# tiamo 2.2

Metrohm
Ion analysis

## Manual

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# tiamo 2.2

## Manual

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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 its samples and exchange data and methods without loss.

### Overview of the main program features

- *Program interface: easy to operate and configure*
- *Simple integration of devices and accessories*
- *Convenient method editor*
- *Database-based program with Client/Server functionality*
- *A wide range of import and export functions*
- *FDA-compatibility in acc. with 21 CFR Part 11*
- *Comprehensive online help*

- *Program versions*
- *What is new in tiamo 2.2?*

## 1.2 Operation

Introduction

The modern **user interface** makes it simple for the user to find his/her way around *tiamo*. All the commands and control elements are where you would expect to find them. 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 rights, these buttons are either visible or invisible. The menu bar is in the upper part of the screen. It is also possible for the individual commands to be masked out, depending on the access rights.

In the centre of the screen are 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. This means that the users only see the buttons needed for their work. This reduces the introductory period for routine users to a minimum; incorrect operation as a result of overcrowded screens are 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 fast and simply and to use them immediately.

## 1.3 Connecting devices

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 processors which to some extent are no longer included in the sales program, are integrated in *tiamo*. That is how Metrohm secures your investments!

Naturally, all of the models of the new Titrando generation, as well as the new sample processors, are compatible with *tiamo*. Thus, for example, 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 ones with USB controls 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
- **Conductometer**
  712, 856
- **KF coulometer**
  756, 831
- **Sample changer**
  730, 774, 778, 789, 814, 815, 855, 864, 874
- **Miscellaneous**
  846 Dosing Interface, 859 Titrotherm, 867 pH module, Avantes spectrometer, balances, barcode readers, IO controllers, …

## 1.4 Method editor

Introduction

The new graphic **method editor** gets more out of your titration system. With the aid of the numerous templates, methods can be created fast 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.

One new feature is that **actions running parallel** in terms of time can now be programmed and linked. Now a sample can be prepared with the new Titrando System and the Robotic Sample Processors while the previous one is being titrated. This saves time and increases sample throughput. The crowning feature is the simultaneous processing of several samples at once. 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

- Graphic method editor *(see Chapter 5.6.1.2, page 419)*
- Method manager *(see Chapter 5.3.1, page 398)*
- Separate management of access rights for each method group *(see Chapter 5.4.2.3, page 410)*
- Templates for method development and calculation *(see Chapter 5.2.1, page 385)*
- Plausibility check for methods *(see Chapter 5.2.5, page 394)*
- Comments can be added to the methods *(see Chapter 5.2.4.2.9, page 393)*
- Parallel runs *(see Chapter 5.6.10.3.1, page 1183)*
- Loop functions *(see Chapter 5.6.10.4.1, page 1185)*

## 1.5 Database

Introduction

**tiamo** is based on an **object-oriented database**, that has proven itself in practice. In the **configuration database**, all program settings, user administration, methods and templates are stored and in the **determination databases** defined by the user, the determination data. 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 new 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 1222)*.
- Layout manager for the database view *(see Chapter 3.1.7, page 92)*.
- Quick filter *(see Chapter 4.5.2.4.3, page 293)*.
- Efficient search functions *(see Chapter 4.5.2.3, page 289)*.
- Access rights control for every database *(see Chapter 4.3.5.3, page 200)*.
- Automatic database backup *(see Chapter 4.3.5.4, page 201)*.
- Control cards *(see Chapter 4.5.2.17, page 330)*.
- Reprocess determinations *(see Chapter 4.5.2.6, page 303)*.

## 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. 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

- Importing sample data *(see Chapter 3.3.1.6, page 104)*.

- Various export formats , e.g. XML, CSV, SLK *(see Chapter 4.4.4.2.1, page 251)*.
- Automatic data export, e.g. to NuGenesis SDMS, Scientific Software CyberLAB, etc.*(see Chapter 5.6.8.5.1, page 1157)*
- Report designer *(see Chapter 4.4.1.4.1.1, page 208)*.
- E-mail functions for status messages, error messages or results *(see Chapter 2.6, page 86)*.
- Importing external measured values *(see Chapter 5.6.3.11.2, page 880)*.

# 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 already being applied at the time of software development and programming.tiamo has been designed to fulfill the **FDA directive 21 CFR Part 11** and its customer-specific interpretations. This is evidenced by a Certificate of Conformity. A centralized user administration defines the access rights 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 deleting 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 1203)*.
- Detailed access rights *(see Chapter 6.2.1.2.2, page 1205)*.
- Password protection under tiamo or Windows *(see Chapter 6.2.2.2, page 1213)*.

- Digital signature on two levels *(see Chapter 2.3, page 19)*.
- One signature each for methods and results.
- Documentation of all methods and changes in results *(see Chapter 4.5.2.14, page 329)*.
- Traceability thanks to detailed Audit Trail *(see Chapter 6.4.1.1, page 1244)*.

## 1.8 Versions

Introduction

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

| | **tiamo 2.2 light** | **tiamo 2.2 full** | **tiamo 2.2 multi** |
|---|---|---|---|
| Product | 6.6056.221 | 6.6056.222 | 6.6056.223 |
| Maximum number of devices 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 requested in two ways:

- **General request** 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 request** 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:

| | |
|---|---|
| *Devoce table* | Link to another help topic in which information is shown for the marked term. |
| **Method** | **Dialog text**<br>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. |
| **[Continue]** | **Button** |
| | **Formula editor**<br>Formulae can be entered in fields with this symbol, and the formula editor opens when you click on the symbol *(see Chapter 2.4, page 25)*. |
| **1** | **Instruction step**<br>Carry out these steps in the sequence shown. |
| | **Warning**<br>This symbol draws attention to a possible risk of fatal injury or risk of injury. |
| | **Warning**<br>This symbol draws attention to a possible hazard due to electrical current. |

| | |
|---|---|
| | **Warning**<br>This symbol draws attention to a possible hazard due to heat or hot instrument parts. |
| | **Warning**<br>This symbol draws attention to a possible biological hazard. |
| | **Caution**<br>This symbol draws attention to a possible risk of damage to instruments or instrument parts. |
| | **Note**<br>This symbol marks additional information and tips. |

# 1.10 What is new in tiamo 2.2?

Introduction

In this chapter the changes since tiamo 2.1 are described.

## 1.10.1 New features

### New instruments

- 859 Titrotherm

**Note**

When installing tiamo 2.2 an eventually existing USB driver for the 859 Titrotherm from the Multitrator software will be deleted and replaced by the tiamo driver. Therefore it cannot be titrated with the Multitrator software on this system anymore.

### New commands

- **TET**: Command for thermometric titration with the 859 Titrotherm.
- **RLS DEV**: Release device for parallel working on another workplace.
- **RLS DOS**: Release dosing device for parallel working on another workplace.

### News in the program part Workplace

- Sample data: By typing in the first characters to the field **Method** the selection of the method is continuously restricted and allows fast selecting of the method required.

- Statistical results are being additionally regressed against the **Sample size**. This results in the new variables **.SLO**, **.ITC**, **.COR**. This can be used e.g. for validation purposes, for titer and blank value determinations (thermal titration).

### News in the program part Method

- In the formula editor the **sample data variables of the next sample line** are available.

### News in the program part Configuration

- Besides client-specific common variables, there are also global variables available which are saved over all clients and can be used in formulas under the designation **'GV.Name'**.
- New sensor type: **Thermoprobe** for Titrotherm.

## 1.10.2 Improvements

### Program part Workplace

- With single determinations in which the option **Autorepeat determination** is set, the field **Autostart** is displayed for the determination parameteres in which the number of determination starts already carried-out is shown.
- The request windows for the commands **WAIT** and **REQUEST** are now automatically resized if the text content needs more space.

### Program part Database

- The dialog window **Open database** opens immediately and shows all databases. Additional information (database size, etc.) is displayed one after the other. The access rights are then checked when opening the databases.
- The databases are opened even faster if they are sorted by the **Determination start**.
- In the menu **File** the last five databases opened on this client are listed.
- Reading-in barcodes has been improved.
- tiamo repairs databases automatically.
- Fixed values are being displayed inactive in the Recalculating.
- The sequence of the results in the statistics dialog corresponds to the definition in the **CALC** command (this concerns the results view in the determination database, views in the Recalculating, report result list, report statistics short, report statistics overview).

