.

6.12.2.4 Printing list of racks

Dialog window: **Configuration ► Rack data ► [Edit] ► Print (PDF)… ► Print list of racks (PDF)**

[Edit] ► Print (PDF)… opens the dialog window **Print list of racks (PDF)**.

Orientation

Selection	**Portrait** | **Landscape**
Default value	**Portrait**

Portrait
Prints rack table in portrait format.

Landscape
Prints rack table in landscape format.

[OK]

The rack table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed and/or saved.

6.12.3 Rack properties

6.12.3.1 Editing rack properties

Dialog window: **Configuration ▶ Rack data ▶ [Edit] ▶ Properties… ▶ Rack data**

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the number of positions on the rack in position. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

The parameters for the rack in position are defined in the following tabs:

- *Rack parameters*
  Defines the parameters that are valid for all rack positions.
- *Lift positions*
  Defines the work, rinse, shift and special positions for Tower 1 and Tower 2 (if present).
- *Special beakers*
  Special beaker Settings for all special beakers on the rack in position.

6.12.3.2 Properties - Rack parameters

Tab: **Configuration ▶ Rack data ▶ [Edit] ▶ Properties... ▶ Rack data ▶ Rack parameters**

Beaker radius samples

Radius of the sample beakers on the rack. If the lift is moved to the work position then this value will be compared with the parameter **Min. beaker radius** *(see chapter 7.3.3, page 1498)* that can be specifically defined for each tower. If **Beaker radius samples < min. beaker radius** then a corresponding error message will appear. With **off** the beaker radius will not be checked.

Input range	**1.0 to 100.0 mm**
Selection	**off**

Beaker sensor

When a sample position is moved to with the command **MOVE** then the beaker sensor (**Tower**, **Robotic arm**) checks whether the special beaker

is present or not. With **off** no check will be made. For the option **Robotic arm** a swing head with beaker sensor must be installed and a suitable work position with beaker contact must be defined for the lift, as this must move to the beaker recognition position.

With the parameter **Beaker test** in the command **MOVE** you can determine whether the determination is to be terminated if a beaker is missing with or without the display of a corresponding message and whether the series is to be continued or also terminated.

Selection	**Tower** | **Robotic arm** | **off**

Rack offset

The rack offset is a production-dependent tolerance value between the upper part of the rack and the lower part. The value is determined by a rack adjustment and displayed here. If necessary, it can be edited.

Input range	**-5.00 to 5.00 °**

6.12.3.3 Properties - Lift positions

Tab: **Configuration ► Rack data ► [Edit] ► Properties... ► Rack data ► Lift positions**

Tower 1

Defines the lift positions for Tower 1. These apply for all rack positions except those that are defined as **Special beaker**.

Work position

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Input range	**0 to 235 mm**

Rinse position

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Input range	**0 to 235 mm**

Shift position

Shift position for Lift 1. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Input range	**0 to 235 mm**

Special position

Special position for Lift 1. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Input range	**0 to 235 mm**

Tower 2

Defines the lift positions for Tower 2. These apply for all rack positions except those that are defined as **Special beaker**.

Work position

Work position for Lift 2. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Input range	**0 to 235 mm**

Rinse position

Rinse position for Lift 2. This lift position is used for rinsing the electrodes.

Input range	**0 to 235 mm**

Shift position

Shift position for Lift 2. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Input range	**0 to 235 mm**

Special position

Special position for Lift 2. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Input range	**0 to 235 mm**

6.12.3.4 Properties - Special beaker

Tab: **Configuration ▶ Rack data ▶ [Edit] ▶ Properties... ▶ Rack data ▶ Special beakers**

The table shows all the data of all the special beakers of the attached rack in tabular form. Each special beaker can be assigned to any position on the rack. The table cannot be edited directly.

NOTICE

Special beakers should preferably be set at high rack positions so that sample series can start from rack position 1. Rack positions which are defined as special beakers are no longer available as sample positions. A specific work position can be defined for each special beaker at Tower 1 and Tower 2 (if present). The shift, rinse and special positions of the affected tower are taken from the general rack positions.

The following columns are shown in the table:

Special beaker

Number of the special beaker for the selected rack.

Rack position

Number of the rack position for the special beaker.

Work position Tower 1

Work position for the special beaker at Tower 1.

Work position Tower 2

Work position for the special beaker at Tower 2.

Beaker radius

Radius of the special beaker.

Beaker sensor

Shows whether and which beaker sensor is to be used for the special beaker.

[Edit]

Opens the dialog window **Special beaker #** *(see chapter 6.12.3.5, page 1480)* for editing the data of the selected special beaker.

6.12.3.5 Special beaker

Dialog window: **Configuration ► Rack data ► [Edit] ► Properties... ► Rack data ► Special beaker ► [Edit] ► Special beaker #**

The parameters for the special beaker selected in the table of special beakers can be defined in the dialog window **Special beaker #**.

Rack position

Number of rack position for selected special beaker.

Input range	**0 to n (n is rack-dependent)**

NOTICE

Special beakers should preferably be set at high rack positions so that sample series can start from rack position 1. Rack positions which are defined as special beakers are no longer available as sample positions. They will be skipped during an automatic movement to a sample position.

Work position Tower 1

Work position of the selected special beaker at Tower 1.

Input range	**0 to 235 mm**

Work position Tower 2

Work position of the selected special beaker at Tower 2.

Input range	**0 to 235 mm**

Beaker radius

Radius of the selected special beaker on the rack. If the lift is moved to the work position then this value will be compared with the parameter **Min. beaker radius** *(see chapter 7.3.3, page 1498)* that can be specifically defined for each tower. If **Beaker radius samples < min. beaker radius** then a corresponding error message will appear. With **off** the beaker radius will not be checked.

Input range	**1.0 to 100.0 mm**
Selection	**off**

Beaker sensor

When the selected special beaker is moved to with the command **MOVE** then the beaker sensor (**Tower**, **Robotic arm**) checks whether the special beaker is present or not. With **off** no check will be made. For the option **Robotic arm** a swing head with beaker sensor must be installed and a suitable work position with beaker contact must be defined for the lift, as this must move to the beaker recognition position.

With the parameter **Beaker test** in the command **MOVE** you can determine whether the determination is to be terminated if a beaker is missing with or without the display of a corresponding message and whether the series is to be continued or also terminated.

Selection	**Tower** | **Robotic arm** | **off**

6.12.3.6 Editing rack properties (774 774 Oven Sample Processor)

Menu item: **Configuration ► Rack data ► Edit ► Properties…**

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the number of positions on the rack in position. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

The parameters for the attached rack are defined on the following 2 tabs:

- *Lift positions*
  Defines the work, rinse, shift and special position for Tower 1.
- *Special beakers*
  Display of the special beaker for the rack in position.

6.12.3.7 Properties - Lift positions (774 Oven Sample Processor)

Dialog window: **Configuration ► Rack data ► Properties**

Tower 1

Defines the lift positions for Tower 1. These apply for all rack positions except those that are defined as *(see chapter 6.12.3.8, page 1483)*.

Work position

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Input range	**0 to 100 mm**

Rinse position

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Input range	**0 to 100 mm**

Shift position

Shift position for Lift 1. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a

higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Input range	**0 to 100 mm**

Special position

Special position for Lift 1. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Input range	**0 to 100 mm**

6.12.3.8 Properties - Special beaker (774 Oven Sample Processor)

Dialog window: **Configuration ▶ Rack data ▶ Properties**

Special beaker

Shows the number of the special beaker for the selected rack.

Rack position

Shows the number of the rack position for the special beaker.

7 Devices

7.1 874 Oven Sample Processor

7.1.1 874 Oven Sample Processor - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **874 Oven Sample Processor** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Tower*
  Properties of the tower.
- *Rack*
  Information on the rack attached.
- *MSB #*
  Properties of the MSB connector 1...3 and the peripheral devices connected to it.
- *Oven*
  Information on the oven.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.1.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.1.3 Properties - Tower

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Tower**

On the tab **Tower** the tower parameters for the tower on the **874 Oven Sample Processor** are edited.

Max. stroke path

Entry of the lowest permitted lift position for the tower. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Input range	**0 to 110 mm**
Default value	**110 mm**

Lift rate

Entry of the lift rate for manual control of the tower.

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

7.1.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.1.5 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.1.6 Properties - Oven

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Oven**

On the tab **Oven** the oven parameters are set:

Oven program version

Shows the program version of the oven module.

Display for the 874 Oven Sample Processor only.

Oven serial number

Shows the serial number of the oven module.

Display for the 874 Oven Sample Processor only.

Initial temperature

Enter the initial temperature of the oven. Entering an initial temperature means that the oven will heat up to the set temperature when it is switched on. **off** means that the oven will not be switched on.

With the 774 Oven Sample Processor display of the initial temperature set on the device only.

Input range	**50 to 250 °C**
Default value	**off °C**

Max. temperature

With the 774 Oven Sample Processor display of the maximum temperature set on the device only.

With the 774 Oven Sample Processor display only.

Input range	**50 to 250 °C**
Default value	**250 °C**

Temperature correction

Enter the temperature correction. This parameter directly affects the temperature control and allows it to be adjusted. In this way any temperature difference that may occur between the oven and sample temperature can be compensated.

With the 774 Oven Sample Processor display of the temperature correction set on the device only.

Input range	**-10 to +10 °C**
Default value	**0 °C**

7.1.7 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.2 867 pH Module

7.2.1 867 pH Module - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name'**

The parameters for the **867 pH Module** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
  Properties of the measuring inputs.
- *MSB #*
  Properties of the MSB connector 1...4 and the peripheral devices connected to it.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.2.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.2.3 Properties - Measuring inputs

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)

ADC type

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	**Pt 1000** | **NTC**
Default value	**Pt 1000**

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Input range	**1000 to 99999 Ohm**
Default value	**30000 Ohm**

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Input range	**1000 to 9999**
Default value	**4100**

7.2.4 Properties - MSB

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.2.5 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.3 864 Robotic Balance Sample Processor

7.3.1 864 Robotic Balance Sample Processor - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name'**

The parameters for the **864 Robotic Balance Sample Processor** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Tower #*
  Properties of tower 1 and tower 2 (if present).
- *Rack*
  Information on the rack attached.
- *Initializing position*
  Defining a position which is automatically approached when the sample changer is initialized.
- *MSB #*
  Properties of the MSB connector 1 - 3 and the peripheral devices connected to it.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.3.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.3.3 Properties - Tower

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Input range	**0 to 235 mm**
Default value	**235 mm**

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table***(see chapter 6.12.2.1, page 1474)* for general **Sample positions***(see chapter 6.12.3.2, page 1477)* and **Special beakers***(see chapter 6.12.3.4, page 1479)* will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	**1.0 ... 100.0 mm** | **off**
Default value	**off**

Lift rate

Lift speed for manual operation.

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Input range	**100.0 to 300.0 mm**

814 USB Sample Processor, 855 Robotic Titrosampler without robotic arm

Selection	**166.0 mm**
Default value	**166.0 mm**

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler with robotic arm, 864 Robotic Balance Sample Processor

Selection	**196.0 mm**
Default value	**196.0 mm**

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

Rinse position

Rinse position valid for all 4 external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

[Configuration]

Opens the dialog window **Configuration** *(see chapter 7.7.8, page 1533)* in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** *(see chapter 7.7.9, page 1535)* in which the parameters for the external position selected from the table can be edited.

7.3.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.3.5 Properties - Initial position

On tab **Initial position**, a position can be defined which is automatically moved to when initializing the sample changer.

Moving to the initial position

on | off (Default value: **off**)

If this option is activated, the position defined here is moved to when initializing the device.

Tower

Selection of the tower on the sample changer for moving to the required position.

Only editable for **Move to initial position** = **on** and if the corresponding sample changer has 2 towers, otherwise inactive.

Selection	**1** | **2**
Default value	**1**

Destination

Selection of the target position which is to be moved to:

Only editable for **Move to initial position** = **on**, otherwise inactive.

Selection	**Rack position** | **Special beaker** | **Ext. position**
Default value	**Rack position**

Rack position
Predefined position on the rack. The lift is thereby lowered to the work position defined for that position.

Special beaker
Special position on the rack defined in the rack properties. The lift is thereby lowered to the work position defined for that position.

Ext. position
External position which is defined for the Swing Head mounted to the tower. The lift is thereby lowered to the work position defined for that position. This option is only available if a Swing Head is mounted to the tower.

Number

Specification of the number of the rack position, of the special beaker or of the external position.

Only editable for **Move to initial position** = **on**, otherwise inactive.

for Move = Rack position

Input range	**1 to 999**
Default value	**1**

for Move = Special beaker

Input range	**1 to 16**
Default value	**1**

for Move = External position

Input range	**1 to 4**
Default value	**1**

7.3.6 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.3.7 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.4 856 Conductivity Module

7.4.1 856 Conductivity Module - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

The parameters for the **856 Conductivity Module** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
  Properties of the measuring inputs.
- *MSB #*
  Properties of the MSB connector 1...4 and the peripheral devices connected to it.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.4.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.4.3 Properties - Measuring inputs

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)

ADC type

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	**Pt 1000** | **NTC**
Default value	**Pt 1000**

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Input range	**1000 to 99999 Ohm**
Default value	**30000 Ohm**

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Input range	**1000 to 9999**
Default value	**4100**

7.4.4 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.4.5 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.5 855 Robotic Titrosampler

7.5.1 855 Robotic Titrosampler - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **855 Robotic Titrosampler** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
  Properties of the measuring inputs.
- *MSB #*
  Properties of the MSB connector 1 - 3 and the peripheral devices connected to it.
- *Tower*
  Properties of tower 1.
- *Rack*
  Information on the rack attached.
- *Initializing position*
  Defining a position which is automatically approached when the sample changer is initialized.

- *GLP*
  Information on GLP tests and GLP monitoring.

7.5.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.5.3 Properties - Measuring inputs

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)

ADC type

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	**Pt 1000** | **NTC**
Default value	**Pt 1000**

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Input range	**1000 to 99999 Ohm**
Default value	**30000 Ohm**

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Input range	**1000 to 9999**
Default value	**4100**

7.5.4 Properties - Tower

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Input range	**0 to 235 mm**
Default value	**235 mm**

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table***(see chapter 6.12.2.1, page 1474)* for general **Sample positions***(see chapter 6.12.3.2, page 1477)* and **Special beakers***(see chapter 6.12.3.4, page 1479)* will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	**1.0 … 100.0 mm** | **off**
Default value	**off**

Lift rate

Lift speed for manual operation.

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Input range	**100.0 to 300.0 mm**

814 USB Sample Processor, 855 Robotic Titrosampler without robotic arm

Selection	**166.0 mm**
Default value	**166.0 mm**

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler with robotic arm, 864 Robotic Balance Sample Processor

Selection	**196.0 mm**
Default value	**196.0 mm**

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

Rinse position

Rinse position valid for all 4 external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

[Configuration]

Opens the dialog window **Configuration** *(see chapter 7.7.8, page 1533)* in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** *(see chapter 7.7.9, page 1535)* in which the parameters for the external position selected from the table can be edited.

7.5.5 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.5.6 Properties - Initial position

On tab **Initial position**, a position can be defined which is automatically moved to when initializing the sample changer.

Moving to the initial position

on | off (Default value: **off**)

If this option is activated, the position defined here is moved to when initializing the device.

Tower

Selection of the tower on the sample changer for moving to the required position.

Only editable for **Move to initial position** = **on** and if the corresponding sample changer has 2 towers, otherwise inactive.

Selection	**1** | **2**
Default value	**1**

Destination

Selection of the target position which is to be moved to:

Only editable for **Move to initial position** = **on**, otherwise inactive.

Selection	**Rack position** | **Special beaker** | **Ext. position**
Default value	**Rack position**

Rack position
Predefined position on the rack. The lift is thereby lowered to the work position defined for that position.