### Program part Method

- Command **REPORT**: The path for PDF and E-mail address can be transferred as variables.
- Command **WAIT**: The E-mail address can be transferred as a variable.
- Command **CALC**: The E-mail address can be transferred as a variable.

### Program part Configuration

- Global variables, text templates and sample assignment tables can be exported and imported.
- When changing the titer, the values **Date titer det.**, **Titration method**, **User** are additionally saved in the Audit Trail.

### Program part Manual Control

- If all stirrers are selected, no **Stirring time** for continuous operation can be entered.

## 1.10.3 Fixed bugs and problems

### General

- When tiamo is closed before the login dialog appears, then an exception may occur.
- If having canceled after the entry of the licence update (tiamo 1.x to tiamo 2.x) and tiamo is normally started afterwards, an error message occurs.

### Program part Workplace

- Fast reading-in of barcodes can lead to the fact, that no more barcodes can be read-in.
- If a titration command is started via a **SEND** command in status **Cond not ok**, then no entry appears in the message list.

### Program part Database

- The data of a conductivity determination is not displayed with the menu item **Determinations ▸ Show calibration curve...**.
- The blank value with a concentration calibration is not being recalculated in the Recalculating.
- Indexed method variables get lost during the Recalculating.
- With fixed reports, in the selection list, the report **Used titrants/solutions** is missing.
- The run test returns an exception when a **WEIGH** command is present in the method.

### Program part Method

- **DOS**: For Titrinos, the stirrer mistakenly occurs on the tab **General/ Hardware**.
- In the method parameters report the field **Tolerance** is missing for **CAL Spec**.

### Program part Configuration

- When newly adding a Titrando, the firmware version is not being checked.
- The PREP warning does not appear for the 700 Dosino and 685 Dosimat.

- If a rack has the same name as a rack template in the directory **.../tiamo/res/rackdata**, an exception may occur.

# 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.

**Workplace program part**

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

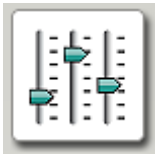
**Database program part**

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

**Method program part**

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

**Configuration program part**



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

### Manual program part

- Manual control of devices

> **Note**
>
> 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 96)*.

### 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 195)*.

### 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 387)*.

### Elements

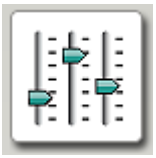
The desktop of the program part **Method** comprises the following elements:

- 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



By clicking on on the configuration symbol in the vertical bar at the left-hand margin the program part **Configuration** is opened, 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-conforming settings

If you are to be in conformity with FDA, the settings on the tab **Login/ Password protection** in the dialog window **Security settings** have to be activated corresponding to 21 CFR 11 with the button **[Set]**. The following conditions are therefore complied with:

- A **login with user name and password** is required each time the program is started.
- The **password administration** is carried out in **tiamo**.
- **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 comprise a **minimum number of characters**.
- 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.

| | |
|---|---|
| Input | **24 characters** |

### Password

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Note**

Users who log in for the first time or users whose status has been reset from **inactive** or **removed** back to **active**, must log in with the **Start password***(see Chapter 6.2.1.3.1, page 1210)* 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 Log out manually

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** dialog appears, allowing a new user to log in.

### 2.2.4 Log out automatically

Program part: **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.

**Note**

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

### 2.2.5 Changing password

Dialog window: **Log in ▸ [Change password] ▸ Change password**

**Note**

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.

**Note**

The password always has to be changed before the **Validity** of the password expires. For users who are logging in for the first time or users whose status has been reset from **inactive** or **removed** back to **active**, 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.

| | |
|---|---|
| Input | **24 characters** |

**New password**

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

| | |
|---|---|
| Input | **24 characters** |

**Confirm password**

Confirmation of the new password.

| | |
|---|---|
| Input | **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**
  Signature levels for 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.
- **Sign at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.
- **Sign at Level 2**
  Level 2 can only be signed if signatures already exist at Level 1.

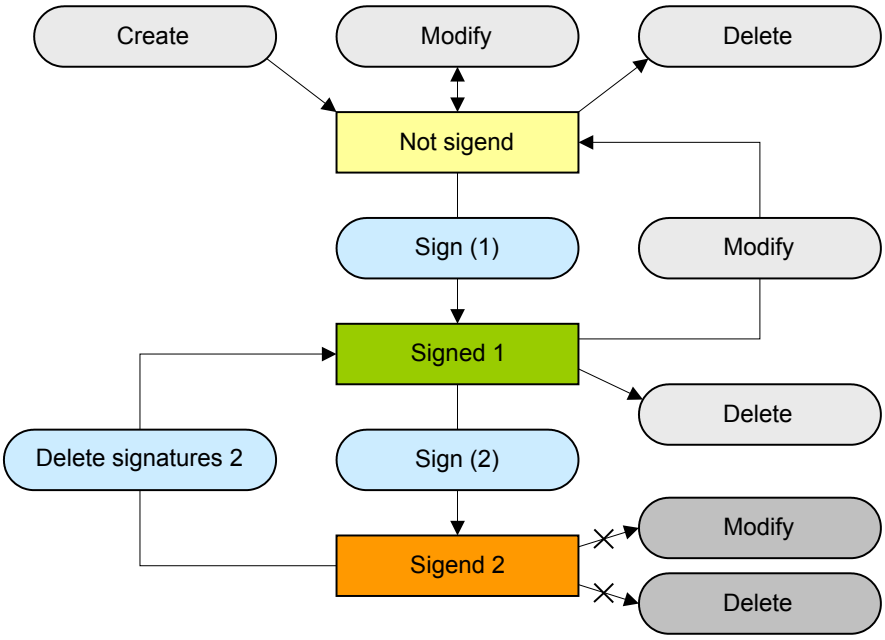
- **Different users**
  The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
  Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can also be entered.
- **Saved data**
  The signature date, user name, full name, reason and comments are saved for each signature.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when compiling a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Sign 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**

or

**Dialog window:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 1... ▸ Signature Level 1**

Methods or determinations can be signed at Level 1 in the **Signature Level 1** window.

**Note**

Methods or determinations which have been signed at Level 1 can be changed and deleted. If the altered 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**

Information display 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).

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 2... ▸ Signature Level 2**

or

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

Methods or determinations can be signed at Level 2 in the **Signature Level 2** window.

**Note**

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be edited 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).

| | |
|---|---|
| Input | **24 characters** |

### Password

Password entry.

| | |
|---|---|
| Input | **24 characters** |

### Reason

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

### Comment

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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 Signature Level 2

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

or

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

The **Delete Level 2 signatures** window allows you to delete all signatures on Level 2 for the selected methods or determination.

**User**

Entry of the user name (short name).

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Delete]**

Delete Signatures 2.

**Note**

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 calculating results. It has an automatic **Syntax check**, which is activated when applying the formula. 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 25)*.
- **Function buttons**
  Buttons for the rapid entry of operators and parentheses *(see Chapter 2.4.1, page 25)*.
- **Variables**
  Selection of the variables available for the calculation formula *(see Chapter 2.4.3, page 28)*.
- **Operators/functions**
  Selection of the operators and functions variables available for the calculation formula *(see Chapter 2.4.4.1, page 49)*.
- **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 and ended with an apostrophe **'** (e.g. **'MV.my variable'**).

- **Time**
  Time indications must always be made with the aid of the **Time( )** function.

### Entry using the function buttons

Mathematical operators and parentheses can simply be added to the formula using the corresponding buttons. A space is automatically added before and after the sign.

| | | | | | |
|---|---|---|---|---|---|
| + | *Addition* | = | *Equal to* | AND | *Logic AND* |
| – | *Subtraction* | > | *Greater than* | OR | *Logic OR* |
| × | *Multiplication* | < | *Less than* | ( ) | Round parentheses |
| / | *Division* | <> | *Not equal to* | { } | Curly parentheses 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 fields **Variables** or **Operators** can be added to the formula by double clicking or **[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). In so doing, **1, 2, 3, 4** are always rounded down and **5, 6, 7, 8, 9** 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, absolute and relative standard deviation of results *R* are calculated using the following formula:

**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 statistical calculations of the software have been implemented so that they can be checked to as great a degree as possible by the user. The individual values are therefore incorporated in the statistics with full accuracy.

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. The binary 64 bit numerical format implemented on the basis of the IEEE 754 standard means that the decimal numerals resulting from this have 15 certain 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 result displayed **1234.56789158763 mg/L** has 15 certain places. It should be rounded off to three decimal places according to the above rounding procedure:

**1234.568 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".

**Note**

The above losses of accuracy by rounding off in the area of the maximum certain places are only relevant theoretically. Most of the time they are lower by several orders of magnitude than – as an example – the uncertainties resulting from weighing out the sample.