Special beaker
Special position on the rack defined in the rack properties. The lift is thereby lowered to the work position defined for that position.

Ext. position
External position which is defined for the Swing Head mounted to the tower. The lift is thereby lowered to the work position defined for that position. This option is only available if a Swing Head is mounted to the tower.

Number

Specification of the number of the rack position, of the special beaker or of the external position.

Only editable for **Move to initial position** = **on**, otherwise inactive.

for Move = Rack position

Input range	**1 to 999**
Default value	**1**

for Move = Special beaker

Input range	**1 to 16**
Default value	**1**

for Move = External position

Input range	**1 to 4**
Default value	**1**

7.5.7 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.5.8 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.6 846 Dosing Interface

7.6.1 846 Dosing Interface - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

The parameters for the **846 Dosing Interface** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *(see chapter 7.1.5, page 1486)*
  Properties of the MSB connector and the peripheral devices connected to it.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.6.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.6.3 Properties - MSB

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.6.4 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.7 814/815 USB Sample Processor

7.7.1 814/815 USB Sample Processor - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name'**

The parameters for the **814 USB Sample Processor** and **815 Robotic USB Sample Processor XL** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Tower #*
  Properties of tower 1 and tower 2 (if present).
- *Rack*
  Information on the rack attached.
- *Initializing position*
  Defining a position which is automatically approached when the sample changer is initialized.
- *MSB #*
  Properties of the MSB connector 1 - 3 and the peripheral devices connected to it.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.7.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.7.3 Properties - Tower

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Input range	**0 to 235 mm**
Default value	**235 mm**

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii

defined in **Rack table***(see chapter 6.12.2.1, page 1474)* for general **Sample positions***(see chapter 6.12.3.2, page 1477)* and **Special beakers***(see chapter 6.12.3.4, page 1479)* will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	**1.0 … 100.0 mm** | **off**
Default value	**off**

Lift rate

Lift speed for manual operation.

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Input range	**100.0 to 300.0 mm**

814 USB Sample Processor, 855 Robotic Titrosampler without robotic arm

Selection	**166.0 mm**
Default value	**166.0 mm**

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler with robotic arm, 864 Robotic Balance Sample Processor

Selection	**196.0 mm**
Default value	**196.0 mm**

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

Rinse position

Rinse position valid for all 4 external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

[Configuration]

Opens the dialog window **Configuration** *(see chapter 7.7.8, page 1533)* in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** *(see chapter 7.7.9, page 1535)* in which the parameters for the external position selected from the table can be edited.

7.7.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.7.5 Properties - Initial position

On tab **Initial position**, a position can be defined which is automatically moved to when initializing the sample changer.

Moving to the initial position

on | off (Default value: **off**)

If this option is activated, the position defined here is moved to when initializing the device.

Tower

Selection of the tower on the sample changer for moving to the required position.

Only editable for **Move to initial position** = **on** and if the corresponding sample changer has 2 towers, otherwise inactive.

Selection	**1** | **2**
Default value	**1**

Destination

Selection of the target position which is to be moved to:

Only editable for **Move to initial position** = **on**, otherwise inactive.

Selection	**Rack position** | **Special beaker** | **Ext. position**
Default value	**Rack position**

Rack position
Predefined position on the rack. The lift is thereby lowered to the work position defined for that position.

Special beaker
Special position on the rack defined in the rack properties. The lift is thereby lowered to the work position defined for that position.

Ext. position
External position which is defined for the Swing Head mounted to the tower. The lift is thereby lowered to the work position defined for that position. This option is only available if a Swing Head is mounted to the tower.

Number

Specification of the number of the rack position, of the special beaker or of the external position.

Only editable for **Move to initial position** = **on**, otherwise inactive.

for Move = Rack position

Input range	**1 to 999**
Default value	**1**

for Move = Special beaker

Input range	**1 to 16**
Default value	**1**

for Move = External position

Input range	**1 to 4**
Default value	**1**

7.7.6 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.7.7 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.7.8 Configuration Robotic arm

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Tower ► [Configuration] ► Robotic arm configuration**

In the dialog window **Robotic arm configuration**, the specific settings can be made for each robotic arm mounted on a swing head.

Swing offset

Swing angle offset for specific robotic arm model. This value must be set according to the leaflet supplied with the swing head.

Input range	**-270.0 to 270.0 °**
Default value	**0.0 °**

Max. swing range

Maximum usable swing range for specific robotic arm model. Each robotic arm model displays a different value on the basis of its construction. This value must be set according to the leaflet supplied with the swing head and can also be reduced as required.

Input range	**0.0 to 330.0 °**
Default value	**60.0 °**

Swing radius

The swing radius depends on the length of the robotic arm and, together with the axial distance, is the most important parameter for exact movement to a rack position. This value must be set according to the leaflet supplied with the swing head.

Input range	**30.0 to 300.0 mm**
Default value	**110.0 mm**

Rotation offset

Offset from the middle of the tower to the middle of the robotic arm. If a robotic arm must be mounted on the tower so that it is offset to one side, then this value can be determined by the service technician during rack adjustment.

Input range	**-270.0 to 270.0 °**
Default value	**0.0 °**

Swing direction

The swing direction of the robotic arm depends on the type of robotic arm.

For a 2-tower model, the robotic arm at Tower 1 must swing to the right, i.e. **–** and that at Tower 2 must be mounted **+** so that it swings to the left.

Selection	**+** | **–**
Default value	**+**

+
Clockwise rotation.

–
Counterclockwise rotation.

7.7.9 External position

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Tower ▶ [Edit] ▶ External position #**

In the dialog window **External position #** a **Swing angle** and a specific **Work position** can be defined for each external position. **Shift position** and **Rinse position** can only be defined for all 4 external positions together. No **Special position** can be defined for external positions.

Angle

Definition of the swing angle for the selected external position. The offset is made up of a design-dependent angle (approximately 8-9°) together with the robotic arm offset from the Robotic arm properties *(see chapter 7.7.8, page 1533)*. The maximum swing range is also defined under Robotic arm properties.

Input range	**(Offset) to (Offset + max. swing range) °**
Default value	**60.0 °**

Work position

Definition of the work position for the selected external position.

Input range	**0 to 235 mm**
Default value	**0 mm**

7.8 778/789 Sample Processor

7.8.1 778/789 Sample Processor - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **778 Sample Processor** and **789 Robotic Sample Processor XL** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Tower #*
  Properties of tower 1 and tower 2 (if present). These tabs are only displayed if the Sample Processor is connected to the PC via an RS-232 interface.
- *Rack*
  Information on the rack attached. This tab is only displayed if the Sample Processor is connected to the PC via an RS-232 interface.

- *MSB #*
  Properties of the MSB connector 1 - 3 and the peripheral devices connected to it. These tabs are only displayed if the Sample Processor is connected to the PC via an RS-232 interface.
- *RS-232*
  Selection of the serial interface to which the device is connected.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.8.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.8.3 Properties - Tower

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Input range	**0 to 235 mm**
Default value	**235 mm**

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table***(see chapter 6.12.2.1, page 1474)* for general **Sample positions***(see chapter 6.12.3.2, page 1477)* and **Special beakers***(see chapter 6.12.3.4, page 1479)* will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	**1.0 … 100.0 mm** | **off**
Default value	**off**

Lift rate

Lift speed for manual operation.

Input range	**3 to 25 mm/s**
Default value	**25 mm/s**

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Input range	**100.0 to 300.0 mm**

814 USB Sample Processor, 855 Robotic Titrosampler without robotic arm

Selection	**166.0 mm**
Default value	**166.0 mm**

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler with robotic arm, 864 Robotic Balance Sample Processor

Selection	**196.0 mm**
Default value	**196.0 mm**

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

Rinse position

Rinse position valid for all 4 external positions.

Input range	**0 to 235 mm**
Default value	**0 mm**

[Configuration]

Opens the dialog window **Configuration** *(see chapter 7.7.8, page 1533)* in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** *(see chapter 7.7.9, page 1535)* in which the parameters for the external position selected from the table can be edited.

7.8.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.8.5 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.8.6 Properties - RS-232

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name' ▶ RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.8.7 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.9 774 Oven Sample Processor

7.9.1 774 Oven Sample Processor - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name'**

The parameters for the device **774 Oven Sample Processor** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Tower*
  Properties of the tower. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Rack*
  Information on the rack attached. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Dosing device*
  Properties of the connector and the dosing devices connected to. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Oven*
  Shows the oven parameters. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Gas*
  Shows the parameters for the gas flow. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *RS-232*
  Selection of the serial interface the device is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.9.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.9.3 Properties - Tower

Tab: **Configuration ▶ Device ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Tower**

On the tab **Tower** the tower parameters for the tower mounted on the **774 Oven Sample Processor** are shown. These cannot be edited, but must be set on the device itself via the keyboard.

Max. stroke path

Shows the lowest permitted lift position for the tower. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Beaker sensor

Shows whether the beaker sensor for the tower is switched on or off. Each time that a sample position is moved to the beaker sensor checks whether a beaker is present or not.

7.9.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.9.5 Properties - Dosing device

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Dosing**

On the tab **Dosing device** the number and type of dosing devices connected to the **730 Sample Changer** or **774 Oven Sample Processor** is displayed. A maximum of 12 dosing devices of the type **685 Dosimat** or **700 Dosino** can be connected.

Dosing devices

Shows the dosing device type for each dosing device connected.

NOTICE

Connecting the dosing devices is described in the manual for the 730 Sample Changer or 774 Oven Sample Processor. If no dosing device is connected then the tab will remain empty.

7.9.6 Properties - Oven

Tab: **Configuration ▶ Device ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Oven**

On the tab **Oven** the oven parameters are set:

Oven program version

Shows the program version of the oven module.

Display for the 874 Oven Sample Processor only.

Oven serial number

Shows the serial number of the oven module.

Display for the 874 Oven Sample Processor only.

Initial temperature

Enter the initial temperature of the oven. Entering an initial temperature means that the oven will heat up to the set temperature when it is switched on. **off** means that the oven will not be switched on.

With the 774 Oven Sample Processor display of the initial temperature set on the device only.

Input range	**50 to 250 °C**
Default value	**off °C**

Max. temperature

With the 774 Oven Sample Processor display of the maximum temperature set on the device only.

With the 774 Oven Sample Processor display only.

Input range	**50 to 250 °C**
Default value	**250 °C**

Temperature correction

Enter the temperature correction. This parameter directly affects the temperature control and allows it to be adjusted. In this way any temperature difference that may occur between the oven and sample temperature can be compensated.

With the 774 Oven Sample Processor display of the temperature correction set on the device only.

Input range	**-10 to +10 °C**
Default value	**0 °C**

7.9.7 Properties - Gas

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Gas**

On the tab **Gas** the parameters for the gas flow on the **774 Oven Sample Processor** are shown. The parameters cannot be edited, they are only read off by the device.

Unit for gas flow

Shows the unit selected at the device for the gas flow display (**mL/min** or **L/h**).

Minimum gas flow

Shows the lower warning limit set on the device for the gas flow.

Maximum gas flow

Shows the upper warning limit set on the device for the gas flow.

NOTICE

If the minimum gas flow is undercut or the maximum gas flow is exceeded then an error message will appear.

7.9.8 Properties - RS-232

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name' ▶ RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.9.9 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.10 756/831 Coulometer

7.10.1 756/831 Coulometer - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties… ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **756** and **831 Coulometers** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *RS-232*
  Selection of the serial interface the Coulometer is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.10.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.10.3 Properties - RS-232

Tab: **Configuration ► Devices ► [Edit] ► Properties ► Properties - 'Device type' - 'Device name' ► RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.10.4 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.11 730 Sample Changer

7.11.1 730 Sample Changer - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

The parameters for the device **730 Sample Changer** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Towers*
  Properties of Tower 1 and Tower 2 (if present). This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *Rack*
  Information on the rack attached. This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *Dosing device*
  Properties of the connector and the dosing devices connected to it. This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *RS-232*
  Selection of the serial interface the device is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.11.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.11.3 Properties - Tower

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Towers**

NOTICE

This tab is only displayed if a PC and a sample changer are connected via an RS-232 interface.

On the tab **Towers** the tower parameters for Tower 1 and Tower 2 (if present) are shown for the **730 Sample Changer**. These cannot be edited, but must be set on the device itself via the keyboard.

Tower 1 / Tower 2

Max. stroke path

Shows the lowest permitted lift position for the two towers. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Beaker sensor

Shows whether the beaker sensor for the two towers is switched on or off. Each time a sample position is moved to the beaker sensor checks whether a beaker is present or not.

Tower 1

Number of pumps

Shows how many pumps are connected to Tower 1.

759 Swing Head

Shows whether a swing head is mounted on Tower 1.

Tower 2

Number of pumps

Shows how many pumps are connected to Tower 1.

NOTICE

A swing head can only be mounted on Tower 1.

7.11.4 Properties - Rack

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "**-----**" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the

Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Input range	**3 to 20 °/s**
Default value	**20 °/s**

[Rack Data]

Opens the dialog window **Rack data** *(see chapter 6.12.3.1, page 1477)* or **Rack data (774)** *(see chapter 6.12.3.6, page 1482)* in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.11.5 Properties - Dosing device

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Dosing**

On the tab **Dosing device** the number and type of dosing devices connected to the **730 Sample Changer** or **774 Oven Sample Processor** is displayed. A maximum of 12 dosing devices of the type **685 Dosimat** or **700 Dosino** can be connected.

Dosing devices #

Shows the dosing device type for each dosing device connected.

NOTICE

Connecting the dosing devices is described in the manual for the 730 Sample Changer or 774 Oven Sample Processor. If no dosing device is connected then the tab will remain empty.

7.11.6 Properties - RS-232

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name' ▶ RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.11.7 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.12 712 Conductometer

7.12.1 712 Conductometer - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties… ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **712 Conductometer** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *RS-232*
  Selection of the serial interface the Coulometer is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.12.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.12.3 Properties - RS-232

Tab: **Configuration ► Devices ► [Edit] ► Properties ► Properties - 'Device type' - 'Device name' ► RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.12.4 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.13 089 Photometer

7.13.1 089 Photometer - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

The parameters for the **089 Photometer** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Settings*
  Information on light source and heater.
- *Adjustment*
  Information on the determination of the transmission factor.
- *MSB #*
  Information on dosing preparation and connected devices.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.13.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.13.3 Properties - Settings

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Settings**

Light source

Wavelength

Wavelength which has been set on the photometer. If a value is defined here, a check is performed for each command containing a specified wavelength whether the wavelength specified in the command corresponds with the wavelength defined here for the device.

Input range	**100 to 2000 nm**
Selection	**'empty'**
Default value	**'empty'**

Light source always active

on | off (Default value: **on**)

If this check box is activated, then the LED on the photometer is always on. Else the firmware takes care of switching it on before the measurement or switching it off after the measurement.

Heater

Initial temperature

Initial temperature of the device (temperature of the cuvette). Entering an initial temperature means that the heater will heat up to the set temperature when the device is switched on. **off** means that the heater will not be switched on.

Input range	**20 to 60 °C**
Default value	**30 °C**
Selection	**off**

7.13.4 Properties - Adjustment

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Adjustment**

Transmission factor

Transmission factor, either determined via **MEAS TMF** or manually entered here.

Input range	**0.0100 to 20.0000**
Default value	**1.0000**

Date

Shows time and date when the transmission factor was determined.

User

Shows the user logged in during the determination of the transmission factor.

Method

Shows the method used to determine the transmission factor. If the transmission factor was entered manually, **manual** is displayed.

Determination ID

ID of the determination during which the transmission factor was determined.

7.13.5 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.13.6 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter*

2.5.1, page 84). After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.14 Avantes spectrometer

7.14.1 Avantes spectrometer - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

Two different measurement configurations can be realized with instruments of the type Avantes spectrometer:

One-channel instrument setup

The measurement configuration consists of a spectrometer and a light source, with which a reference spectrum and a dark spectrum have to be measured first. These spectra are then taken into account for the subsequent sample measurements.

Two-channel instrument setup

The measurement configuration consists of two spectrometers connected via a SYNC cable and a light source. One spectrometer is used as the instrument for the measuring channel (sample), while the other measures the reference channel spectrum (100% transmission) at the same time.

The instrument setup is defined in the configuration with the **Instrument for reference channel** parameter on the **Settings** tab.

The parameters for the **Avantes spectrometer** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Settings*
  Information on light source and output signal.
- *Detector*
  Information on the detector.
- *Calibration*
  Information on the wavelength calibration.
- *Dark spectrum*
  Information on the dark spectrum.
- *Reference spectrum*
  Information on the reference spectrum.
- *Correction spectrum*
  Information on the correction spectrum.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.14.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.14.3 Properties - Settings

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Settings**

Device assignment

Instrument for reference channel

Name of the reference instrument assigned to the instrument for the measuring channel in a two-channel instrument setup. It measures the reference, while the instrument for the measuring channel measures the sample solution at the same time.

Selection	**'Instrument name'** | **not defined**

'Instrument name'
All spectrometers for which **Instrument for reference channel** = **not defined** is selected.

not defined
In a one-channel instrument setup and for spectrometers that have already been assigned in a two-channel instrument setup, **not defined** has to be selected.

Instrument for measuring channel

Only visible for two-channel instrument setups. Name of the instrument for sample solution measurement.

Light source

Type

Type of light source used.

Selection	**continuous** | **pulsed**
Default value	**continuous**

Analog output

on | off (Default value: **on**)

If this option is enabled, then the measuring signal is output at the analog output of the spectrometer. If the connected spectrometer is not equipped with an analog output, then this option will be ignored.

Sensitivity

Setting of the sensitivity of the analog output. The number of mAU (absorption units) represented by 1 mV is indicated.

Only editable if the analog output is switched on.

Input range	**1 to 214,783,647 mAU/mV**
Default value	**100 mAU/mV**

7.14.4 Properties - Detector

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Detector**

The **Detector** tab shows information on the detector that is built into the spectrometer.

Detector type

Shows the detector type.

Minimum wavelength

Shows the minimum wavelength of the measurable range in nm (instrument-specific parameter).

Maximum wavelength

Shows the maximum wavelength of the measurable range in nm (instrument-specific parameter).

Number of pixels

Shows the resolution with which the spectrum is recorded (instrument-specific parameter).

7.14.5 Properties - Calibration

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Calibration**

On the tab **Calibration** the data of the wavelength calibration is displayed. A specific wavelength, defined by four wavelength coefficients, is assigned to each pixel on the detector. The wavelength calibration is carried out with the command **CAL Spec**, the calibration data is calculated automatically and displayed on this tab.

Date

Display of the time and date of the wavelength calibration.

User

Display of the user logged in at the time of the wavelength calibration.

Method

Display of the method the wavelength calibration has been carried out with.

Selection	**Factory settings** | **"Method name"**
Default value	**Factory settings**

[Reset calibration]

Resets the device to factory-adjusted calibration. The **dark spectrum** and **reference spectrum** will be deleted.

Determination ID

ID of the determination the wavelength calibration has been carried out with. With calibration method **Factory setting**, **----** is displayed.

The determination ID can be copied and pasted into another field.

Calibration coefficients

Coefficients of the regression function with which the assignment of the CCD pixels to a wavelength is carried out.

c#

Display of the wavelength coefficients **c1** … **c4**.

7.14.6 Properties - Dark spectrum

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Dark spectrum**

The **Dark spectrum** tab shows information on the dark spectrum stored in the device.

If no dark spectrum has been recorded yet or the calibration has been reset to factory settings, **--** is displayed in the fields.

Date

Shows the date and time when the dark spectrum was recorded.

User

Shows the user logged in during recording of the dark spectrum.

Method

Shows the method with which the dark spectrum has been recorded.

Determination ID

ID of the determination in which the dark spectrum has been recorded.

The determination ID can be copied and pasted into another field.

Integration time

Shows the integration time during recording of the reference spectrum.

Averaged spectra

Number of spectra that are recorded and averaged.

Smoothing

Shows the number of neighboring pixels with which the light intensity of each pixel was determined.

Flash rate

Shows the number of flashes per second of a pulsed xenon lamp as light source.

Spectrum

Shows the dark spectrum. The graph can be zoomed with the mouse. You can display the whole spectrum again by double-clicking on it.

x Axis

Shows the wavelength in nm.

y Axis

Shows the intensity in counts.

7.14.7 Properties - Reference spectrum

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Reference spectrum**

This tab shows information on the reference spectrum stored in the device.

If no reference spectrum has been recorded yet or the calibration has been reset to factory settings, **--** is displayed in the fields.

Date

Shows the date and time when the reference spectrum was recorded.

User

Shows the user logged in during recording of the reference spectrum.

Method

Shows the method with which the reference spectrum was recorded.

Determination ID

ID of the determination in which the reference spectrum was recorded.

The determination ID can be copied and pasted into another field.

Integration time

Shows the integration time during recording of the reference spectrum.

Averaged spectra

Number of spectra that are recorded and averaged.

Smoothing

Shows the number of neighboring pixels with which the light intensity of each pixel was determined.

Flash rate

Shows the number of flashes per second of a pulsed xenon lamp as light source.

Spectrum

Shows the reference spectrum. The graph can be zoomed with the mouse. You can display the whole spectrum again by double-clicking on it.

x Axis

Shows the wavelength in nm.

y Axis

Shows the intensity in counts.

7.14.8 Properties - Correction spectrum

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Correction spectrum**

As production-related differences with regard to the light sensitivity exist even among identically built spectrometers, the light intensity of the measuring and reference instrument has to be corrected before a determination. The resulting correction factors for each wavelength are taken into account in all subsequent measurements made with the instrument.

The **Correction spectrum** tab shows information on the correction spectrum.

If no correction spectrum has been recorded yet or the calibration has been reset to factory settings, **--** is displayed in the fields.

Date

Shows the date and time when the correction spectrum was recorded.

User

Shows the user logged in during recording of the correction spectrum.

Method

Shows the method with which the correction spectrum was recorded.

Determination ID

ID of the determination in which the correction spectrum was recorded.

The determination ID can be copied and pasted into another field.

Integration time

Shows the integration time during recording of the correction spectrum.

Averaged spectra

Number of spectra that are recorded and averaged.

Smoothing

Shows the number of neighboring pixels with which the light intensity of each pixel was determined.

Flash rate

Shows the number of flashes per second of a pulsed xenon lamp as light source.

Spectrum

Shows the correction spectrum. The graph can be zoomed with the mouse. You can display the whole spectrum again by double-clicking on it.

x Axis

Shows the wavelength in nm.

y Axis

Shows the correction factors.

7.14.9 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.15 Barcode reader

7.15.1 Barcode reader - General

A barcode reader is used to enter sample data and other data in **tiamo**.

NOTICE

A barcode reader only has to be configured as a **device** in **tiamo** when the functions for automatic data import into sample tables are to be used. If a USB barcode reader not configured as a device is connected to the PC, it will be recognized (in the same way as a keyboard) as being an **HID** (Human Interface Device) that can be used for data entries in all fields.

Barcode reader as a device

NOTICE

If the functions for automatic data import into sample tables are to be used, the barcode reader must be added as a device in **tiamo** and configured so that during each data transfer the following preamble and postamble control characters are also transmitted:

Preamble #1: **02hex** (^B, STX)

Preamble #2: **02hex - 09hex** (different identification code **02hex - 09hex** for each barcode reader connected)

Postamble #1: **04hex** (^D, EOT)

Finish: **<CR><LF>**

Refer to the barcode reader manual regarding its configuration.

Barcode reader as an HID

NOTICE

If a barcode reader is to be used as an HID it must be configured in such a way that it does not transmit any preamble control characters.

Refer to the barcode reader manual regarding its configuration.

7.15.2 Barcode reader - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name'**

The parameters for a **barcode reader** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Settings*
  Settings for the barcode reader.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.15.3 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.15.4 Properties - Settings

Tab: **Configuration ► Device ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Settings**

Barcode reader ID

Shows the identification of the barcode reader.

Input target

Selection of the field into which the output from the barcode reader is to be entered.

Selection	**Active input field** | **Method** | **ID1…16** | **Sample size** | **Sample size unit** | **Sample position**
Default value	**Active input field**

[Connect]

Establishes a connection to the barcode reader. The dialog window **Establish connection** *(see chapter 7.15.6, page 1585)* appears.

[Disconnect]

Disconnects the connection to the barcode reader (only then the device can be deleted out of the configuration).

7.15.5 Properties - GLP

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on [...] in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing [...] in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.15.6 Establish a connection to the barcode reader

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Settings ▶ [Connect] ▶ Establish connection**

In order to check a connection to a barcode reader the button **[Connect]** on the tab **Settings** has to be pressed.

If then a barcode is read in with the barcode reader, the received data will be inserted in the following fields:

Barcode reader ID

Identifier of the barcode reader.

Data

Read-in data.

7.16 RS-232 device

7.16.1 RS-232 device - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties… ▶ Properties - 'Device type' - 'Device name'**

The parameters for a generic **RS-232 device** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *RS-232*
  Selects and configures the serial interface the device is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.16.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.16.3 Properties - RS-232

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► RS-232**

The properties of the RS-232 interface are defined on this tab.

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission rate. The baud rate selected here must also be set on the device itself.

Selection	**300** | **600** | **1200** | **2400** | **4800** | **9600** | **19200** | **38400** | **57600** | **115200**
Default value	**9600**

Data bit

Number of data bits.

Selection	**7** | **8**
Default value	**8**

Parity

Type of parity testing.

Selection	**None** | **Odd** | **Even**
Default value	**None**

Stop bit

Number of stop bits.

Selection	**1** | **2**
Default value	**1**

Handshake

Type of data transmission protocol.

Selection	**None** | **HW** | **SW**
Default value	**None**

Timeout

Maximum waiting time for receiving characters. If this time is exceeded, receiving will be stopped.

Input range	**1000 to 9000 ms**
Default value	**2000 ms**

Terminator for send

Terminator for send in hexadecimal code.

Selection	**\0D** | **\0D\0A** | **\0D\0A\0A** | **\0D\0D\0A**
Default value	**\0D\0A** (**\0D** = CR, **\0A** = LF)

Terminator for receiving

Final character for receiving in hexadecimal code.

Selection	**\0D** | **\0D\0A** | **\0D\0A\0A** | **\0D\0D\0A**
Default value	**\0D\0A** (**\0D** = CR, **\0A** = LF)

Code page

Code page used for the data transfer.

Selection	**Cp437** | **Cp850** | **Cp852** | **ASCII**
Default value	**Cp437**

Sending characters separately

on | off (Default value: **off**)

If this option is enabled each character is sent separately. The delay time is allowed to run before sending the next character.

Delay time

Delay time until the sending of the next character.

Input range	**0 to 9999 ms**
Default value	**0 ms**

[Connect]

Establishes the connection to the RS-232 device. The dialog window **Establish connection** appears *(see chapter 7.16.5, page 1590)*.

[Disconnect]

Disconnects the connection to the RS-232 device (only then the device can be deleted out of the configuration).

7.16.4 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.16.5 Establish a connection to the RS-232 device

Dialog window: **Configuration ► Devices ► Properties ► RS-232 ► Connect**

In order to establish a connection to a RS-232 device the button **[Connect]** has to be pressed on the tab **RS-232**.

If then a message is entered in the field besides the button **[Send]** and is sent, the message received by the device appears in the large text field.

Text field

The messages sent to and received by the device are shown in the large text field.

Input field

Input field for a message to be sent to the device.

[Send]

Sends the message shown in the input field to the device.

7.17 Titrando

7.17.1 Titrando - Overview

The parameters for the **808, 809, 835, 836, 841, 842, 851, 852, 857, 859, 888, 890, 901, 902, 904, 905, 906**, and **907** Titrandos are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
  Properties of the measuring inputs.

NOTICE

2.xxx.0010 Titrando models only have one measuring input.

NOTICE

857, 888, 890, 901, 902, 904, 905, 906 and 907 Titrandos have additional intelligent measuring inputs (iConnect).

- *MSB #*
  Properties of the four MSB connectors and the peripheral devices connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.17.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.17.3 Properties - Measuring inputs

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)

ADC type

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	**Pt 1000** | **NTC**
Default value	**Pt 1000**

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Input range	**1000 to 99999 Ohm**
Default value	**30000 Ohm**

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Input range	**1000 to 9999**
Default value	**4100**

7.17.4 Properties - MSB

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** *(see chapter 5.6.6.5.1, page 1209)* (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.17.5 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.17.6 Load new program version

Dialog window: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General ► [Update] ► Load new program version**

If it is discovered that the device to connect has an old program version not supported by **tiamo**, it must be updated. Select the device from the device table. **[Edit] ► Properties...** opens the properties window. On the **General** tab, **[Update]** is now active and can be used to open the **Load new program version** dialog window.

Old version

Shows the old device program version.

New version

Shows the new device program version to be loaded.

[Load]

Loads new program version.

NOTICE

Make sure that the device is not manipulated or switched off during the loading process and follow the instructions shown.

7.18 Titrino

7.18.1 Titrino - Overview

The parameters for the **702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798** and **799 Titrinos** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *Int. dosing device D0*
  Properties of the internal dosing device.
- *Ext. dosing device D1/D2*
  Properties of the connected external dosing devices (685 Dosimat or 700 Dosino).

NOTICE

These tabs for external dosing devices are only available for 736, 751, 758 and 799 Titrinos.

- *RS-232*
  Selection of the serial interface the Titrino is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

Program versions

tiamo supports only the following program versions of the Titrinos:

Titrino	Program version
702 SM Titrino	5.702.0021
716 DMS Titrino	5.716.0022
718 STAT Titrino	5.718.0012
719 S Titrino	5.719.0021
720 KFS Titrino	5.720.0021
721 NET Titrino	5.721.0012
736 GP Titrino	5.736.0013
751 GPD Titrino	5.751.0021
758 KFD Titrino	5.758.0022
784 KFP Titrino	5.784.0011
785 DMP Titrino	5.785.0011
794 Basic Titrino	5.794.0010
795 KFT Titrino	5.795.0010
798 MPT Titrino	5.798.0010
799 GPT Titrino	5.799.0010

7.18.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.18.3 Properties - Int. Dosing device D0

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name' ▶ Int. Dosing device D0**

On the tab **Int. Dosing device D0** the properties of the internal dosing device for the preparing of the dosing device can be set.

NOTICE

The preparing of internal dosing devices connected to a **702, 716, 718, 719, 720, 721, 784, 785, 794, 795, 798 Titrino** can only be triggered on the device itself before starting *tiamo*.

Request for dosing device preparation

Selection when the request for carrying out a **PREP (prepare)** *(see chapter 5.6.6.5.1, page 1209)* command is to be shown for the internal dosing device.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

7.18.4 Properties - Ext. Dosing device D#

Tab: **Configuration ► Devices ► [Edit] ► Properties ► Properties - 'Device type' - 'Device name' ► Ext. Dosing device D#**

Request for dosing device preparation

Selection when the request for carrying out the **PREP** (prepare) command *(see chapter 5.6.6.5.1, page 1209)* is to be shown for the external dosing device **D1** or **D2**.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Input range	**0.1 to 999.9 h**
Default value	**12 h**

Connected devices

Here the device (685 or 700) connected to the dosing device connector is displayed with its properties.

Dosing device type

Display of the dosing device type.