## 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 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** commands 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. |
| *System variables* | **'SV.Variable identification'** | System variables are general variables which are adopted in the determination at the start of the determination. |

| Name | Syntax | Description |
|---|---|---|
| *Common variables* | **'CV.Variable name.Variable identification'** | Common variables are client-specific variables, which are adopted from the table of the program part **Configuration** at the start of the determination and assigned to the determination. |
| *Global variables* | **'GV.Variable name.Variable identification'** | Common variables are client-embracing variables, which are adopted from the table of the program part **Configuration** at the start of the determination and assigned to the determination. |

**Enter variables**

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

**Note**

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 field **Variables** of the formula editor lists all **Method variables** which are available for the current method.

**Syntax**

**'MV.Variable name.Variable identification'**

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

You can select the method variables directly in the formula editor under **Variables ▸ Method Variables** in order 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 field **Variables** of the formula editor lists all **Method variables** which 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 syn-

tax 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.

You can select the method variables directly in the formula editor under **Variables ▸ Method Variables ▸ NEXT** in order 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 |

**Note**

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, 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 case of a single determination or if the current determination is the last determination of a series, then 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, that 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 device-dependent commands at the time the determination is started and which are allocated to the individual commands. The field **Variables** of the formula editor lists all **Command variables** which are available for the current method.

**Syntax**

**'Command name.Variable identification'**

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

You can select the command variables 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.

**Note**

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 |
| **.C1** | Coefficient c0 of the calibration curve | CAL Spec |
| **.C2** | Coefficient c0 of the calibration curve | CAL Spec |
| **.C3** | Coefficient c0 of the calibration curve | CAL Spec |

| 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) | MEAS Cond, CAL Cond |
| **.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 |
| **.DBL** | Total duration for the processing of the command in s | DET, MET, SET, KFT, KFC, BRC, STAT, MEAS, CAL MEAS, STDADD, DOS |
| **.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 |

| Identification | Description | Commands |
|---|---|---|
| **.DSC** | Time for processing all start conditions s | DET, MET, SET, KFT, STAT |
| **.DTI** | Time for drift correction (time from the start of the titration to the end of the command) in s | 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 MEAS, STDADD, DOS |
| **.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 |
| **.EP{x}.CHA** | Load for endpoint x (1…9) in mA·s | KFC, BRC |
| **.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** | Quantity 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 |

| Identification | Description | Commands |
|---|---|---|
| **.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}.UGE** | Voltage at the generator electrode for endpoint # (1...9) in V. In case of measurements with 756, 831: **0 = not defined, 1 = <14V, 2 = 14...28V, 3 = >28V** | 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 MEAS, STDADD, DOS |
| **.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 |
| **.FP{x}.MEA** | Measured value for the fixed endpoint x (1...9) in mV | DET, MET, SET, KFT, STAT |

| Identification | Description | Commands |
|---|---|---|
| **.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}.UGE** | Voltage at the generator electrode for the fixed endpoint # (1...9) in V. In case of measurements with 756, 831: **0 = not defined, 1 = <14V, 2 = 14...28V, 3 = >28 V** | KFC, BRC |
| **.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 |

| Identification | Description | Commands |
|---|---|---|
| **.HP{x}.MEA** | Measured value for the HNP x (1…9) in mV (HNP = half neutralization potential) | DET, MET |
| **.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 MEAS, STDADD, DOS |
| **.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 |
| **.LCO** | Loop counter = current quantity of completed runs, both of *Repeat loops* and of *While loops* | LOOP, CAL 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 |
| **.LP.CHA** | Load for the last measuring point of the measuring point list in mA s | KFC, BRC |
| **.LP.CNT** | Intensity of the last measuring point on the measuring point list in counts | MEAS Opt |

| Identification | Description | Commands |
|---|---|---|
| **.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 of the measuring point list in the unit of the measured value | DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL MEAS, DOS |
| **.LP.QTY** | Measured value (water) for the last measuring point in the measuring point list in µg | KFC, BRC |
| **.LP.TEM** | Temperature for the last measuring point of the measuring point list in °C | DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL MEAS, DOS |

| Identification | Description | Commands |
|---|---|---|
| **.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 MEAS, DOS |
| **.LP.TRN** | Transmission of the last measuring point of the measuring point list in % | 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 |
| **.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) |
| **.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 |

| Identification | Description | Commands |
|---|---|---|
| **.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 with 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 |
| **.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 MEAS, STDADD, DOS |

| Identification | Description | Commands |
|---|---|---|
| **.NMP** | Number of measuring points in the measuring point list | DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL MEAS, DOS |
| **.PK{x}.ABS** | Absorbance of the peak x (1…9) in mAU | MEAS Spec |
| **.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 ending 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 |

| Identification | Description | Commands |
|---|---|---|
| **.RES** | Calculated result of the standard addition in the selected unit | STDADD |
| **.RPO** | Current rack position (entry at time of ending the command); **0** means **'not defined'** | MOVE |
| **.RTE** | Reference temperature in °C | MEAS Cond |
| **.SAN** | Current, absolute swing angle of the robotic arm in ° (entry upon ending 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 |
| **.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 |
| **.STE** | Start temperature (temperature after processing of 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 MEAS, STDADD, DOS |
| **.SVA** | Start volume absolute (volume that was added according to the start condition "start volume") in mL | DET, MET, SET, KFT, STAT |

| Identification | Description | Commands |
|---|---|---|
| **.SVM** | Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL | DET, MET |
| **.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 in dependence on all three start conditions) in mL | DET, MET, SET, KFT, STAT |
| **.TC.TC** | Temperature coefficient of the conductivity in %/°C | MEAS Cond |
| **.TC.C0** | Coefficient of the Chebyshev polynomial of conductivity of the zeroth order | MEAS Cond, MEAS TC Cond |
| **.TC.C1** | Coefficient of the Chebyshev polynomial of conductivity of the first order | MEAS Cond, MEAS TC Cond |
| **.TC.C2** | Coefficient of the Chebyshev polynomial of conductivity of the second order | MEAS Cond, MEAS TC Cond |
| **.TC.C3** | Coefficient of the Chebyshev polynomial of conductivity of the third order | MEAS Cond, MEAS TC Cond |
| **.TC.C4** | Coefficient of the Chebyshev polynomial of conductivity of the fourth order | MEAS Cond, MEAS TC Cond |
| **.TC.MIN** | Minimum temperature coefficient of the conductivity in %/°C | MEAS TC Cond |
| **.TC.MAX** | Maximum temperature coefficient of the conductivity in %/°C | MEAS TC Cond |
| **.TC.TSTART** | Start temperature in °C | MEAS Cond, MEAS TC Cond |
| **.TC.TSTOP** | Stop temperature in °C | 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 |
| **.TOL** | Tolerance within which a measured peak can be assigned to a calibration wavelength. | CAL Spec |
| **.TOU** | Timeout status: **1 = Timeout expired**; **0 = Timeout 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. **Commandname.Portname'** =**Commandname.Portname.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 standard addition in the selected unit | STDADD |
| **.VOL** | Dosed volume | STDADD, ADD, DOS, LQH |

### 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 field **Variables** of the formula editor lists all **Result variables** which are available for the current method.

#### Syntax

**'RS.Result name.Variable identification'**

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

You can select the method variables directly in the formula editor under **Variables ▸ Result Variables** in order to avoid syntax errors.

**Result variables**

| 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 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 |
| **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 |
| **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 |

| Variable name | Description | Data type |
|---|---|---|
| **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:**<br>▪ *Addition* (+)<br>▪ *Subtraction* (-)<br>▪ *Multiplication* (*)<br>▪ *Division* (/)<br>▪ *Potentiation* (^) | **Arithmetic:**<br>▪ *Exponential function* (Exp)<br>▪ *Natural logarithm* (Ln)<br>▪ *Common logarithm* (Log)<br>▪ *Square root* (Sqrt)<br>▪ *Absolute value* (Abs)<br>▪ *Fraction* (Frac)<br>▪ *Integer* (Int)<br>▪ *Round integer* (Round)<br>▪ *Sign* (Sign)<br>▪ *Quantiles of the Student's t-distribution* (Tinv) |
| **Logic:**<br>▪ *AND*<br>▪ *OR* | **Date/Time:**<br>▪ *Time()*<br>▪ *Time(Date)*<br>▪ *Time(Date+Time)* |
| **Comparison:**<br>▪ *Equal to* (=)<br>▪ *Greater than* (>)<br>▪ *Greater than or equal to* (>=)<br>▪ *Less than* (<)<br>▪ *Less than or equal to* (<=)<br>▪ *Not equal to* (<>) | **Type conversion:**<br>▪ *NumberToText*<br>▪ *NumberToTime*<br>▪ *TextToNumber*<br>▪ *TextToTime*<br>▪ *TimeToNumber*<br>▪ *TimeToText* |
| | **Text:**<br>▪ *TextPosition*<br>▪ *SubText*<br>▪ *Trim* |

| Operators | Functions |
|---|---|
| | **Miscellaneous:**<br>▪ *Error*<br>▪ *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 operators 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. | | | | |

| Operand1 | Operand2 | Result | Example | Remark |
|---|---|---|---|---|
| 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:** | | | | |
| 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 |

| 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. |

### 2.4.4.2.3 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"** | - |
| 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 |
| 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 +*bi*, 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**<br>**4 AND 0 --> 0** | Numbers greater than 0 are interpreted as **1** (true). |
| Text | Text | Number | **"Metrohm" AND "AG" --> 1**<br>**"" 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**<br>**0 AND "1" --> 1**<br>**0 AND "0" --> 1**<br>**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. |
| Number | Time | Number | **2.0 AND Time(1999;10;7) --> 1**<br>**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**<br>**"" 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**<br>**4 OR 0 --> 1** | Numbers greater than 1 are automatically interpreted as 1 (true) |
| Text | Text | Number | **"Metrohm" OR "AG" --> 1**<br>**"" OR "Metrohm" --> 1**<br>**"" 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)* |
| **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**<br>**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**<br>**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. |

| Operand1 | Operand2 | Result | Example | Remark |
|---|---|---|---|---|
| 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**

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| **Operands of the same type:** | | | | |
| Number | Number | Number | **5 = 5 --> 1**<br>**4 = 5 --> 0** | - |
| Text | Text | Number | **"Metrohm" = "AG" --> 0**<br>**"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 81)*. **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 69)* |
| **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 81)*. |
| Text | Number | Number | **"Metrohm" = 1.2 --> 0** | The same rules apply here as for the previous operation. |

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| 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 74)*. |
| 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 81)*. |
| 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**<br>**4 > 5 --> 0** | - |
| Text | Text | Number | **"Metrohm" > "AG" --> 1**<br>**"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 81)*. **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 69)* |
| **Operands of a different type:** | | | | |

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| 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 81)*. |
| 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 81)*. |
| 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**<br>**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 81)*. **Attention:** Uppercase and lowercase letters have different values! |

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| Time | Time | Number | **Time(1998;04;06) >= Time(1964;02;03) --> 1** | *(see Chapter 2.4.4.6.2, page 69)* |
| **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 81)*. |
| 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 81)*. |
| 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**<br>**4 < 5 --> 1** | - |

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| 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 81)*. **Attention:** Upper-case 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 69)* |
| **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 81)*. |
| 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 81)*. |
| 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:** | | | | |

| Oper-and1 | Oper-and2 | Result | Example | Remark |
|---|---|---|---|---|
| Number | Number | Number | **5 <= 4 --> 0**<br>**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 81)*. **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 69)* |
| **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 81)*. |
| 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 81)*. |
| 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**<br>**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 81)*. **Attention:** Upper-case 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 69)* |
| **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 81)*. |
| 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 81)*. |
| 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 = $\sqrt[2]{}$ **number**.

**Parameters**

**Number** $\geq 0$

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.

**Note**

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.

**Note**

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 $\mu$ 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 $\mu$ 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**

**Note**

**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**.

**Note**

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**

**Note**

**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**.

**Note**

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**

**Note**

**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

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

**Syntax**

**y = NumberToText(numberl)**

Gives 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) als **Text**

#### 2.4.4.7.2 NumberToTime

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

**Syntax**

**y = NumberToTime(number)**

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

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

### 2.4.4.7.3 TextToNumber

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

#### Syntax

**y = TextToNumber(Text)**

Gives 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.DurchschnTemp')** = Value of the variables (AverageTemp) as **Number**

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

### 2.4.4.7.4 TextToTime

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

#### Syntax

**y = TextToTime(Text;Format)**

Gives 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 a **delimiter** betwen 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 |

**Note**

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

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

**Syntax**

**y = TimeToNumber(Time)**

Gives the entered number as a **Number**.

**Note**

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';'TestTag'))** = Value of the common variables as number of days as a **Number**

### 2.4.4.7.6 TimeToText

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

#### Syntax

**y = TimeToText(Time)**

Gives 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 for entering any text | |
| '' | Entry of ' | ' |

**Note**

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.TestZeit')** = 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.

**Note**

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**.

**Note**

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**

Only characters that can be printed are listed in the table below:

| ASCII value (dec) | Characters | ASCII value (dec) | Characters | ASCII value (dec) | Characters |
|---|---|---|---|---|---|
| 32 | Space | 64 | At sign (@) | 96 | Accent grave (`) |
| 33 | Exclamation mark (!) | 65 | A | 97 | a |
| 34 | Quotation mark (") | 66 | B | 98 | b |
| 35 | Hash mark (#) | 67 | C | 99 | c |
| 36 | Dollar ($) | 68 | D | 100 | d |

| ASCII value (dec) | Characters | ASCII value (dec) | Characters | ASCII value (dec) | Characters |
|---|---|---|---|---|---|
| 37 | Percent (%) | 69 | E | 101 | e |
| 38 | Commercial "and" (&) | 70 | F | 102 | f |
| 39 | Inverted comma (') | 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 | Apostrophe (') | 76 | L | 108 | l |
| 45 | Subtraction sign (-) | 77 | M | 109 | m |
| 46 | Point (.) | 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 | Semi-colon (;) | 91 | Square parentheses ([) | 123 | Curly parentheses ({) |
| 60 | Less than (<) | 92 | Backslash (\) | 124 | Vertical stroke (¦) |
| 61 | Equals (=) | 93 | Square parentheses (]) | 125 | Curly parentheses (}) |
| 62 | Greater than (>) | 94 | Circumflex (^) | 126 | Tilde (~) |

| ASCII value (dec) | Characters | ASCII value (dec) | Characters | ASCII value (dec) | Characters |
|---|---|---|---|---|---|
| 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

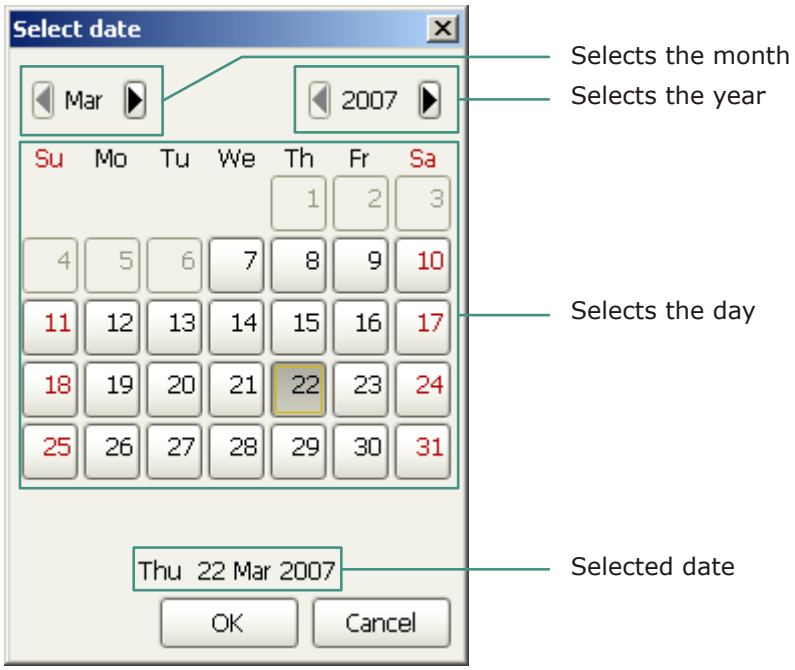
| Molecular formula | Molar mass |
|---|---|
| H2SO4 | **98.0734** |
| Ca(OH)2 | **74.09268** |
| AlCl3*6H2O | **238.43174** |

## 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.

Paste text from the clipboard.

Open editor for entering a hyperlink *(see Chapter 2.5.3, page 85)*.