7.18.5 Properties - RS-232

Tab: **Configuration ► Devices ► [Edit] ► Properties ► Properties - 'Device type' - 'Device name' ► RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	**1200** | **2400** | **4800** | **9600**
Default value	**9600**

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.

NOTICE

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.18.6 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing … in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.19 Balances

7.19.1 Balance - Overview

Dialog window: **Configuration ► Devices ► [Edit] ► Properties… ► Properties - 'Device type' - 'Device name'**

The parameters for a **balance** are set on the following tabs:

- *General*
  General device information such as device name, device type, serial number, etc.
- *RS-232*
  Selection of the serial interface the device is connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

7.19.2 Properties - General

Tab: **Configuration ► Devices ► [Edit] ► Properties... ► Properties - 'Device type' - 'Device name' ► General**

On the tab **General**, general properties of the device are displayed.

Device name

Designation of the device (can be freely defined by user).

Entry	**50 characters**
Default value	**Device type number_#**

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** *(see chapter 7.17.6, page 1596)*.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own data storage under legal control.

Only visible and editable with Sartorius balances

Selection	**on** | **off**
Default value	**off**

Remarks

Remarks about the device.

Entry	**1000 characters**
Default value	**empty**

7.19.3 Properties - RS-232

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	**COM1** | **COM2** | **...** | **COMn**
Default value	**COMn**

COMn
First free COM port.

Baud rate

Transmission rate. The baud rate selected here must also be set on the device itself.

Selection	**300** | **600** | **1200** | **2400** | **4800** | **9600** | **19200** | **38400** | **57600** | **115200**
Default value	**9600**

Data bit

Number of data bits.

Selection	**7** | **8**
Default value	**8**

Parity

Type of parity testing.

Selection	**None** | **Odd** | **Even**
Default value	**None**

Stop bit

Number of stop bits.

Selection	**1** | **2**
Default value	**1**

Handshake

Type of data transmission protocol.

Selection	**None** | **HW** | **SW**
Default value	**None**

Timeout

Maximum waiting time for receiving characters. If this time is exceeded, receiving will be stopped.

Input range	**1000 to 9999 ms**
Default value	**2000 ms**

Terminator for send

Terminator for send in hexadecimal code.

Selection	**\0D** | **\0D\0A** | **\0D\0A\0A** | **\0D\0D\0A**
Default value	**\0D\0A** (**\0D** = CR, **\0A** = LF)

Terminator for receiving

Final character for receiving in hexadecimal code.

Selection	**\0D** | **\0D\0A** | **\0D\0A\0A** | **\0D\0D\0A**
Default value	**\0D\0A** (**\0D** = CR, **\0A** = LF)

Code page

Code page used for the data transfer.

Selection	**Cp437** | **Cp850** | **Cp852** | **ASCII**
Default value	**Cp437**

[Connect]

Establishes the connection to the balance. The dialog window **Establish connection** appears *(see chapter 7.19.5, page 1608)*.

[Disconnect]

Disconnects the connection to the balance (only then the device can be deleted out of the configuration).

7.19.4 Properties - GLP

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*.

Comment on GLP test

Comment on GLP test.

Entry	**1000 characters**

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is enabled then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Input range	**1 to 999 days**
Default value	**999 days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by pressing ... in the dialog window **Select date** *(see chapter 2.5.1, page 84)*. After the date has been entered the field **GLP test interval** will be adjusted automatically.

Can only be edited if monitoring is switched on.

Default value	**GLP test date + 999 days**

Message

The message options can only be edited if monitoring is switched on.

Message by e-mail

on | off (Default value: **off**)

If this option is activated, the message is sent to the e-mail address defined under **[E-mail...]**l. The message is sent in text format.

[E-mail...]

[E-mail...] opens the **Send e-mail** window *(see chapter 2.6.1, page 87)*.

Acoustic signal

on | off (Default value: **off**)

If this option is activated, an acoustic signal will be emitted in addition to the message defined above.

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at start test:

Selection	**Record message** | **Display message** | **Cancel determination**
Default value	**Display message**

Record message
The message that the validity period has expired will be automatically saved with the determination.

Display message
A message is displayed and you can select whether you want to continue the sequence or cancel it. If the sequence is continued then the message that the validity period has expired will be automatically saved with the determination.

Cancel determination
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

7.19.5 Establish a connection to the balance

Dialog window: **Configuration ► Devices ► Properties ► RS 232 ► Connect**

In order to establish a connection to a balance the button **[Connect]** has to be pressed on the tab **RS 232**.

If then the print key on the connected balance is pressed, the data provided by the balance will be inserted in the following fields:

Device name

Name of balance.

Sample size

Sample size.

Sample size unit

Sample size unit.

ID1

Sample identification ID1.

ID2

Sample identification ID2.

8 Manual control

8.1 Manual control - General

Program part: **Manual control**

Definition

The term **Manual control** is used in **tiamo** to refer to the program part in which the connected devices can be directly controlled, i.e. without a predefined run instruction. The precondition for this is that the devices are switched on and detected by **tiamo**. Manual control is also possible live during a method run.

Close

The **Manual control** dialog window can be closed with **[Close]** or the Windows button for closing.

NOTICE

The Manual control can only be closed when no manually triggered actions are running any longer (exception: stirrer on).

8.2 Manual control - Desktop

Program part: **Manual Control**

Manual Control symbol

If you click on the **Manual** symbol in the vertical bar on the left margin, the program part **Manual Control** will be opened in its own window, while the **Manual** symbol will be shown in color at the same time.

Elements

The desktop of the program part **Manual control** comprises the following elements:

- *Selecting device*
- *Functions/Parameters*
- *Graphic function*

8.3 Manual control - Device selection

Program part: **Manual control**

In the subwindow for the device selection, the devices or function units of devices for which functions are to be triggered manually can be selected. For this purpose, they are displayed in tree-form. All devices configured in the device table with the status "**ok**" are displayed with the device name and (in brackets) the device type number. The currently selected device is shown with a blue background. Devices that are still performing manually triggered actions are shown in red letters.

8.4 Manual control - Functions

In the subwindow for functions/parameters, the functions for the manual control of the selected device and the corresponding parameters can be selected. In addition, the measured values for ongoing actions and messages are displayed here.

Depending on the device, different functions are possible.

8.4.1 Dosing

8.4.1.1 Dosing - Overview

Program part: **Manual control**

If in the subwindow for the device selection, the group **Dosing device** or a single **Dosing device** is selected, then the functions and parameters belonging to these dosing devices are displayed in the subwindow Functions/Parameters.

Dosing functions

The dosing functions for exchange and dosing units are displayed on the following tabs:

- *General*
- *Preparing*
- *Filling*
- *Emptying*
- *Fixed volume*
- *Dosing*

Instruments

The dosing functions can be carried out with dosing devices that are built in or connected to the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 857, 859, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

pH / Ion - Meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Photometer: 089

8.4.1.2 Dosing - General

Program part: **Manual control**

Information on the selected dosing device, the attached exchange/dosing unit and the containing solution is displayed here. This tab only appears if a single dosing device is selected.

Exchange/Dosing unit:

Name

Display of the designation for the exchange or dosing unit entered in the configuration. This field appears always for intelligent exchange/dosing units. With non-intelligent exchange/dosing units it is only displayed, if a solution has been selected for **Solution**.

Type

Display of the type of the exchange/dosing unit attached to the dosing device (**EU**, **IEU**, **DU**, **IDU**).

Cylinder volume

Display of the cylinder volume of the exchange/dosing unit attached to the dosing device.

Solution

Solution

Selection	**Titrant/Solution** | **not defined**
Default value	**not defined**

not defined
Selection of the titrants and solutions for non-intelligent exchange/dosing units listed in the **Solution table**. For intelligent exchange/dosing units, only the name is displayed.

Titer

Display of the titer of the attached solution. This field only appears for intelligent exchange/dosing units or if the solution for non-intelligent exchange/dosing units has been selected.

8.4.1.3 Dosing - Preparing

Program part: **Manual control**

Here the preparing of exchange/dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices.

NOTICE

This tab is not displayed for an internal dosing device on the **Titrinos 702, 716, 718, 719, 720, 721, 784, 785, 794, 795, 798**.

[Start]

Start preparing for the selected dosing device(s). The parameters defined for the exchange unit or dosing unit will be used.

[Stop]

Stop preparing for the selected dosing device(s).

8.4.1.4 Dosing - Filling

Program part: **Manual control**

Here the filling of exchange/dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices.

NOTICE

Before filling the dosing devices connected to Titrinos, ensure that the corresponding exchange or dosing units are attached. If the filling procedure is started nevertheless, the Titrino might not be actuated anymore and has to be switched off and on again.

[Start]

Start filling for the selected dosing device(s).

[Stop]

Stop filling for the selected dosing device(s).

8.4.1.5 Dosing - Emptying

Program part: **Manual control**

Here the emptying of dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices with dosing units.

NOTICE

This tab is not displayed for external dosing devices on the **Titrinos 736, 751, 758, 799**.

[Start]

Start emptying for the selected dosing device(s). The parameters defined for the dosing units will be used.

[Stop]

Stop emptying for the selected dosing device(s).

8.4.1.6 Dosing - Dosing a fixed volume

Program part: **Manual control**

Here the dosing of a preset volume can be started and stopped. This tab only appears if a single dosing device is selected.

Volume

Fixed volume that is to be dosed.

Input range	**0.100 to 99999.9 mL**
Default value	**0.100 mL**

Dosing rate

The volume is dosed at this rate. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

NOTICE

The dosing rate should be reduced for viscous liquids.

Selection	**maximum**
Default value	**maximum**

Titrando, 814, 815, 855

Input range	**0.01 to 166.00 mL/min**

730, 774, 778, 789

Input range	**0.01 to 160.00 mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**

Filling rate

The buret will be filled at this rate after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

NOTICE

The filling rate should be reduced for viscous liquids.

Selection	**maximum**
Default value	**maximum**

Titrando, 814, 815, 855

Input range	**0.01 to 166.00 mL/min**

730, 774, 778, 789

Input range	**0.01 to 160.00 mL/min**

Titrino

Input range	**0.01 to 150.00 mL/min**

Fill automatically

on | off (Default value: **on**)

This parameter is only visible for devices of the type Titrando, Dosing Interface and USB Sample Processor.

If this option is activated, the buret is filled automatically after dosing. During the filling procedure the volume display is reset to **0.0000 mL**. If this option is deactivated, the added volume is displayed cumulatively.

[Start]

Start fixed volume dosing for the selected dosing device. The dosed volume is displayed live.

NOTICE

Parameters modified after the start of the dosing are not valid until the next dosing procedure.

[Fill]

Start filling of the buret for the selected dosing device. This button is only available if **Fill automatically** is deactivated. During the filling procedure, the volume display is set to **0.0000 mL**.

[Stop]

Stop fixed volume dosing for the selected dosing device. If the dosing has been stopped, it cannot be continued.

8.4.1.7 Dosing - Dosing

Program part: **Manual control**

Here the manual dosing can be started and stopped. This tab only appears if a single dosing device is selected and not for dosing devices of the type **Titrino**.

Dosing rate

Rate at which dosing should take place. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

NOTICE

The dosing rate should be reduced for viscous liquids.

Selection	**maximum**
Default value	**maximum**

Titrando, 814, 815, 855

Input range	**0.01 to 166.00 mL/min**

778, 789

Input range	**0.01 to 160.00 mL/min**

Filling rate

The buret will be filled at this rate after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing

device, it will automatically be reduced during dosing to the largest possible value.

NOTICE

The filling rate should be reduced for viscous liquids.

Selection	**maximum**
Default value	**maximum**

Titrando, 814, 815, 855

Input range	**0.01 to 166.00 mL/min**

778, 789

Input range	**0.01 to 160.00 mL/min**

[Dosing]

Start manual dosing for the selected dosing device. Dosing will take place as long as the button is pressed down. The dosed volume is displayed live.

NOTICE

Parameters modified after the start of the dosing are not valid until the next dosing procedure.

[Fill]

Start filling of the buret for the selected dosing device. During the filling procedure the volume display is set to **0.0000 mL**.

8.4.2 Stirring

8.4.2.1 Stirring - Overview

Program part: **Manual control**

If in the subwindow for the device selection *(see chapter 8.3, page 1611)*, a **Stirrer** connected via MSB or stirrer connector is selected, then the functions and parameters belonging to the stirrers are displayed in the subwindow Functions/Parameters.

Stirrer functions

The stirrer functions are displayed on the following tabs:

- *Switch on/off*
- *Continuous operation*

Instruments

The stirrer functions can be carried out with stirrers that are connected to the following devices:

Titrino: 751, 758, 785, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 857, 859, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Photometer: 089 (stirrer is built-in in the photometer)

8.4.2.2 Stirring - Switching on/off

Program part: **Manual control**

Here the stirrers can be switched on and off. This tab appears when selecting a single stirrer as well as with all stirrers.

Stirring rate

Selection of the stirring rate. This parameter can also be modified live.

all instruments except for photometer

Input range	**–15 to 15**
Default value	**8**

Photometer only

Input range	**1 to 15**
Default value	**3**

[Start]

Start stirring for the selected stirrer.

[Stop]

Stop stirring for the selected stirrer.

8.4.2.3 Stirring - Continuous operation

Program part: **Manual control**

Here stirrers can be switched on for a defined time. This tab only appears if a single stirrer is selected.

Stirring rate

Selection of the stirring rate. This parameter can also be modified live.

all instruments except for photometer	
Input range	**–15 to 15**
Default value	**8**

Photometer only	
Input range	**1 to 15**
Default value	**3**

Stirring time

Entry of the time during which stirring is to be carried out. If this parameter is modified after the start of the stirrer, it is not valid until the next stirring procedure.

Input range	**1 to 999999 s**
Default value	**60 s**

[Start]

Start continuous operation for the selected stirrer. In the status display the remaining time is shown. The stirrer will be switched off automatically after the stirring time has elapsed

[Stop]

Stop stirring for the selected stirrer.

8.4.3 Remote functions

Program part: **Manual Control**

If in the subwindow for the device selection, a remote box or a remote interface is selected, then the functions and parameters belonging to these elements are displayed in the subwindow Functions/Parameters.

Devices

The remote functions can be carried out with the following devices:

Titrino: 702*, 716*, 718*, 719*, 720*, 721*, 736*, 751, 758, 784, 785, 794*, 795, 798, 799 (* devices with only 3 output lines)

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Spectrometer: Avantes

Input signal

Will not be displayed for the Avantes Spectrometer

Current status

Displays the current status of the 8 input lines.

Templates/Input

If the current status corresponds to one of the defined templates for the inputs, the corresponding name is shown here.

NOTICE

Only templates without asterisks ***** are recognized.

Output signal

Current status

Displays the current status of the 14 output lines.

Templates/Input

Input of the binary pattern for the output signal or selecting a predefined signal pattern.

It is possible to enter the following characters:

0 = line inactive

1 = line active

***** = any line status

p = set pulse (pulse length = 200 ms. If a pulse of another length should be put out, a corresponding template has to be defined.)

Titrando, 831, 846, 855, 856, 867, 751, 756, 758, 784, 785, 795, 798, 799, sample changer

Selection	**Bit-pattern with exactly 14 characters (0, 1, *, p) | ************** | Signal pattern**
Default value	**************

702, 716, 718, 719, 720, 721, 736, 794

Selection	**Bit-pattern with exactly 8 characters (0, 1, *, p) | ******** | Signal pattern**
Default value	************

Spectrometer

Selection	**Bit-pattern with exactly 10 characters (0, 1, *, p) | ********** | Signal pattern**
Default value	**************

The output lines are numbered from right to left:

Output	13 12 11 10 9 8 7 6 5 4 3 2 1 0
Bit	13 12 11 10 9 8 7 6 5 4 3 2 1 0

Examples:

**************1*** sets the output line 1 to enabled (= set), which would result in a stop command for a connected Titrino, for example.