Open formula editor for entering calculation formulas .*(see Chapter 2.4, page 25)*

**Note**

In order for results of formulas of the type **Date** to be output correctly, they must be converted for text windows with the function **TimeTo-Text***(see Chapter 2.4.4.7.6, page 75)* to **Text**.

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 in order to link 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 84)*.

# 3 Workplace

## 3.1 Workplace - General

### 3.1.1 Workplace - Definition

Program part: **Workplace**

**Workplace** is defined in **tiamo** 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 96)*.

#### 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**

| | |
|---|---|
| **Workplace ▸** | |
| **New...** | Opens new workplace *(see Chapter 3.2.1, page 95)*. |
| **Properties...** | Edits properties of the selected workplace *(see Chapter 3.2.2, page 95)*. |
| **Exit** | Closes the selected workplace *(see Chapter 3.2.4, page 97)*. |
| **Method ▸** | |
| **Save** | Saves the method with the modified live parameters *(see Chapter 3.7.3, page 170)*. |
| **Save as...** | Saves the method with the modified live parameters under a new name *(see Chapter 3.7.3, page 170)*. |
| **Logout...** | Logout user *(see Chapter 2.2.3, page 18)*. |
| **Exit** | End program. |

### 3.1.3.3 Workplace - Menu View

Program part: **Workplace**

| | |
|---|---|
| **Change layout** | Changes layout of the loaded workplace view *(see Chapter 3.1.7.2, page 93)*. |
| **Load view** | Loads a saved workplace view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view** | Saves the current workplace view *(see Chapter 3.1.7.4, page 94)*. |
| **Split vertically** | Splits workplace window vertically and display two workplaces side by side *(see Chapter 3.2.3.3, page 97)*. |
| **Split horizontally** | Splits workplace window horizontally and display two workplaces below each other *(see Chapter 3.2.3.4, page 97)*. |
| **Unsplit** | Unsplits the workplace window *(see Chapter 3.2.3.2, page 97)*. |
| **Properties ▸** | |

| | |
|---|---|
| **Properties Run window** | Sets properties for the tab **Single determination** or **Determination series** in the subwindow **Run**. |
| **Properties live display 1** | Sets properties for the subwindow **Live display 1** *(see Chapter 3.8.5, page 173)*. |
| **Properties live display 2** | Sets properties for the subwindow **Live display 2** *(see Chapter 3.8.5, page 173)*. |
| **Toolbar** | Switches toolbar display on/off. |

### 3.1.3.4 Workplace - Menu Tools

Program part: **Workplace**

| | |
|---|---|
| **Run test** | Carries out run test for determination(s) *(see Chapter 3.6.2, page 122)*. |
| **Sample table ▸** | |
| **New...** | Opens a new and empty sample table *(see Chapter 3.3.1.1, page 97)*. |
| **Open...** | Opens a saved sample table *(see Chapter 3.3.1.2, page 97)*. |
| **Manager...** | Opens the saved sample table manager *(see Chapter 3.3.3.1, page 116)*. |
| **Sample assignment table...** | Defines sample identifications which a certain method can be assigned to *(see Chapter 3.4.1, page 118)*. |
| **Text templates...** | Creates text templates for sample identification *(see Chapter 3.5.1, page 120)*. |

### 3.1.3.5 Help Menu

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

| | |
|---|---|
| **tiamo Help** | Open tiamo Help. |
| **About** | Displays information about the program and the installation. |

## 3.1.4 Workplace - Toolbar

Program part: **Workplace**

| | |
|---|---|
| **Sample table/New...** | Opens a new and empty sample table *(see Chapter 3.3.1.1, page 97)*. |
| **Sample table/Open...** | Opens a saved sample table *(see Chapter 3.3.1.2, page 97)*. |
| **Sample table/Manager...** | Opens the saved sample table manager *(see Chapter 3.3.3.1, page 116)*. |

| | |
|---|---|
| **Change layout** | Changes layout of the loaded workplace view *(see Chapter 3.1.7.2, page 93)*. |
| **Load view** | Loads a saved workplace view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view** | Saves the current workplace view *(see Chapter 3.1.7.4, page 94)*. |
| **Run test** | Carries out run test for determination(s) *(see Chapter 3.6.2, page 122)*. |
| **Split vertically** | Splits workplace window vertically and display two workplaces side by side *(see Chapter 3.2.3.3, page 97)*. |
| **Split horizontally** | Splits workplace window horizontally and display two workplaces below each other *(see Chapter 3.2.3.4, page 97)*. |
| **Unsplit** | Unsplits the workplace window *(see Chapter 3.2.3.2, page 97)*. |
| **Logout** | Logout user *(see Chapter 2.2.3, page 18)*. |
| **MagIC Net Help** | Open MagIC Net Help. |

## 3.1.5 Workplace - Subwindows

Program part: **Workplace**

### Selection

The following subwindows can be displayed in the main window:

- *Run*
  Window for the control of run sequences and entering of sample data. This subwindow is permanently on display.
- *Method*
  Display of the method currently loaded.
- *Live display 1*
  Display of live curves, measured values and messages for the determination running.
- *Live display 2*
  Display of live curves, measured values and messages for the determination running.
- *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*
- *Sample table manager*

#### 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*
- *Interrupt 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*
  Defines the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.
- *Load view*
  Load view saved.
- *Rename view*
  Rename view saved.
- *Delete view*
  Delete view saved.

#### Automatic save

If in the programm part Configuration under **Tools ▸ Options** on the **Save** tab, the respective point under **Save on closing** is enabled, then the current view of the program will be saved automatically.

### 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**

With the symbol or the menu item **View ▸ Change Layout...** the dialog window **Change layout** is opened.

### Select layout

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

| Selection | **Selection of the possible combinations** |
|---|---|

### Available subwindows

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

| Selection | **Subwindow selection** |
|---|---|

### Displayed subwindows

Displays the subwindows that are shown in the view.

| Selection | **Subwindow** |
|---|---|

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 Load view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Load view… ▸ Load view**

With the symbol or the menu item **View ▸ Load view...** the dialog window **Load view** is opened.

**Name**

Name of the view that should be loaded.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Load]**

Load the selected view.

### 3.1.7.4 Save view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Save view… ▸ Save view**

With the symbol or the menu item **View ▸ Save view...** the dialog window **Save view** is opened.

**Name**

Name under which the view is to be saved.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Save]**

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

#### 3.1.7.5 Rename view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Rename view… ▸ Rename view**

To be able to rename a view, either open the dialog window **Load View** or **Save View** and press the **[Rename]** button. The **Rename View** window is opened.

**Rename view to**

Enter a new name for the view.

| | |
|---|---|
| Input | **50 characters** |

#### 3.1.7.6 Delete view

Function: **Workplace / Database / Configuration ▸ View ▸ Load/Save view… ▸ [Delete]**

To be able to delete a view, either open the dialog window **Load view** or **Save view** and press the **[Delete]** button. 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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

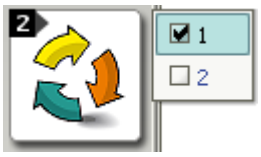
### 3.2.3.1 Selecting workplace

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 ▸ Sampe 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 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 115)*.

#### 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.

| Input | **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 the sample table** | Saves sample table. |
| **PDF output** | Outputs sample table as PDF file. |
| **Reset sample table** | Resets lines that have been run, i.e. they can be edited again. |
| **Duplicate** | Duplicates selected line(s). The new lines are inserted underneath the selected range. |

| | |
|---|---|
| **Increment** | Automatically increments selected lines. |
| **Filling** | Automatically fills selected lines. |
| **Test sample table** | Check whether or not all sample data in the sample table is correct. |

### Sample data table

This table contains sample data lines that have already been saved in the sample data 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** | Edits selected line. |
| **Insert new line** | Inserts a new empty line above the line selected. |
| **Cut lines** | Cuts selected lines and transfers them to the clipboard. |
| **Copy lines** | Copies selected lines to the clipboard. |
| **Insert lines** | Inserts lines from the clipboard above the selected line. |
| **Delete lines** | Deletes the selected lines. |
| **Increment** | Using the cursor, which takes on the form ✜, the region 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** | Automatically fill selected lines. |
| **Duplicate** | Duplicates selected line(s). The new lines are inserted underneath the selected range. |
| **Mark lines** | Marks 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 tab **Process***(see Chapter 3.3.2.4, page 112)* 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 carried out in the method run. Such lines are crossed through with a red line. |
| **Set lines executable** | Sets the selected lines to "executable", i.e. they will be carried out in the run. |

**[Sample table]** contains the following menu items:

| | |
|---|---|
| **Save** | Saves the current sample table under the same name. |
| **Save as…** | Saves the current sample table under a new name. |
| **Print (PDF)…** | Outputs sample table as PDF file. |
| **Properties…** | Edits properties of the selected sample table. |
| **Import data…** | Imports sample table in a file with the format ***.csv**. |
| **Export data…** | Exports sample table in 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 per 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/Strg 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.

| | |
|---|---|
| Input | **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.