**************0*** sets the line to inactive.

NOTICE

We recommend masking the irrelevant output lines with an asterisk ***** so as not to modify these line conditions.

NOTICE

For Titrinos with 3 output lines, only 3 characters can be entered. If signal pattern is selected, also only the first 3 characters will be used.

[Set]

Set the bit pattern defined under **Outputs**.

8.4.4 Sample changer functions

8.4.4.1 Sample changer - Overview

Program part: **Manual**

If a tower of a sample changer is selected in the subwindow for the device selection, then the functions that are possible with this sample changer are displayed together with the corresponding parameters in the subwindow for functions/parameters.

Sample changer functions

The sample changer functions are displayed on the following tabs:

- *General*
- *Move*
- *Assign position*
- *Pump*
- *Heater/Gas*

Devices

The changer functions can be carried out with the following devices:

730, 774, 778, 789, 814, 815, 855, 864, 874

8.4.4.2 Sample changer - General

Program part: **Manual**

Information on the attached rack is displayed here. In addition, the shift rate and lift rate for the manual control of the changer can be set here.

Rack name

Shows the name of the attached rack. If no rack is attached, **--------** is displayed.

Rack code

Shows the rack code of the attached rack. If no rack is attached, **--------** is displayed.

Number of positions

Shows the number of positions on the attached rack. If no rack is attached, **--------** is displayed.

Shift rate

Shift rate for manual control of the sample changer.

Input range	**5 to 20 °/s**
Default value	**20 °/s**

Lift rate

Lift rate for manual control on the selected tower.

730, 778, 789, 814, 815, 855, 864

Input range	**5 to 25 mm/s**
Default value	**25 mm/s**

774, 874

Input range	**3 to 12 mm/s**
Default value	**12 mm/s**

Swing rate

Swing rate for manual control of the Swing Head on the sample changer.

Input range	**10 to 55 °/s**
Default value	**20 °/s**

[Initialize rack]

The attached rack is initialized.

NOTICE

When the rack is initialized, the following actions are carried out:

- Rack rotates to the position for reading out the rack code.
- Rack data on the rack code is transferred to the sample changer.
- Lifts are moved upwards to 0 mm.
- The robotic arm is moved back.

8.4.4.3 Sample changer - Moving

Program part: **Manual**

Moving to the desired rack position, lift position or robotic arm position can be triggered manually here.

Rack position

Setting the rack position.

Current position

Shows the current rack position.

Target position

Selection or entry of the rack position to be approached.

Input range	**1 to n (depending on rack)**
Default value	**1**

Selection	**Special beaker 1 - 16**

Shift rate

Shift rate for manual control of the sample changer.

Input range	**5 to 20 °/s**
Default value	**20 °/s**

[Start]

Starts moving to the target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as disabled (gray) and **Move...** is shown as status message instead of **Ready**.

Moves to current rack position –1.

Moves to current rack position +1.

Lift position

Setting the lift position for the selected tower.

Current position

Shows the current lift position in mm.

Target position

Selection or entry of the lift position that is to be approached for the current rack position (regular beaker, special beaker, external position).

Input range	**0 to max. stroke path defined (235 mm) mm**
Default value	**235 mm**

Selection	**Home position** | **Work position** | **Shift position** | **Rinse position** | **Special position**

Shift position
Only for regular beakers and external positions.

Rinse position
Only for regular beakers and external positions.

Special position
Only for regular beakers and external positions.

Lift rate

Lift rate for manual control on the selected tower.

730, 778, 789, 814, 815, 855, 864

Input range	**5 to 25 mm/s**
Default value	**25 mm/s**

774, 874

Input range	**3 to 12 mm/s**
Default value	**12 mm/s**

[Start]

Starts moving to the target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as disabled (gray) and **Move...** is shown as status message instead of **Ready**.

Moves the lift upwards for as long as this button is pressed.

Moves the lift downwards for as long as this button is pressed.

Robotic arm position

Setting the robotic arm position (angle) on the selected tower.

Current position

Shows the current position of the robotic arm in °.

Target position

Selection or entry of the robotic arm position to be approached.

Input range	**0.0 to 330.0 °**
Default value	**0.0 °**

Selection	**External 1 - 4**

Swing rate

Swing rate for manual control of the Swing Head on the sample changer.

Input range	**10 to 55 °/s**
Default value	**20 °/s**

[Start]

Starts moving to the target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as disabled (gray) and **Move...** is shown as status message instead of **Ready**.

Moves the robotic arm to the left (towards **0°**) at a swing rate of 20°/s for as long as this button is pressed.

Moves the robotic arm to the right (towards **330°**) at a swing rate of 20°/s for as long as this button is pressed.

8.4.4.4 Sample changer - Assigning a position

Program part: **Manual**

Here you can assign the current rack position, lift position or robotic arm position to a specific special position.

Rack position

Assigning the current rack position to a specific special beaker.

Current position

Shows the current rack position.

Special beaker

Selection of the special beaker to which the current rack position is to be assigned.

Input range	**1 to 16**
Default value	**1**

[Assign]

Triggers assignment. During the assignment the cursor is displayed as hourglass.

Lift position

Assigning the current lift position to a specific special position.

Current position

Shows the current lift position in mm.

Work position for

If this option is selected, the current lift position is assigned to the work position of the tower or a special beaker or to an external position of the robotic arm.

all except 730

Selection	**Tower** | **External positions**
Default value	**Tower**

730 only

Selection	**Tower 1 + 2** | **Special beaker 1 - Special beaker 16** | **External 1 - External 4**
Default value	**Tower 1 + 2**

Rinse position for

If this option is selected, the current lift position is assigned to the rinse position of the tower.

all except 730

Selection	**Tower** | **External positions**
Default value	**Tower**

730 only

Selection	**Tower 1 + 2** | **External positions**
Default value	**Tower 1 + 2**

Shift position for

If this option is selected, the current lift position is assigned to the shift position of the tower.

all except 730

Selection	**Tower** | **External positions**
Default value	**Tower**

730 only

Selection	**Tower 1 + 2**
Default value	**Tower 1 + 2**

Special position for

If this option is selected, the current lift position is assigned to the special position of the tower.

all except 730

Selection	**Tower** | **External positions**
Default value	**Tower**

730 only

Selection	**Tower 1 + 2**
Default value	**Tower 1 + 2**

Swing position

If this option is selected, the current lift position is assigned to the swing position of the robotic arm.

Selection	**External positions**
Default value	**External positions**

[Assign]

Triggers assignment. During the assignment the cursor is displayed as hourglass.

Robotic arm position

Assigning the current rack position to a specific external robotic arm position.

Current position

Shows the current position of the robotic arm in °.

External position

Selection of the external position to which the current robotic arm position is to be assigned.

Input range	**1 to 4**
Default value	**1**

[Assign]

Triggers assignment. During the assignment the cursor is displayed as hourglass.

8.4.4.5 Sample changer - Pumping

Program part: **Manual**

The pumps connected to the tower can be switched on and off here.

Pump 1

Manually controlling pump 1 or valve 1 on the selected tower.

Operation

Selection whether the pump or valve is to be switched on or off manually or whether it is to be switched on for a specified duration and then switched off again automatically.

Selection	**On/Off** | **Duration**
Default value	**On/Off**

Duration

Entry of the duration during which the pump/valve should remain switched on. This field is only displayed if **Operation** = **Duration**.

Input range	**1 to 999,999 s**
Default value	**60 s**

[Start]

Starts pump 1. The time elapsed since the start is shown in the status display.

[Stop]

Stops pump 1.

Pump 2

Manually controlling pump 2 or valve 2 on the selected tower.

Operation

Selection whether the pump or valve is to be switched on or off manually or whether it is to be switched on for a specified duration and then switched off again automatically.

Selection	**On/Off** | **Duration**
Default value	**On/Off**

Duration

Entry of the duration during which the pump/valve should remain switched on. This field is only displayed if **Operation** = **Duration**.

Input range	**1 to 999,999 s**
Default value	**60 s**

[Start]

Starts pump 2. The time elapsed since the start is shown in the status display.

[Stop]

Stops pump 2.

8.4.4.6 Sample changer - Heater/Gas

Program part: **Manual**

The heater and gas flow on the 774 and 874 Oven Sample Processor can be switched on and off here.

Heater

Heating the oven up to the desired temperature during the defined heating time.

Temperature

Temperature to which the oven has to be heated. With **Init** it is heated up to the initial temperature set on the instrument.

Input range	**50 to 250 °C**
Default value	**50 °C**

Selection	**Init**

Heating period

Duration of the heating period until the desired temperature is reached.

Input range	**1 to 999 min**
Selection	**off**
Default value	**off**

[Start]

Starts the heater. The current temperature is shown in the status display.

[Stop]

Stops the heater.

Gas flow

Inlet

Selection of the carrier gas inlet.

Selection	**Pump** | **Valve**
Default value	**Pump**

Pump
Use of ambient air as carrier gas.

Valve
Use of gas from a compressed gas cylinder.

Flow rate

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Input range	**10 to 150 mL/min**
Default value	**50 mL/min**

Gas type

Gas type of the carrier gas.

Selection	**Air** | **Nitrogen** | **Other gas**
Default value	**Air**
	In the case of the 874 USB Oven Sample Processor, a gas flow factor has to be specified for the carrier gas used if **Other gas** is selected. The gas flow factor is used for the correct measurement of the flow rate.

Gas flow factor

Factor for the correct determination of the gas flow. This parameter is displayed only if **Gas type** = **Other gas**. For air and nitrogen, the appropriate gas flow factor is inserted automatically. The gas flow factor values for other commonly used carrier gases can be found in the table *Gas flow factors of various gases*.

Input range	**0.001 to 2.000** (Increment: **0.001**)
Default value	**1.000**

Table 45 Gas flow factors of various gases

Gas type	Gas flow factor
Argon	0.950
Helium	0.300
Air	1.000

Gas type	Gas flow factor
Oxygen	1.000
Nitrogen	1.000

[Start]

Switches the gas flow on. The time elapsed since the start is shown in the status display.

[Stop]

Switches the gas flow off.

Gas flow pump

Switching the gas flow pump on the Oven Sample Processor on/off.

[Start]

Switches the gas flow pump on. The time elapsed since the start is shown in the status display.

[Stop]

Switches the gas flow pump off.

Inert gas valve

Switching the inert gas valve on the Oven Sample Processor on/off.

[Start]

Switches the inert gas valve on. The time elapsed since the start is shown in the status display.

[Stop]

Switches the inert gas valve off.

8.4.5 Measuring

8.4.5.1 Measuring - Overview

Program part: **Manual**

If a **Measuring input** is selected in the subwindow for the device selection, then the functions and parameters belonging to this device are displayed in the Functions/Parameters subwindow.

Measurement functions

The measurement functions are displayed on the following tabs:

- *Measure*
- *Intensity*
- *Sample spectrum*

Devices

The measurement functions can be carried out with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 712, 856

pH/ion meter: 867

Robotic Titrosampler: 855

Spectrometer: Avantes

8.4.5.2 Measuring - Measure

Tab: **Manual ▶ Measure**

Here the measurement can be started and stopped.

Measured quantity

The selectable measured quantities depend on the device whose measuring input has been selected in the device selection.

Selection	**pH** | **U** | **Ipol** | **Upol** | **Temperature** | **Conc** | **Cond**

NOTICE

Which other parameters are displayed depends on the selected measured quantity.

Sensor

Selection of the sensor; the ones of the sensor table are available. Depending on the measured quantity only specific sensor types can be selected.

NOTICE

If an intelligent sensor is connected to the measuring input, then it will be displayed.

Sensor

Selection of a sensor of the type **Metal electrode**, **pH electrode**, **ISE electrode**, **Optrode type 1** or **Optrode type 2** from the sensors avail-

able in the sensor table. The calibration data for the sensor is adopted for pH electrodes and ISE electrodes.

Selection	**Sensor name** | **pH electrode** | **Metal electrode** | **ISE electrode**
Default value	**Metal electrode**

Sensor (wavelength)

If an Optrode is selected as sensor, then the wavelength can also be specified.

Selection	**470 nm** | **502 nm** | **520 nm** | **574 nm** | **590 nm** | **610 nm** | **640 nm** | **660 nm**
Default value	**610 nm**

Measuring temperature

Temperature, which can be entered manually. If a temperature sensor is connected, the temperature is measured continuously and the value entered will be ignored. The value is used for the temperature correction of the measurement.

Titrando, 855

Input range	**–20.0 to 150.0 °C**
Default value	**25.0 °C**

Titrino

Input range	**–170.0 to 500.0 °C**
Default value	**25.0 °C**

I(pol)

The polarization current is the current applied to the polarizable electrode during a voltametric measurement.

Titrando, 855

Input range	**–125.0 to 125.0 µA** (Increment: **0.5**)
Default value	**5.0 µA**

Titrino

Input range	**–127 to 127 µA** (Increment: **1**)
Default value	**5 µA**

U(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrando, 855

Input range	**–1,250 to 1,250 mV** (Increment: **25**)
Default value	**400 mV**

Titrino

Input range	**–1,270 to 1,270 mV** (Increment: **10**)
Default value	**400 mV**

Reference temperature

The electrical conductivity depends greatly on the temperature. The conductivity measured at a particular temperature is thus automatically converted to this reference temperature (usually 20 °C or 25 °C).

712

Input range	**–170.0 to 500.0 °C**
Default value	**20.0**

856

Input range	**–20.0 to 150.0 °C**
Default value	**20.0**

Selection	**off**

off
The conductivity at the measuring temperature is displayed.

Temperature compensation

Selection	**Temperature coefficient** | **Sample solution**
Default value	**Temperature coefficient**

Temperature coefficient
Manual entry of a constant temperature coefficient.

Sample solution
Selection of a function for the temperature coefficient from the table **Sample solutions (TC conductivity)**.

Temperature coefficient

Input range	**0.00 to 9.99 %/°C**

Sample solution

Select the name from the table **Sample solutions (TC conductivity)**.

Selection	**DIN** | **Table entries**
Default value	**DIN**

[Start]

Starts measurement.

[Stop]

Stops measurement.

8.4.5.3 Measuring - Intensity

Tab: **Manual ▶ Intensity**

Here the intensity of an uncorrected spectrum can be measured and displayed for the device type **Avantes spectrometer**.

Start wavelength

Lower limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

End wavelength

Upper limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**1,000.0 nm**

Integration time

Integration time for spectrum recording.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Input range	**0 to 100 Pixels**
Default value	**0 Pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

[Start]

Starts measurement of the intensity.

[Stop]

Stops measurement of the intensity.

8.4.5.4 Measuring - Sample spectrum

Tab: **Manual ► Sample spectrum**

Here a sample spectrum can be measured and displayed.

NOTICE

Before a sample spectrum can be measured, a reference spectrum has to be recorded in a determination by a spectrometer using a **MEAS Ref** command.

In the case of a **one-channel instrument setup**, the parameters **Start wavelength**, **End wavelength**, **Integration time**, **Averaged spectra**, **Smoothing** and **Flash rate** are read out from the reference spectrum and displayed but they cannot be modified. In the case of a **two-channel instrument setup**, these parameters are editable, except for **Integration time** and **Smoothing**.

Start wavelength

Lower limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**400.0 nm**

End wavelength

Upper limit of the spectrum.

Input range	**100.0 to 2,000.0 nm**
Default value	**1,000.0 nm**

Integration time

Integration time for spectrum recording.

Input range	**0.01 to 600,000 ms**
Default value	**6 ms**

Averaged spectra

Number of spectra that are recorded and averaged.

Input range	**1 to 10,000**
Default value	**10**

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Input range	**0 to 100 Pixels**
Default value	**0 Pixels**

Flash rate

Number of flashes per second of a pulsed xenon lamp as light source.