**Note**

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.

**Note**

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 427)*.

### 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.

| | |
|---|---|
| Range | **1 ... 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 120)*.

| | |
|---|---|
| Input | **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.

**Note**

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**.

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

#### 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 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 in addition however also be marked automatically when the **[Enter]** is used.

**[Exit]**

Closes the input window. The current sample data will not be applied in the sample table thereby (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.

| | |
|---|---|
| Range | **1 ... 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.

**Note**

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 Exporting sample data

**Dialog window:Workplace ▸ Tools ▸ Sample table ▸ Open… ▸ [Open] ▸ [Sample table] ▸ Export data… ▸ Save file under..**

**Dialog window:Workplace ▸ Run ▸ Determination series ▸ [Sample table] ▸ Export data… ▸ Save file as..**

In this dialog window, you determine the file into which the sample data is to be exported.

**File name**

Input or selection of the file into which the export is to be made.

| Selection | **File name** |
|---|---|

**File type**

Prescribed format ***.csv**.

| | |
|---|---|
| Selection | **[*.csv]** |
| Default value | **[*.csv]** |

**[Save]**

The sample data will be written to the export file.

### 3.3.1.8 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.

**Note**

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 122)*, 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.

### 3.3.1.9 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 115)*.

**Saving sample table**

**Name**

Name under which the sample table is to be saved.

**Note**

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

| Input | **50 characters** |
|---|---|

**[Save]**

Save the sample table under the desired name.

#### 3.3.1.10 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*
  Enabling/disabling 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 operating elements and columns that are to be displayed in the sample table.

### Operating elements

**Note**

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 operating buttons **[Pause]** or **[Cont]**.

**[Hold]/[Cont]**

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

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

### Determination parameters

**Note**

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

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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** \| **Sample size unit** \| **Sample position** |
| Default value | **Sample size** |

**Lock editing in working sample table**

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

If this option is enabled, 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 enabled, 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 enabled, 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 enabled, 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 enabled, 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 unit**

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

If this option is enabled, 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 enabled, 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 enabled, 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 enabled, then the selected sample identification will be used for the method selection in the working sample table. 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 118)*, 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.

**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**

Enabling/disabling the import of external data for sample table fields.

**Note**

The successful conclusion of the data import during the run will be signaled by an acoustic signal (beep).

**Importing from balance**

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

If this option is enabled, 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**.

**Note**

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 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.

### Importing from barcode reader

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

If this option is enabled, 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 7.18.4, page 1455)*.

**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 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 file**

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

If this option is enabled, 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.

**Note**

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**

**Import file**

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

| Input | **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**

Entering a comment on the sample table.

**Comment on sample table**

Entering 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**.

| Input | **1000 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 115)*.

#### 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 117)*. |

| | |
|---|---|
| **Copy** | Copies the selected sample table(s) *(see Chapter 3.3.3.3, page 117)*. |
| **Delete…** | Deletes the selected sample table(s) *(see Chapter 3.3.3.4, page 117)*. |
| **Export…** | Exporting selected sample table(s) in the file format ***.mstab** *(see Chapter 3.3.3.5, page 117)*. |
| **Import…** | Importing sample table(s) from ***.mstab** file(s) *(see Chapter 3.3.3.6, page 118)*. |

### 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.

**Note**

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

| | |
|---|---|
| Input | **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.

**Note**

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

| Input | **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.

**Note**

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.

| | |
|---|---|
| Input | **50 characters** |
| Selection | **Selection of text templates** |

**Note**

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.

| | |
|---|---|
| Input | **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 121)*.

**[Properties]**

Edit selected text template *(see Chapter 3.5.2, page 121)*.

**[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.

| Input | **100 characters** |
|---|---|

## 3.6 Subwindow Run

### 3.6.1 Run - General

Subwindow: **Workplace**

#### Subwindow Run

The subwindow **Run** contains the operating elements for controlling method sequences and for administering sample data. It is always displayed in the program part **Workplace**, i.e. it can not be removed from the Workplace display. The subwindow can be enlarged and reduced as required; it can also be maximized.

#### Tabs

The subwindow **Run** is comprised of the following three tabs:

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

**Note**

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

## 3.6.2 Run test

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

> **Note**
>
> 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 tab **Single determination**. It contains the following tools and functions:

- *Single determination - Operating elements*
  Buttons for starting, stopping, interrupting and resuming determinations.
- *Single determination - Status display*
  Shows the current status of the workplace.
- *Single determination - Determination parameters*
  Enters 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 tab **Single determination**.

### 3.6.3.2 Single determination - Operating elements

Tab: **Workplace** ▸ **Run** ▸ **Single determination**

The following operating elements are located on the tab **Single determination**:

**Start single determinations** (Abbreviation: **Ctrl G**)

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

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

The button is present in the status **BUSY** (determination is running), **COND READY** (condition requirement 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** (condition requirement 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 will be displayed on the tab **Single determination**:

**Status**

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

**READY**
Ready for starting a determination or for conditioning.

**BUSY**
Determination running.

**HOLD**
Determination interrupted.

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

**COND READY**
Condition requirement fulfilled (is displayed only when no determination is running).

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

**ERROR**
Error.

### 3.6.3.4 Single determination - Determination parameters

Subwindow: **Run** ▸ **Sequence** ▸ **Single determination**

#### User

If the option **User name** required is enabled in the security settings, then the abbreviation of the currently registered 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**).

| | |
|---|---|
| Input | **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 be edited by the user only when it is in the status **READY**.

| | |
|---|---|
| Range | **0 ... 99999** |
| 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 120)*.

**Note**

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 128)*.

| | |
|---|---|
| Input | **100 characters** |

#### Autostart

Display of the number of automatic, internal starts of single determinations. This field is only displayed if the option **Autorepeat determinations** is enabled on the **Process** tab *(see Chapter 3.6.3.9.4, page 135)*. 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 in the **START** command of which the option **Statistics** has been enabled. The statistics

defined in the method can be enabled and disabled 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 menu item **Delete statistics**, whereby the already calculated statistics data is deleted at the same time.

The second field after **Statistics** shows the number of determinations still to be carried out for the statistics (Setpoint counter). In its default settings, 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**.

**Note**

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.

| | |
|---|---|
| Input | **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.

**Note**

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.

**Note**

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 427)*.

### 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.

| | |
|---|---|
| Range | **1 ... 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 120)*.

| | |
|---|---|
| Input | **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.

**Note**

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** subwindow as **Data entry** and **Data source**.

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **16 characters** |
| Selection | **g** \| **mg** \| **µg** \| **mL** \| **µL** \| **pieces** |
| Default value | **g** |

**Note**

**Sample position**, **ID1…ID16**, **Sample size** and **Unit** can be modified live for a running determination *(see Chapter 3.6.3.7, page 129)*. Generally speaking, no formula input is possible in these fields.

**Note**

The name of the method variables assigned in the **START** command are displayed automatically for the sample data variables **ID1 … ID16, 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 120)*.

| | |
|---|---|
| Input | **100 characters** |

### 3.6.3.7 Live modifications

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.

| | |
|---|---|
| Range | **1 ... 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 120)*.

| | |
|---|---|
| Input | **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.

**Note**

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** subwindow as **Data entry** and **Data source**.

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **16 characters** |
| Selection | **g** \| **mg** \| **µg** \| **mL** \| **µL** \| **pieces** |
| Default value | **g** |

**Note**

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 1218)*.

### 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 3.6.3.9.4, page 135)*, then the method defined in the sample assignment table will be loaded *(see Chapter 3.4, page 118)*.

### 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 410)*.
- **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 394)*.
- **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.

**Note**

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. Conditioning 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 Single determination - Properties

#### 3.6.3.9.1 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**.

### 3.6.3.9.2 Properties - Display

Dialog window: **Workplace** ▸ **Run** ▸ **Single determination** ▸ **Properties Run window** ▸ **Properties - Single determination**

Definition of the operating elements and columns that are to be displayed on the tab **Single determination**..