Input range	**0 to 100 Hz**
Selection	**off**
Default value	**off**

off
For the **continuous** type of the light source.

[Start]

Starts the measurement of the sample spectrum. Only active if a reference spectrum is available.

[Stop]

Stops the measurement of the sample spectrum.

8.5 Manual control - Graphical display

Program part: **Manual control**

All ongoing, manually triggered functions are displayed graphically in the subwindow for the graphical display.

9 How to proceed?

9.1 Audit Trail

9.1.1 Opening Audit Trail

How to proceed?

NOTICE

The Audit Trail Table can only be opened if the option **Enable Audit Trail** is switched on in **Security settings** under **Audit Trail/Modifications**.

1 Select program part **Configuration**.

2 Click on the symbol or the menu item **Tools ► Audit Trail…**.

The dialog window **Audit Trail** opens.

3 If required, adjust the column display.

9.1.2 Filtering Audit Trail

How to proceed?

Opening the "Audit Trail" dialog window

1 Select program part **Configuration**.

2 Click on the symbol or the menu item **Tools ► Audit Trail…**.

The dialog window **Audit Trail** opens.

Filtering can now be done via quick filter or special filter in the **Audit Trail** dialog window:

Quick filter

1 Click on the symbol or menu item **Filter ► Quick filter**.

After this function has been selected, the field in which the cursor is located will have a yellow background when navigating in the Audit Trail table.

2 Double click on the desired field with the left-hand mouse key.

The contents of the field selected in the table will be set as a filter condition and this filter will be applied directly to the table.

NOTICE

The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

Defining and using special filter

1 Click on the symbol or menu item **Filter ► Special filter**.

The dialog window **Special filter** opens for defining user-specific filters.

2 Use the **Edit ► Edit line** menu to open the dialog window **Edit filter criterion New filter**.

3 Enter the filter criteria and confirm with **OK**.

4 In the **Special filter** dialog window, click on **[Apply filter]**.

The table will be filtered.

Using special filter

1 In the **Special filter** dialog window, select the desired special filter from the list box **Filter**.

The table will be filtered.

9.1.3 Exporting Audit Trail

How to proceed?

1 Select program part **Configuration**.

2 Click on the symbol or the menu item **Tools ► Audit Trail…**.

The dialog window **Audit Trail** opens.

3 If desired, filter Audit Trail table.

4 If desired, select Audit Trail entries to be exported.

5 Click on the menu item **File ► Export...**.

The dialog window **Export Audit Trail** opens.

6 Enter or select directory and file name for saving the export file in the field **Save file as**.

7 In the field **Selection** select the desired option (**All records** or **Selected records**).

8 Click on **[OK]**.

The entries selected in the Audit Trail table will be exported.

NOTICE

Audit Trail entries are exported in text format. They cannot be imported back into the Audit Trail table.

9.1.4 Archiving Audit Trail

How to proceed?

NOTICE

Audit Trail entries can be backed up and restored together with the configuration data.

1 Select program part **Configuration**.

2 Click on the symbol or the menu item **Tools ► Audit Trail...**.

The dialog window **Audit Trail** opens.

3 With menu item **File ► Archive...** the dialog window **Archive Audit Trail** opens.

4 Enter or select directory and file name for saving the archive file in the field **Save file as**.

5 In the field **Selection** select the desired option (**All records** or **Records until** including date selection).

6 Click on **[OK]**.

The entries selected in the Audit Trail table will be archived as a text file.

NOTICE

Archiving Audit Trail entries is identical to export, i.e. the Audit Trail entries are stored in text format. They cannot be imported back into the Audit Trail table. The difference between this and exporting is that the archived entries can be marked in the column **Archive** and then deleted.

NOTICE

The text files generated by archiving are no longer protected and can be manipulated. If you want to ensure that these files are archived in an unaltered condition you must use a suitable external backup or archiving program.

9.1.5 Deleting Audit Trail

How to proceed?

NOTICE

Audit Trail entries can only be deleted if they have previously been archived.

1 Select program part **Configuration**.

2 Click on the symbol or the menu item **Tools ▶ Audit Trail…**.

The dialog window **Audit Trail** opens.

3 Archive desired Audit Trail entries.

4 With the menu item **File ▶ Delete** the dialog window **Delete Audit Trail** opens.

5 Under **Selection**, select the desired option (**All archived records** or **Archived records until** including date selection).

6 User 1: Enter **User name** and **Password**.

7 User 2: Enter **User name** and **Password**.

8 Click on **[OK]**.

The archived entries selected in the Audit Trail table will be deleted.

9.2 Backup

9.2.1 Backing up a database

How to proceed?

General

The **determination databases** that, in contrast to the **configuration database**, can be generated by the user and contain the determination data, are referred to as databases in **tiamo**. Included among such determination data are the method data used for the determination, the measured data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**), the databases are stored on the drives administered by the computer and are only available to those users registered on that computer who have the appropriate access permission. In client/server systems (**tiamo multi**), the databases are stored on drives administered centrally by the server and are globally available throughout the entire client/server system, i.e., all users with the appropriate access permission can use these databases.

NOTICE

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files also be copied to an external directory or to a CD/DVD.

Backing up a database manually

1 Select the **Database** program part.

2 Click on the icon or the **File ▶ Database manager...** menu item.

The **Database manager** dialog window opens.

3 Select the database.

4 Click on **[Backup]** in the **Database manager** dialog window.

The **Backup database 'Database name'** dialog window opens.

5 Select the directory for the backup in the **Backup directory** field.

6 Select or enter the name for the **Backup file**. If an existing backup file is selected, it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added to the **Backup name** field, because the backup date information is not available when the data is restored.

7 Click on **[Start]**.

The manual backup of the database is started and the database is backed up to the selected directory.

Backing up a database automatically

1 Select the **Database** program part.

2 Click on the icon or the **File ▶ Database manager...** menu item.

The **Database manager** dialog window opens.

3 Select the desired database and click on **[Properties]**.

The **Properties - Database - 'Database name'** dialog window opens for editing the database properties.

4 Enter a comment on the database in the **Comment** field on the **General** tab.

5 On the **Backup** tab, activate the **Backup monitoring** check box.

6 Enter an **Interval** for backup monitoring or a date for the next backup in the **Next backup** field.

7 Activate the **Start backup automatically** check box.

8 Select the directory for the backup in the **Backup directory** field.

9 Click on **[OK]**.

The **Properties - Database** dialog window closes and the database will be backed up automatically to the selected directory at the desired moment.

9.2.2 Restoring the database

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or menu item **File ► Database manager…**.

The dialog window **Database manager** opens.

3 Click on **[Restore]** in the **Database manager** dialog window.

The **Restore databases** dialog window opens.

4 Select the directory in the **Backup directory** in which the desired database was backed up.

5 Select or enter the name for the desired **Backup file**.

6 Enter the name under **Save As** under which the database is to be restored.

7 Click on **[Start]**.

The database restoring is started.

NOTICE

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

9.2.3 Backing up configuration data

How to proceed?

General

The configuration data is saved in **tiamo** in the **Configuration database**. Configuration data includes all settings that apply to all methods, i.e. settings for devices, titrants/solutions, sensors, common variables and rack data as well as **Methods**, **Security settings** *(see chapter 6.2.2.1, page 1314)*, **User administration** *(see chapter 6.2.1.1, page 1305)*, **Program administration** *(see chapter 6.2.3.1, page 1325)*, templates and **Audit Trail** *(see chapter 6.4, page 1355)*.

In local server systems (**tiamo light**, **tiamo full**), the configuration database is located in the program directory of the computer on which the program has been installed. In client/server systems (**tiamo multi**), the configuration database is stored centrally on the server and contains all the configuration data of all computers (clients) that are connected to this server.

NOTICE

It is strongly recommended that the configuration database be backed up periodically.

Backing up configuration data manually

1. Select the **Configuration** program part.
2. Click on the **File ► Backup ► Manually** menu item.

   The **Backup configuration data manually** dialog window opens.
3. Select the directory for the backup in the **Backup directory** field.
4. Select or enter a new name for the backup file in the **Backup name** list box. If an existing backup file is selected, it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added to the **Backup name** because the backup date information is not available when the data is restored.

5 Click on **[Start]**.

The manual backup is started and the configuration database is backed up to the selected directory.

Backing up configuration data automatically

1 Select the **Configuration** program part.

2 Click on the **File ▶ Backup ▶ Automatically** menu item.

The **Backup configuration data automatically** dialog window opens.

3 Activate the **Automatic backup** check box.

4 Enter an **Interval** for backup monitoring or a date for the next backup in the **Next backup** field.

5 Select the directory for the backup in the **Backup directory** field.

6 Click on **[OK]**.

The **Backup configuration data automatically** dialog window closes and the configuration database will be backed up automatically to the selected directory at the desired moment.

9.2.4 Restoring configuration data

How to proceed?

tiamo light, tiamo full

1 Exit **tiamo**.

2 Start the file **ConfigRestore.exe** in the program directory **…\tiamo \bin**.

The **Restore configuration data** dialog window opens.

3 Select the directory in which the configuration database was backed up in the **Backup directory** field.

4 Select or enter the name for the desired **Backup file**.

5 Click on **[Start]**.

The restoring of the configuration database is started.

tiamo multi

1 Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.

2 Start the **ConfigRestore.exe** file in the **…\tiamo\bin** program directory on the server.

The **Restore configuration data** dialog window opens.

3 Select the directory in which the configuration database was backed up in the **Backup directory** field.

4 Select or enter the name for the desired **Backup file**.

5 Click on **[Start]**.

The restoring of the configuration database is started.

9.2.5 Backing up methods

How to proceed?

General

Methods are stored in the configuration database and are globally accessible for all clients. This means that in order to back up methods the configuration data must be backed up manually or automatically. Another possible way is to export the methods and then to store these files outside of **tiamo**.

Backing up configuration data manually

1 Select the **Configuration** program part.

2 Click on the **File ▶ Backup ▶ Manually** menu item.

The **Backup configuration data manually** dialog window opens.

3 Select the directory for the backup in the **Backup directory** field.

4 Select or enter the name for the desired backup file in the **Backup name** list box. If an existing backup file is selected, it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added to the **Backup name** because the backup date information is not available when the data is restored.

5 Click on **[Start]**.

The manual backup of the configuration database is started.

Backing up configuration data automatically

1 Select the **Configuration** program part.

2 Click on the **File ▶ Backup ▶ Automatically** menu item.

The **Backup configuration data automatically** dialog window opens.

3 Activate the **Automatic backup** check box.

4 Enter an **Interval** for backup monitoring or a date for the **Next backup**.

5 Select the directory for the backup in the **Backup directory** field.

6 Click on **[OK]**.

The **Backup configuration data automatically** dialog window closes.

Exporting methods

1 Select the **Method** program part.

2 Click on the icon or the **File ► Method manager…** menu item.

The **Method manager** dialog window opens.

3 Select the desired **Method group**.

4 Select the desired methods.

5 Click on the **File ► Export…** menu item.

The **Select directory for export** dialog window opens.

6 Select the desired directory for the export files and click on **[OK]**.

The selected methods are each exported as files named **'Method name'.mmet**.

NOTICE

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is tampered with, then it cannot be imported again.

9.2.6 Archiving the Audit Trail

How to proceed?

NOTICE

Audit Trail entries can be backed up and restored together with the configuration data.

1 Select the **Configuration** program part.

2 Click on the icon or the **Tools ► Audit Trail…** menu item.

The **Audit Trail** dialog window opens.

3 Click on the **File ► Archive…** menu item.

The **Archive Audit Trail** dialog window opens.

4 Enter or select a directory and file name for saving the archive file under **Save file as**.

5 In the **Selection** field, select the desired option (**All records** or **Records until** including date selection).

6 Click on **[OK]**.

The selected Audit Trail data sets will be archived in text format.

NOTICE

Archiving Audit Trail entries is identical to exporting, i.e., the Audit Trail entries are stored in text format. They cannot be imported back into the Audit Trail table. The difference between this and exporting is that the archived entries can be marked in the column **Archive** and then deleted.

NOTICE

The text files generated by archiving are no longer protected and can be tampered with. If it is necessary to ensure that these files are archived in an unaltered condition, then a suitable external backup or archiving program must be used.

9.3 Determinations

9.3.1 Starting single determination

How to proceed?

Single determination without statistics

1 Select program part **Workplace**.

2 In the **Run** subwindow, select the **Single determination** tab.

3 If desired, enter **Determination parameters**.

4 In the **Method** list box select the method to be used for carrying out the determination.

The subwindow **Method** shows the method loaded.

5 If a method was loaded in which the check box **Statistics** in the **START** command is enabled, disable the check box **Statistics** on the tab **Single determination**.

6 Enter **sample data**.

7 Click on **[Start]**.

The single determination will be started. The subwindow **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.

Single determination with statistics

1 Select program part **Workplace**.

2 In the **Run** subwindow, select the **Single determination** tab.

3 If desired, enter **Determination parameters**.

4 In the **Method** list box select the method to be used for carrying out the determination.

The subwindow **Method** shows the method loaded.

NOTICE

In order to calculate statistical calculations for results, the **Statistics** option must be enabled in the **START** command of the method and, in addition, the **Statistics** option must be enabled in the **CALC** command for each desired result.

5 Activate the **Statistics** check box.

6 If desired, modify number of single determinations.

7 Enter **sample data**.

8 Click on **[Start]**.

The single determination will be started. The subwindow **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.

NOTICE

If the method contains a **DATABASE** command, then it is mandatory that this command be executed in all statistically linked determinations. If this is not done, then the statistical results will be displayed incorrectly and the determinations cannot be reprocessed.

9.3.2 Starting determination series

How to proceed?

Determination series without statistics

1 Select program part **Workplace**.

2 Use the **Run** subwindow to select the **Determination series** tab.

3 If desired, enter **Determination parameters**.

4 Load existing sample table or enter sample data directly into the working sample table.

The subwindow **Method** shows the method loaded in the first line.

5 If a method was loaded in which the option **Statistics** in the **START** command is enabled, disable the check box **Statistics** on the tab **Determination series**.

6 Click on **[Start]**.

The first determination of a sample series will be started. The subwindow **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.

Determination series with statistics

1 Select program part **Workplace**.

2 Use the **Run** subwindow to select the **Determination series** tab.

3 If desired, enter **Determination parameters**.

4 Load existing sample table or enter sample data directly into the working sample table.

The subwindow **Method** shows the method loaded in the first line.

NOTICE

In order to carry out statistics calculations for results, the check box **Statistics** has to be enabled in the **START** command of the method. In addition, the check box **Statistics** has to be enabled for every desired result in the **CALC** command.

5 On the **Determination series** tab, enable the check box **Statistics**.

6 If desired, modify number of single determinations.

7 Click on **[Start]**.

The first determination of a sample series will be started. The subwindow **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.

NOTICE

If the method contains a **DATABASE** command, then it is mandatory that this command be executed in all statistically linked determinations. If this is not done, then the statistical results will be displayed incorrectly and the determinations cannot be reprocessed.

9.3.3 Search for determinations

How to proceed?

1. Select program part **Database**.
2. Click on the symbol or the menu item **File ► Open...**.

   The dialog window **Open database** opens.
3. Select desired database or enter name in the field **Database name**.
4. Click on **[Open]**.

   The selected database opens and its data sets are displayed in the **Determination overview**.
5. Click on the symbol or the menu item **Determination ► Find...**.

   The dialog window **Search - Database 'Database name'** is opened.
6. Enter or select desired search terms and search options.
7. Click on **[Search next]**.

   The next determination containing the search term is marked in the **Determination overview**.

9.3.4 Filter determinations

How to proceed?