#### Operating elements

**[Hold]/[Cont]**

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

Enable/disable the display of the operating 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

**Note**

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.

### 3.6.3.9.3 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**)

### 3.6.3.9.4 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 118)*, 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.

## 3.6.3.9.5 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**.

**Note**

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**.

**Note**

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 7.18.4, page 1455)*.

**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.

#### 3.6.3.10 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 1218)*.

**Reason**

Selection from the standard reasons for the category **Modifications of sample data** *(see Chapter 6.2.2.6, page 1220)* that are defined in the security settings.

| Selection | **Selection from default reasons** |
|---|---|

**Comment**

Entry of remarks about the modifications to the sample data.

| Input | **1000 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 tab **Determination series** in the subwindow **Run**. It contains the following tools and functions:

- *Operating elements*
  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 tab **Determination series**.

### 3.6.4.2 Determination series - Operating elements

Tab: **Workplace** ▸ **Run** ▸ **Determination series**

The following operating elements are located on the tab **Determination series**:

**Start series** (abbreviation: **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, then it will be green, otherwise light gray. Conditioning will be started first for methods that have conditioning, afterwards automatically the determination (Status **COND READY**).

**Stop series** (abbreviation: **Ctrl S**)

Immediate stop of the determination (or the conditioning) of a sample series that is currently running. This button is present in the status **BUSY** (determination is running), **COND READY** (condition requirement fulfilled) and **COND BUSY** (conditioning is running), i.e. when conditioning has been started.

**Interrupt run**

Interrupts the running determination of a sample series. The button is enabled (dark gray) in the status **BUSY** (determination is running), **COND READY** (condition requirement 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**

Interrupts the running 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 carried out to completion, 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**

Start of the next determination of an 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 will be displayed on the tab **Determination series**:

**Status**

| | |
|---|---|
| Selection | **READY** \| **BUSY** \| **HOLD** \| **PAUSE** \| **COND BUSY** \| **COND READY** \| **COND HOLD** \| **ERROR** |

**READY**
Ready for starting a determination or for conditioning.

**BUSY**
Determination running.

**HOLD**
Determination interrupted.

**PAUSE**
Series interrupted.

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

**COND READY**
Condition requirement fulfilled (is displayed only when no determination is running).

**COND HOLD**
Conditioning 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 **User name required** is enabled in the security settings, then the abbreviation of the currently registered user will be displayed in this field *(see Chapter 6.2.2.2, page 1213)*. 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**).

| | |
|---|---|
| Input | **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 be edited by the user only when it is in the status **READY**.

| | |
|---|---|
| Range | **0 ... 99999** |
| 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 120)*.

**Note**

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 128)*.

| | |
|---|---|
| Input | **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 menu item **Reset autostart counter**.

The second field after **Autostart** shows the total number of determinations per series that are still to be carried out (Setpoint counter). It contains in its default settings 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**.

**Note**

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 menu item **Modify autostart counter**.

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **Sample table** |

### Statistics

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

This field is displayed only when a method has been loaded in the **START** command of which the option **Statistics** has been enabled. The statistics defined in the method can be enabled and disabled 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 menu item **Delete statistics**, whereby the already calculated statistics data is deleted at the same time.

The second field after **Statistics** shows the number of determinations still to be carried out for the statistics (Setpoint counter). In its default settings, 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**.

**Note**

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 sample data lines that have already been saved in the sample data 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 Edit sample data*.

The lines in the working sample table can exhibit different **background colors**:

- **Light gray background**
  Line already processed. Data in this line can no longer be modified. These lines only appear if the option **Delete processed lines** on the tab **Process** has been disabled *(see Chapter 3.3.2.4, page 112)*.
- **Dark gray background**
  Selected, already processed line.
- **Light orange background**
  Line currently running.
- **Dark orange background**
  Selected 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**
  Lines that have not yet been processed. These lines can be edited.
- **Turquoise background**
  Selected line not yet processed.

#### Loaded

Display of the sample table, the data of which has been loaded into the working sample table. If no sample table was loaded or if all lines were deleted, then this field is empty. If data for a loaded sample table are modified retroactively or expanded to include new lines, then the term **(modified)** will be added to the display of the name.

#### Toolbar

| | |
|---|---|
| **Save the sample table** | Saves sample table. |
| **PDF output** | Outputs sample table as PDF file. |

| | |
|---|---|
| **Reset sample table** | Resets lines that have been run, i.e. they can be edited again. |
| **Duplicate** | Duplicates selected line(s). The new lines are inserted underneath the selected range. |
| **Increment** | Automatically increments selected lines. |
| **Filling** | Automatically fills selected lines. |
| **Test sample table** | Check whether or not all sample data in the sample table is correct. |

## Window menus

**[Edit]** contains the following menu items:

| | |
|---|---|
| **Edit line** | Edits selected line. |
| **Insert new line** | Inserts a new empty line above the line selected. |
| **Cut lines** | Cuts selected lines and transfers them to the clipboard. |
| **Copy lines** | Copies selected lines to the clipboard. |
| **Insert lines** | Inserts lines from the clipboard above the selected line. |
| **Delete lines** | Deletes the selected lines. |
| **Increment** | Using the cursor, which takes on the form ✜, the region 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 not only with pure numbers but also with text extracts which end with a number (e.g. **ABC10→ ABC11→ ABC12**…). |
| **Filling** | Automatically fill selected lines. |
| **Duplicate** | Duplicates selected line(s). The new lines are inserted underneath the selected range. |
| **Mark lines** | Marks 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 tab **Process***(see Chapter 3.3.2.4, page 112)* 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 carried out in the method run. Such lines are crossed through with a red line. |
| **Set lines executable** | Sets the selected lines to "executable", i.e. they will be carried out in the run. |

**[Sample table]** contains the following menu items:

| | |
|---|---|
| **New** | Loads new empty sample table. |
| **Load…** | Loads saved sample table into the working sample table. |
| **Save** | Saves the current sample table under the same name. |
| **Save as…** | Saves the current sample table under a new name. |
| **Sample table test…** | Check whether or not all sample data in the working sample table is correct. |
| **Print (PDF)…** | Outputs working sample table as PDF file. |
| **Properties…** | Edits properties of the working sample table. |
| **Import data…** | Imports sample table in a file with the format ***.csv**. |
| **Export data…** | Exports sample table in a file with the format ***.csv**. |
| **Reset** | Resets lines that have been run, i.e. they can be edited again. |

### Moving lines with Drag&Drop

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

### Copying lines with Drag&Drop

The lines selected in the working sample table can be copied into an opened sample table with Drag&Drop by pressing the **Ctrl/Strg 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 120)*.

| | |
|---|---|
| Input | **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 112)*, then the method defined in the sample assignment table will be loaded *(see Chapter 3.4, page 118)*.

#### 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 410)*.
- **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 394)*.
- **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.

**Note**

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** command. 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 Working sample table

#### 3.6.4.9.1 Loading new working 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 lines will be deleted.

#### 3.6.4.9.2 Loading sample table

Dialog window: **Workplace ▸ Run ▸ Determination series ▸ [Sample table] ▸ Load as... ▸ Load sample table**

One of the globally available sample tables can be selected in this dialog window for loading as 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 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 115)*.

**Loading 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.

| Input | **50 characters** |
|---|---|

**[Load]**

Loads 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.

### 3.6.4.9.3 Editing 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.

**Note**

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.

| | |
|---|---|
| Input | **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.

**Note**

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.

**Note**

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 427)*.

### 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.

| | |
|---|---|
| Range | **1 ... 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 120)*.

| | |
|---|---|
| Input | **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.

**Note**

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**.

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **16 characters** |
| Selection | **g** \| **mg** \| **µg** \| **mL** \| **µL** \| **pieces** |
| Default value | **g** |

**Note**

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 1218)*.

### 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 in addition however also be marked automatically when the **[Enter]** is used.

**[Exit]**

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

### 3.6.4.9.4 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.

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **1** |

### 3.6.4.9.5 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.

**Note**

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;**.

### 3.6.4.9.6 Exporting sample data

**Dialog window:Workplace ▸ Tools ▸ Sample table ▸ Open... ▸ [Open] ▸ [Sample table] ▸ Export data... ▸ Save file under..**

**Dialog window:Workplace ▸ Run ▸ Determination series ▸ [Sample table] ▸ Export data... ▸ Save file as..**

In this dialog window, you determine the file into which the sample data is to be exported.