Opening the database

1. Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

Filtering can now be done via quick filter or special filter in the **Determination overview** window:

Quick filter

1 Click on the symbol or on **Filter ► Quick filter** in the context menu.

After this function has been selected, the field in which the cursor is located will have a yellow background when navigating in the determination table.

2 Double click on the desired field with the left-hand mouse key.

The contents of the field selected in the table will be set as a filter condition and this filter will be applied directly to the table.

NOTICE

The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

Defining and using special filter

1 Click on the symbol or on **Filter ► Special filter** in the context menu

The dialog window **Special filter** opens for defining user-specific filters.

2 Use the **Edit ► Edit line** menu item to open the dialog window **Edit filter criterion New filter**.

3 Define filter criteria.

4 Click on **[Save filter]**.

5 Click on **[Apply filter]**.

The table will be filtered.

Using special filter

1 In the list box **Filter**, select the desired special filter.

The table will be filtered.

9.3.5 Signing determination

How to proceed?

Selecting determination

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

5 Select desired determination.

Signature 1

NOTICE

Determinations can only be signed at level 1 if the user belongs to a user group with the corresponding authorization *(see chapter 6.2.1.2.3, page 1308)*.

1 Click on the symbol or menu item **Determinations ► Sign ► Signature 1…**.

The window **Signature Level 1** opens. If the selected determination can be signed, **Signature possible** is displayed in the field **Info**.

2 Enter or select **User**, **Password**, **Reason** and **Comment**.

3 Click on **[Sign]**.

The selected determination will be signed on level 1.

NOTICE

Determinations that have been signed at level 1 can be reprocessed and deleted. If the modified determination is saved as a new determination version then all existing signatures will be deleted automatically, i.e. the determination must be signed again.

Signature 2

NOTICE

Determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization *(see chapter 6.2.1.2.3, page 1308)*.

1 Click on the symbol or menu item **Determinations ► Sign ► Signature 2…**.

The window **Signature Level 2** opens. If the selected determination can be signed, **Signature possible** is displayed in the field **Info**.

2 Enter or select **User**, **Password**, **Reason** and **Comment** and click on **[Sign]**.

The selected determination will be signed on level 2.

NOTICE

Determinations that can be signed at level 2 are **blocked**, i.e. they can neither be reprocessed nor deleted. In order to be able to edit such determinations again the signatures at level 2 must first be deleted.

9.3.6 Export determinations

How to proceed?

Defining export template

1 Select program part **Database**.

2 Click on menu item **Tools ▶ Templates ▶ Export templates…**.

The window **Export templates** opens.

3 Click on **[New]**.

The window **Export templates – 'New file'** opens.

4 Define the properties of the new export template.

5 Click on **[OK]**.

The dialog window is closed.

6 Click on **[Close]**.

The dialog window **Export templates** is closed.

Selecting determinations

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ▶ Open…**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

5 Select desired determinations.

Export determinations

1 Click on the menu item **Determinations ► Export...**.

The window **Export determinations** opens.

2 In the field **Selection** select the desired option (**All records** or **Selected records**).

3 In the list box **Export template**, select an export template.

4 Click on **[OK]**.

The selected determinations are exported into the directory defined in the export template.

9.3.7 Importing determinations

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

5 Click on the menu item **Determinations ► Import...**.

The window **Import determinations** opens.

6 Select desired determinations.

7 Click on **[Open]**.

The selected determinations are imported into the open database.

NOTICE

Exported determinations can only be imported in the file format ***.mdet**.

9.3.8 Deleting determinations

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ▶ Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

5 Select desired determinations.

6 Click on the symbol or the menu item **Determination ▶ Delete**.

7 Confirm deleting.

The selected determinations with all **Determination versions** are deleted.

NOTICE

If the option **Comment on modification of determinations** in the **Security settings** is enabled, then the window **Modification comment determination** will appear before the modification is saved.

9.3.9 Make the determination version current

How to proceed?

1. Select program part **Database**.
2. Click on the symbol or the menu item **File ► Open...**.

   The dialog window **Open database** opens.
3. Select desired database or enter name in the field **Database name**.
4. Click on **[Open]**.

   The selected database opens and its data sets are displayed in the **Determination overview**.
5. Select desired determination.
6. Click on the symbol or menu item **Determinations ► Show history…**.

   Only the currently selected determination in the **determination table** as well as all the previous versions of this determination will be shown.
7. Select desired determination that is to be made current.
8. Click on the symbol or the menu item **Determination ► Make current**.

   The determination version selected in the determination table will again be made the current determination version. This creates a new determination, the version number of which is increased by **+1** compared with the last version to have been saved.

9.3.10 Reprocessing determinations

How to proceed?

NOTICE

Determinations that have a signature at level 2 cannot be reprocessed.

1. Select program part **Database**.
2. Click on the symbol or the menu item **File ► Open...**.
3. Select desired database or enter name in the field **Database name**.

   The selected database opens and its data sets are displayed in the **Determination overview**.
4. Select desired determinations.
5. Click on the symbol or the menu item **Determination ► Reprocess...**.

   The dialog window **Reprocessing** opens. Displayed is the first of the selected determinations.

Modify variables

1. Select the **Variables** tab.
2. Select the desired variable in the table.
3. Click on **[Modify]**.

   The dialog window **Modify variable** opens.
4. In the field **Value**, enter a new value for the variable.
5. Click on **[OK]**.
6. Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

NOTICE

If a variable is modified, then with **[Recalculate]** all the selected determinations will be recalculated with the new value. If one variable is not modified then when several determinations are recalculated the original value of the variable will be used (i.e. variables with the same name but different values will not be overwritten until they are deliberately altered).

7 In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive for as long as the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Modify method

NOTICE

The method can only be modified if the method is identical for all the determinations that have been selected.

1 Change to the **Method** tab.

2 Click on **[Modify method]**.

The dialog window **Method editor** opens.

3 Modify method as desired.

Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands.

4 Click on **[OK]**.

5 Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

6 If desired, save the modified method with **[Save as...]** under the same name or under a new name.

If the modified method is saved under the name of an existing method then all the earlier method versions will be deleted and a new version with the number **1** will be generated.

7 In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Modify statistics

NOTICE

The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.

1 Change to the **Statistics** tab.

2 In the field **Result name**, select the result whose **Result value** is to be displayed.

3 Select desired determination whose result value(s) should be switched on or off for the statistics.

4 If only the selected result of the determination has to be switched on or off for the statistics, click on **[Result on/off]**.

If the result is switched off, an asterisk (*****) appears behind the result value, is it switched on again, the asterisk disappears.

5 If all results of the selected determination have to be switched on or off for the statistics, click on **[Determination on/off]**.

If the determination is switched off then an asterisk (*****) appears behind all result values in the table and the line is shown as inactive (gray); if it is switched on again then the asterisks will disappear.

NOTICE

If the results of a determination are switched off, the statistics for these results will be switched off when this determination is recalculated, i.e. no data for the mean value and standard deviations will be shown. However, the determinations remain statistically linked to each other so that the results can also be switched on again.

6 Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

7 In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Edit curve evaluation

NOTICE

The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

1 Change to the tab **Curve evaluation**.

2 In the field **Command name**, select the command whose curve is to be displayed.

3 Click on **[Edit]**.

The dialog window **Curve evaluation** opens for manually reprocessing the curve evaluation.

4 Modify curve evaluation manually.

5 Then close the window with **[OK]**.

6 Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

7 In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the subwindow **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

9.3.11 Printing determination report

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.

NOTICE

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on the menu item **File ► Print ► Report...**.

The dialog window **Report output** opens.

7 Under **Selection**, select desired determinations.

8 Under **Report type**, select the option **Original report** or **Report template**.

9 Under **Output target**, enable the check box **Printer** and/or select **PDF file**.

NOTICE

If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

10 In the dialog window **Report output**, click on **[OK]**.

The reports of the selected determination are put out.

9.3.12 Printing determination overview

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.

NOTICE

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on menu item **File ▶ Print ▶ Determination overview…**.

The dialog window **Print determination overview (PDF)** opens.

7 Under **Selection**, select desired determinations.

8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.

9 Click on **[OK]**.

The determination overview is opened as PDF file.

9.4 Databases

9.4.1 Database in general

The **determination databases** that, in contrast to the **configuration database**, can be generated by the user and contain the determination data, are referred to as databases in **tiamo**. Included among such determination data are the method data used for the determination, the measured data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**), the databases are stored on the drives administered by the computer and are only available to those users registered on that computer who have the appropriate access permission. In client/server systems (**tiamo multi**), the databases are stored on drives administered centrally by the server and are globally available throughout the entire client/server system, i.e., all users with the appropriate access permission can use these databases.

NOTICE

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files also be copied to an external directory or to a CD/DVD.

9.4.2 Opening a database

How to proceed?

1. Select the **Database** program part.
2. Click on the icon or the **File ► Open...** menu item.

   The **Open database** dialog window opens.
3. Select the desired database or enter the name in the **Database name** field.
4. Click on **[Open]**.

   The data sets of the selected database are displayed in the **Determination overview**. The database name is displayed in the title bar of the program; the number of currently opened databases is displayed in the left upper corner of the database icon.

NOTICE

A maximum of four databases can be opened, but only two can be displayed at the same time. Databases that are open at the time the program is exited will be opened automatically the next time the program is started.

9.4.3 Closing a database

How to proceed?

Closing a single database

1. Select the **Database** program part.
2. Click on the icon or the **File ► Close** menu item.

   The focused database will be closed.

Closing all databases

1. Select the **Database** program part.
2. Click on the **File ► Close all** menu item.

   All opened databases will be closed.

9.4.4 Creating a database

How to proceed?

1. Select the **Database** program part.
2. Click on the icon or the **File ► Database manager...** menu item.

   The **Database manager** dialog window opens.
3. Click on the **Edit ► New...** menu item.

   The **New database** dialog window opens.
4. Enter a name for the new database.
5. Click on **[OK]**.

   The **Properties - Database - 'Database name'** dialog window opens for editing the database properties.

   NOTICE

   The database name must be unique in the entire client/server system.
6. On the **General** tab, enter a comment on the database in the **Comment** field.
7. On the **Access rights** tab, define access permissions for reading and editing the newly created database for the different user groups.
8. On the **Backup** tab, define backup monitoring and automatic backup for the newly created database.

9 On the **Monitoring** tab, define the monitoring of the size and number of data sets.

9.4.5 Backing up a database

How to proceed?

Backing up a database manually

1 Select the **Database** program part.

2 Click on the icon or the **File ▶ Database manager...** menu item.

The **Database manager** window opens.

3 Click on **[Backup]**.

The **Backup database** window opens.

4 Select the directory for the backup in the **Backup directory** field.

5 Select or enter the name for the **Backup file**. If an existing backup file is selected, it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added to the **Backup name** because the backup date information is not available when the data is restored.

6 Click on **[Start]**.

The manual backup is started and the database is backed up to the selected directory.

Backing up a database automatically

1 Select the **Database** program part.

2 Click on the icon or the **File ▶ Database manager...** menu item.

The **Database manager** dialog window opens.

3 Select the desired database.

4 Click on **[Properties]**.

The **Properties - Database** dialog window opens for editing the database properties.

5 On the **General** tab, enter a comment on the database in the **Comment** field.

6 On the **Backup** tab, activate the **Backup monitoring** check box.

7 Enter an **Interval** for backup monitoring or a date for the **Next backup**.

8 Activate the **Start backup automatically** check box.

9 Select the directory for the backup in the **Backup directory** field.

10 Click on **[OK]**.

11 The **Properties - Database** dialog window closes.

The database is automatically saved in the selected directory at the desired moment.

9.4.6 Restoring the database

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or menu item **File ► Database manager…**.

The dialog window **Database manager** opens.

3 Click on **[Restore]** in the **Database manager** dialog window.

The **Restore databases** dialog window opens.

4 Select the directory in the **Backup directory** in which the desired database was backed up.

5 Select or enter the name for the desired **Backup file**.

6 Enter the name under **Save As** under which the database is to be restored.

7 Click on **[Start]**.

The database restoring is started.

NOTICE

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

9.4.7 Deleting a database

How to proceed?

1 Select the **Database** program part.

2 Click on the icon or the **File ▶ Database manager...** menu item.

The **Database manager** dialog window opens.

3 Select the desired database.

4 Click on the **Edit ▶ Delete** menu item.

The selected database is deleted.

NOTICE

Databases that are open cannot be deleted.

9.5 Configuration data

9.5.1 Configuration data in general

The configuration data is saved in **tiamo** in the **Configuration database**. Configuration data includes all settings that apply to all methods, i.e. settings for devices, titrants/solutions, sensors, common variables and rack data as well as **Methods**, **Security settings** *(see chapter 6.2.2.1, page 1314)*, **User administration** *(see chapter 6.2.1.1, page 1305)*, **Program administration** *(see chapter 6.2.3.1, page 1325)*, templates and **Audit Trail** *(see chapter 6.4, page 1355)*.

In local server systems (**tiamo light**, **tiamo full**), the configuration database is located in the program directory of the computer on which the program has been installed. In client/server systems (**tiamo multi**), the configuration database is stored centrally on the server and contains all the configuration data of all computers (clients) that are connected to this server.

9.5.2 Exporting configuration data

How to proceed?

1. Select the **Configuration** program part.
2. Click on the **File ► Export...** menu item.

   The **Export configuration data** dialog window opens.
3. Select the desired configuration data.
4. Click on **[OK]**.

   The **Export configuration data** dialog window closes and the **Save** dialog window opens.
5. Select or enter a name and directory for the export file. If an existing export file is selected, it will be overwritten.
6. Click on **[Save]**.

   The export of the configuration data is started.

   The selected configuration data is then saved in a file with the extension **.mcfg**.

9.5.3 Importing configuration data

How to proceed?

1. Select the **Configuration** program part.
2. Click on the **File ► Import...** menu item.

   The **Open** dialog window opens.
3. Select or enter a new name and directory for the ***.mcfg** import file.
4. Click on **[Open]**.

   The **Import configuration data** dialog window opens.
5. Select the desired configuration data.

   NOTICE

   Data that is not present in the export file cannot be selected.
6. Click on **[OK]**.

   The import is started and the selected configuration data is imported.

9.5.4 Backing up configuration data

How to proceed?

NOTICE

It is strongly recommended that the configuration database be backed up periodically.

Backing up configuration data manually

1. Select the **Configuration** program part.
2. Click on the **File ► Backup ► Manually** menu item.

   The **Backup configuration data manually** dialog window opens.
3. Select the directory for the backup in the **Backup directory** field.

4 Select or enter the name for the backup file in the **Backup name** field. If an existing backup file is selected, it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added to the backup name, because the backup date information is not available when the data is restored.

5 Click on **[Start]**.

The manual backup is started and the configuration database is backed up to the selected directory.

Backing up configuration data automatically

1 Select the **Configuration** program part.

2 Click on the **File ► Backup ► Automatically** menu item.

The **Backup configuration data automatically** dialog window opens.

3 Activate the **Automatic backup** check box.

4 Enter an **Interval** for backup monitoring or a date for the **Next backup**.

5 Select a directory for the backup in the **Backup directory** field.

6 Click on **[OK]**.

The **Backup configuration data automatically** dialog window closes.

The configuration database is automatically saved in the selected directory at the desired moment.

9.5.5 Restoring configuration data

How to proceed?

tiamo light, tiamo full

1. Exit **tiamo**.
2. Start the file **ConfigRestore.exe** in the program directory **…\tiamo \bin**.

   The **Restore configuration data** dialog window opens.
3. Select the directory in which the configuration database was backed up in the **Backup directory** field.
4. Select or enter the name for the desired **Backup file**.
5. Click on **[Start]**.

   The restoring of the configuration database is started.

tiamo multi

1. Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.
2. Start the **ConfigRestore.exe** file in the **…\tiamo\bin** program directory on the server.

   The **Restore configuration data** dialog window opens.
3. Select the directory in which the configuration database was backed up in the **Backup directory** field.
4. Select or enter the name for the desired **Backup file**.
5. Click on **[Start]**.

   The restoring of the configuration database is started.

9.6 Methods

9.6.1 Opening a method

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or the menu item **File ► Open...**.

   The dialog window **Open method** opens.
3. In the list box **Method group** select the desired method group.
4. Select the desired method from the table or enter a name in the field **Method name**.
5. Click on **[Open]**.

   The selected method is opened in the main window in the place of a method that is already opened. The method name is displayed in the title bar of the program; the number of currently opened methods is displayed in the left upper corner of the method symbol.

NOTICE

A maximum of 9 methods can be opened, but only 2 can be displayed at the same time.

9.6.2 Closing a method

How to proceed?

Closing a single method

1. Select program part **Method**.
2. Click on the symbol or the menu item **Close ► file**.

   The selected method will be closed. If the method has been modified, there will be a request to save the method as a new version.

Closing all methods

1 Select program part **Method**.

2 Click on menu item **File ► Close all…**.

All opened methods will be closed. A request to save the method as a new version will appear for each method having been modified.

9.6.3 Creating a new method

How to proceed?

1 Select program part **Method**.

2 Click on the symbol or the menu item **File ► New...**.

The dialog window **New method** opens.

3 Select **Empty method** or a fixed **Method template**.

4 Click on **[OK]**.

Opens the selected method template for editing.

9.6.4 Creating a new method

How to proceed?

Saving method under the same name

1 Click on the symbol or the menu item **File ► Save**.

The existing, selected method is newly saved under its name. A new **Method version** with a new method identification is created.

If the check box **Comment on modification of methods** is activated in the **Security settings**, the window **Modification comment method** is displayed before the method is saved.

Saving method under a new name

1 Click on the menu item **File ► Save As...**.

The dialog window **Save method** opens.

2 In the list box **Method group** select the desired method group.

3 Select the desired method from the table or enter a name in the field **Method name**.

4 Click on **[Save]**.

The selected method is saved under the desired method name in the selected method group as method version **1**.

If the check box **Comment on modification of methods** is activated in the **Security settings**, the window **Modification comment method** is displayed before the method is saved.

9.6.5 Deleting a method

How to proceed?

1 Select program part **Method**.

2 Click on the symbol or menu item **File ► Method manager…**.

The dialog window **Method manager** opens.

3 In the list box **Method group** select the desired method group.

4 Select the desired method from the table or enter a name in the field **Method name**.

5 Click on the menu item **Edit ► Delete…**.

The selected methods with all its **Method versions** are deleted.

If the check box **Comment on modification of methods** is activated in the **Security settings***(see chapter 6.2.2.4, page 1320)*, the window **Modification comment method** is displayed before the method is saved. In this window, a reason and a comment on deleting can be entered, which is logged in the **Audit Trail**.

NOTICE

Locked methods cannot be deleted.

9.6.6 Export method

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or menu item **File ► Method manager…**.
   The dialog window **Method manager** opens.
3. In the list box **Method group** select the desired method group.
4. Select the desired method from the table or enter a name in the field **Method name**.
5. Click on the menu item **File ► Export...**.
   The dialog window **Select directory for export** opens.
6. Select the directory for the export files.
7. Click on **[OK]**.
   The selected methods are each exported as files named **'Method name'.mmet**.

NOTICE

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is tampered with, then it cannot be imported again.

9.6.7 Import methods

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or menu item **File ► Method manager…**.
   The dialog window **Method manager** opens.
3. In the list box **Method group** select the desired method group.
4. Click on the menu item **Edit ► Import...**.

The dialog window **Select files to import** opens.

5 Select desired import files named as **'Method name'.mmet** in the desired directory.

6 Click on **[OK]**.

The selected methods are imported in the currently opened method group.

9.6.8 Signing method

How to proceed?

Selecting the method

1 Select program part **Method**.

2 Click on the symbol or menu item **File ► Method manager…**.

The window **Method manager** opens.

3 Select desired **Method group**.

4 Select desired method.

Signature 1

NOTICE

Methods can only be signed at level 1 if the user belongs to a user group with the corresponding permission *(see chapter 6.2.1.2.3, page 1308)*.

1 Click on the menu item **Sign ► Signature 1…**.

The dialog window **Signature Level 1** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

2 Enter or select **User**, **Password**, **Reason** and **Comment**.

3 Click on **[Sign]**.

The selected method will be signed on level 1.

NOTICE

Methods can be signed more than once at level 1 and can also be edited and deleted. If the method is edited and saved again, a new version is created and all the signatures will be deleted i.e. the method must be signed again.

Signature 2

NOTICE

Methods can only be signed at level 2 if the user belongs to a user group with the corresponding permission *(see chapter 6.2.1.2.3, page 1308)*.

1 Click on the menu item **Sign ► Signature 2…**.

The dialog window **Signature Level 2** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

2 Enter or select **User**, **Password**, **Reason** and **Comment**.

3 Click on **[Sign]**.

The selected method will be signed on level 2.

NOTICE

Methods signed at level 2 are **locked**, i.e. they can neither be edited nor deleted. In order to be able to edit such methods again the signatures at level 2 must first be deleted *(see chapter 2.3.5, page 23)*.

9.6.9 Making previous method version current

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or menu item **File ► Method manager…**.

   The dialog window **Method manager** opens.
3. In the list box **Method group** select the desired method group.
4. Select desired method.
5. Click on **[History]**.

   The dialog window **Method history** showing a table with all **versions** of the selected method is opened.
6. Select desired method that is to be made current.
7. Click on Make **[current]**.

   The selected method version is set as the current method version. The method will be saved, the version number is increased by **+1** compared to the last method version that was saved.

9.6.10 Print method report

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or the menu item **File ► Open...**.

   The dialog window **Open method** opens.
3. In the list box **Method group** select the desired method group.
4. Select desired method or enter name in the field **Method name**.
5. Click on **[Open]**.

   The selected method is opened in the main window in the place of a method that is already opened. The method name is displayed in the title bar of the program; the number of currently opened methods is displayed in the left upper corner of the method symbol.

6 Click on the menu item **File ► Print (PDF)...**.

The dialog window **Print method reports (PDF)** opens.

7 Select desired report and orientation and click on **[OK]**.

The desired report is opened as PDF file.

9.6.11 Backup methods

How to proceed?

General

Methods are stored in the configuration database and globally accessible for all clients. This means that in order to save methods the configuration data must be saved manually or automatically. A further possible way is to export the methods and then to save these files outside of **tiamo**.

Backing up configuration data manually

1 Select program part **Configuration**.

2 Click on the menu item **File ► Backup ► Manually**.

The dialog window **Backup configuration data manually** opens.

3 In the field **Backup directory** select a directory for the backup.

4 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.

NOTICE

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

5 Click on **[Start]**.

6 The manual backup of the configuration database is started.

Backing up configuration data automatically

1. Select program part **Configuration**.
2. Click on menu item **File ▶ Backup ▶ Automatically**.

   The dialog window **Backup configuration data automatically** opens.
3. Activate the **Automatic backup** check box.
4. Enter an interval for backup monitoring in the field **Interval** or a date for the next backup in the field **Next backup**.
5. In the field **Backup directory** select a directory for the backup.
6. Click on **[OK]**.

   The dialog window **Backup configuration data automatically** is closed.

Exporting methods

1. Select program part **Method**.
2. Click on the symbol or menu item **File ▶ Method manager…**.

   The dialog window **Method manager** opens.
3. Select desired **Method group**.
4. Select desired methods.
5. Click on the menu item **File ▶ Export...**.

   The dialog window **Select directory for export** opens.
6. Select the directory for the export files.
7. Click on **[OK]**.

   The selected methods are each exported as files named **'Method name'.mmet**.

NOTICE

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is tampered with, then it cannot be imported again.

9.7 Method groups

9.7.1 Creating method group

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or the menu item **File ► Method groups...**.

   The dialog window **Method groups** opens.
3. Click on **[New]**.

   The dialog window **Properties - Method group - New Group** opens.
4. On the tab **General** in the field **Name**, enter a new name for the method group and in the field **Comment** enter a comment.
5. On tab **Access rights**, assign access rights for method groups and their methods per **User group**.

   NOTICE

   The user group **Administrators** always has both access rights, i.e. they cannot be disabled.
6. Click on **[OK]**.

   The dialog window **Properties - Method group - New Group** is closed.

9.7.2 Deleting method group

How to proceed?

1. Select program part **Method**.
2. Click on the symbol or the menu item **File ► Method groups...**.

   The dialog window **Method groups** opens.
3. Select desired method group.
4. Click on **[Delete]**.

   The selected method group is deleted.
5. Confirm deleting with **[OK]**.

9.8 Sample tables

9.8.1 Create sample table

How to proceed?

1. Select program part **Workplace**.
2. Click on the symbol or the menu item **Tools ► Sample table ► New...**.

   The dialog window **Sample table 'New sample table** with an empty sample table opens.
3. Click on the menu item **Sample table ► Properties...**.

   The dialog window **Properties - Sample table 'New sample table'** opens.
4. Edit properties of the new sample table.
5. Click on **[OK]**.

   The dialog window **Properties - Sample table 'New sample table'** is closed.

6 In the dialog window **Sample table 'New sample table'**, click on the menu item **Edit ► Edit line**.

The dialog window **Edit line - Sample table 'New sample table** opens.

7 In the list box **Method**, select the desired method and enter sample data.

8 Click on **[Apply]**.

The sample data entered will be applied in the respective line of the sample table.

9 Repeat step **6** for each desired determination.

10 Click on **[Close]**.

The dialog window **Edit line - Sample table 'New sample table'** is closed.

11 In the dialog window **Sample table 'New sample table'** click on the menu item **Sample table ► Save as...**.

The dialog window **Save sample table** opens.

12 In the field **Name** enter the desired name.

13 Click on **[Save]**.

The sample table will be saved under the name that was entered.

9.8.2 Edit sample table

How to proceed?

1 Select program part **Workplace**.

2 Click on the symbol or the menu item **Tools ► Sample table ► Open...**.

The dialog window **Open sample table** opens.

3 Select desired sample table.

4 Click on **[Open]**.

The dialog window with the selected sample table opens.

5 Click on the menu item **Sample table ► Properties…** in the dialog window **Sample table**.

The dialog window **Properties - Sample table** opens.

6 Define the properties for the sample table.

7 Click on **[OK]**.

8 Select the line to be modified in the dialog window **Sample table**.

9 Click on the menu item **Edit ► Edit line** in the dialog window **Sample table**.

The dialog window **Edit line** opens.

10 Select **Method** from the desired method group, enter **Sample data** and click on **[Apply]**.

The sample data entered will be applied in the respective line of the sample table.

11 Repeat step **8** for each desired determination.

12 Close the dialog window **Edit line** with **[Close]**.

13 In the dialog window **Sample table** click on the menu item **Sample table ► Save as...**.

The dialog window **Save sample table** opens.

14 In the field **Name**, enter a new name for the sample table or overwrite the old name.

15 Click on **[Save]**.

The edited sample table is saved.

9.8.3 Loading working sample table

How to proceed?

1. Select program part **Workplace**.
2. In subwindow **Run**, click on the **Determination series** tab.
3. Click on the menu item **Sample table ► Load...**.

   The dialog window **Load sample table** opens.
4. Select desired sample table.
5. Click on **[Load]**.

   The data of the selected sample table is loaded into the working sample table.

9.8.4 Edit working sample table

How to proceed?

1. Select program part **Workplace**.
2. In subwindow **Run**, click on the **Determination series** tab.
3. If desired, load existing sample table into working sample table.
4. If desired, click on the menu item **Sample table ► Properties...** in the subwindow **Run**.

   The dialog window **Properties - Determination series** opens.
5. Define the properties for the determination series.
6. Click on **[OK]**.

   The dialog window **Properties - Determination series** is closed.
7. Select line to be modified in the subwindow **Run**.
8. Click on the menu item **Edit ► Edit line**.

   The dialog window **Edit line** opens.

9 In the list box **Method**, select the desired method and enter sample data.

10 Click on **[Apply]**.

The sample data entered will be applied in the respective line of the working sample table.

11 Repeat step **8** for each desired determination.

12 Click on **[Close]**.

The dialog window **Edit line** is closed.

13 If desired, click on the menu item **Sample table ► Save as...** in the subwindow **Run**.

The dialog window **Save sample table** opens.

14 In the field **Name** enter a name.

15 Click on **[Save]**.

The working sample table will be saved under the name entered as sample table.

9.9 Reports

9.9.1 Creating report template

How to proceed?

1 Select program part **Database**.

2

NOTICE

A database must be open in order to carry out subsequent steps.

Click on the menu item **Tools ► Report templates ► New ► Form report…** or **Tools ► Report templates ► New ► Tabular Report…**.

The program window **Report template** with an empty report template opens.

3 Click on the menu item **File ► Page setup…** in the program window **Report template**.

The dialog window **Page setup** opens.

4 Define desired settings for the report format.

5 Click on **[OK]**.

The dialog window **Page setup** is closed.

6 In the program window **Report template**, click on the menu item **Tools ► Options...**.

The dialog window **Options for report templates** opens.

7 Define desired settings for the report template.

8 Close the dialog window with **[OK]**.

9 Select desired module symbol on the Module bar and place it on the report template by creating a field with the left mouse button.

The properties window for the corresponding module opens automatically.

10 Enter desired settings for the module.

11 Click on **[OK]**.

The properties window is closed.

12 Repeat steps **7** and **8** for each desired module.

13 Click on the symbol or the menu item **File ► Save as...**.

The dialog window **Save report template** opens.

14 In the field **Name** enter a name.

15 Click on **[Save]**.

The report template is saved under the name entered.

9.9.2 Edit report template

How to proceed?

1. Select program part **Database**.
2. Click on the symbol or on the menu item **Tools ► Report templates ► Open…**.

   The program window **Open report template** opens.
3. Open desired report template.
4. Click on **[Open]**.

   The program window with the selected report template opens.
5. Click on the menu item **File ► Page setup...**.

   The dialog window **Page setup** opens.
6. Define desired settings for the report format.
7. Close the dialog window with **[OK]**.
8. In the program window **Report template**, click on the menu item **Tools ► Options...**.

   The dialog window **Options for report templates** opens.
9. Define desired settings for the report template.
10. Close the window with **[OK]**.

Editing existing modules

1. Select the symbol on the module bar and double-click on the desired module in the report template.

   The properties window of the selected module opens automatically.
2. Enter desired settings for the module.
3. Close the properties window with **[OK]**.

4 Repeat steps **1** and **2** for each desired module.

Creating new modules

1 Select desired module symbol on the Module bar and place it on the report template by creating a field with the left mouse button.

The properties window for the corresponding module opens automatically.

2 Define desired setttings for the module.

3 Close the properties window with **[OK]**.

4 Repeat steps **1** and **2** for each desired new module.

5 Click on the symbol or the menu item **File ► Save**.

The report template is saved.

9.9.3 Printing determination report

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.

NOTICE

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on the menu item **File ► Print ► Report...**.

The dialog window **Report output** opens.

7 Under **Selection**, select desired determinations.

8 Under **Report type**, select the option **Original report** or **Report template**.

9 Under **Output target**, enable the check box **Printer** and/or select **PDF file**.

NOTICE

If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

10 In the dialog window **Report output**, click on **[OK]**.

The reports of the selected determination are put out.

9.9.4 Printing determination overview

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or the menu item **File ► Open...**.

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.

NOTICE

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on menu item **File ► Print ► Determination overview…**.

The dialog window **Print determination overview (PDF)** opens.

7 Under **Selection**, select desired determinations.

8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.

9 Click on **[OK]**.

The determination overview is opened as PDF file.

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