**File name**

Input or selection of the file into which the export is to be made.

| | |
|---|---|
| Selection | **File name** |

### File type

Prescribed format ***.csv**.

| | |
|---|---|
| Selection | **[*.csv]** |
| Default value | **[*.csv]** |

### [Save]

The sample data will be written to the export file.

## 3.6.4.9.7 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.

**Note**

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 122)*, 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.

### 3.6.4.9.8 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 115)*.

**Saving sample table**

**Name**

Name under which the sample table is to be saved.

**Note**

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

| Input | **50 characters** |
|---|---|

**[Save]**

Save the sample table under the desired name.

### 3.6.4.9.9 Run test

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

**Note**

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.

#### 3.6.4.9.10 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.

### 3.6.4.10 Determination series - Properties

#### 3.6.4.10.1 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 the dialog window **Edit line**.

- *Process*
  Options for processing the working sample table on the tab **Determination series**.
- *Data import*
  Enabling/disabling the import of external data for working sample table fields.
- *Comment*
  Entry of comment on the working sample table.

### 3.6.4.10.2 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 operating elements and columns that are to be displayed in the sample table.

#### Operating elements

**Note**

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 operating buttons **[Pause]** or **[Cont]**.

**[Hold]/[Cont]**

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

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

#### Determination parameters

**Note**

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

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **50 characters** |
| Default value | **Unit** |

### 3.6.4.10.3 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** \| **Sample size unit** \| **Sample position** |
| Default value | **Sample size** |

**Lock editing in working sample table**

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

If this option is enabled, 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 enabled, 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 enabled, 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 enabled, 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 enabled, 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 unit**

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

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

#### 3.6.4.10.4 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 enabled, 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 enabled, then the selected sample identification will be used for the method selection in the working sample table. 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 118)*, 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.

**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.

### 3.6.4.10.5 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**

Enabling/disabling the import of external data for sample table fields.

**Note**

The successful conclusion of the data import during the run will be signaled by an acoustic signal (beep).

**Importing from balance**

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

If this option is enabled, 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**.

**Note**

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 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.

**Importing from barcode reader**

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

If this option is enabled, 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 7.18.4, page 1455)*.

**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 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 file**

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

If this option is enabled, 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.

**Note**

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**

**Import file**

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

| Input | **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.

### 3.6.4.10.6 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**

Entering a comment on the sample table.

**Comment on sample table**

Entering 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**.

| Input | **1000 characters** |
|---|---|

### 3.6.4.11 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 1218)*.

**Reason**

Selection from the standard reasons for the category **Modifications of sample data** *(see Chapter 6.2.2.6, page 1220)* that are defined in the security settings.

| Selection | **Selection from default reasons** |
|---|---|

**Comment**

Entry of remarks about the modifications to the sample data.

| Input | **1000 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 %**<br>Zoom in the view to 200%. |
| Selection | **150 %**<br>Zoom in the view to 150%. |
| Selection | **100 %**<br>Set view to 100%. |
| Selection | **75 %**<br>Zoom out the view to 75%. |
| Selection | **50 %**<br>Zoom out the view to 50%. |
| Selection | **25 %**<br>Zoom out the view to 25%. |
| Selection | **Fit to width**<br>Adjust to width of the window. |
| Selection | **Fit to height**<br>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…**.

**Note**

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 enabled 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*
  Shows messages generated during a determination.

### 3.8.2 Live display - Tracks

Subwindow: **Workplace ▸ Live display**

In the subwindow **Live window** 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 stopping 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: Abort** \| **Run: Stop by error** |
|---|---|

**Run: regular without remarks**
The determination was finished automatically after it was processed regularly and without any remarks.

**Run: regular with remarks**
The determination was finished automatically after it was processed regularly but with remarks *(see Chapter 4.6.6, page 346)*.

**Run: Abort**
The determination or the conditioning was 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 173)*. |

### 3.8.3 Live display - Application note

Subwindow: **Workplace ▸ Live display**

On the tab **Application note** the application note of the method loaded and which is defined in the **START** command 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 occuring 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 sequence 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

Select 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** \| **KFT** \| **KFC / BRC** \| **STAT** \| **MEAS** \| **MEAS T/Flow** \| **MEAS TC Cond** \| **MEAS Opt** \| **DOS** \| **TET** |
| Default value | **DET** |

#### Measured value display

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

If this option is enabled the measured values required are displayed in the subwindow **Live display**.

### Measured value 1…3

Select the measured values for the measured value display. The measured quantities and the default value depend on the **Command type** selected.

*DET*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*MET*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*SET*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **dV/dt** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*KFT*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **dV/dt** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*KFC / BRC*

| | |
|---|---|
| Selection | **Measured value** \| **Quantity** \| **Time** \| **drift** \| **Charge** \| **Ugen** \| **Igen** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*STAT*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **dV/dt** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*MEAS*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **dMW/dt** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*MEAS T/Flow*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Flow** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*MEAS TC Cond*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **dMW/dt** \| **Calculated 1…3** \| **External 1…3** \| **off** |

*MEAS Opt*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Intensity** \| **Transmission** \| **Saturated pixels** \| **off** |

*DOS*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Temperature** \| **Volume** \| **dV/dt** \| **Calculated 1...3** \| **External 1...3** \| **off** |

*TET*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Volume** \| **Calculated 1...3** \| **External 1...3** \| **off** |

### Curve display

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

If this option is enabled 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** \| **Calculated 1…3** \| **External 1…3** |
| Default value | **Temperature** |

*MEAS Opt*

| | |
|---|---|
| Selection | **Time** \| **Measured value** \| **Intensity** \| **Transmission** \| **Saturated pixels** |
| 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 | **Measured value** \| **Time** \| **Calculated 1…3** \| **External 1…3** |
| Default value | **Measured value** |

*MEAS Opt*

| | |
|---|---|
| Selection | **Measured value** \| **Time** \| **Intensity** \| **Transmission** \| **Saturated pixels** |
| 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** \| **dMW/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 | **off** \| **Measured value** \| **Time** \| **Calculated 1…3** \| **External 1…3** |
| Default value | **off** |

*MEAS Opt*

| | |
|---|---|
| Selection | **off** \| **Measured value** \| **Time** \| **Intensity** \| **Transmission** \| **Saturated pixels** |
| 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 enabled, then in addition to the curve the single measured values are shown as crosses.

**Note**

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.

**Display grid**

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

If this option is enabled, 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 93)*. 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.

| | |
|---|---|
| Range | **1 ... 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 disk 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 195)*.

### 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 layout, load view, save view, modify properties in the subwindows.
- *Determinations*
  Search, filter, sign, delete determinations; overlay curves, calibration curves, reprocess, 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 database *(see Chapter 4.2.1, page 194)*. |
| **Close all** | Close all open databases *(see Chapter 4.2.6, page 197)*. |
| **Exit** | Close database *(see Chapter 4.2.6, page 197)*. |
| **Database manager...** | Manage determination databases *(see Chapter 4.3.1, page 197)*. |
| **Print ▸** | |
| **Determination overview...** | PDF file output of the determination overview *(see Chapter 4.5.2.11, page 326)*. |

| | |
|---|---|
| **Report...** | PDF file output of the report *(see Chapter 4.5.2.12, page 327)*. |
| **Logout...** | Logout user *(see Chapter 2.2.3, page 18)*. |
| **Exit** | End program. |
| **1 'file name'** | Open the selected database *(see Chapter 4.2.1, page 194)*. 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 determination overview. |
| **Change layout...** | Modify layout of loaded database view *(see Chapter 3.1.7.2, page 93)*. |
| **Load view...** | Load a saved database view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view...** | Save the loaded database view *(see Chapter 3.1.7.4, page 94)*. |
| **Split vertically** | Split database window vertically and display two databases side by side *(see Chapter 4.2.4, page 196)*. |
| **Split horizontally** | Split database window horizontally and display two databases, one above the other *(see Chapter 4.2.5, page 196)*. |
| **Unsplit** | Undo the splitting of the database window *(see Chapter 4.2.3, page 196)*. |
| **Properties ▸** | |
| **Column display** | Define column display for the **Determination overview** table *(see Chapter 4.5.1.3, page 284)*. |
| **Properties Curves 1...5** | Set properties for the subwindow **Curves 1...5** *(see Chapter 4.8.4.1, page 364)*. |
| **Properties Results** | Set properties for the subwindow **Results** *(see Chapter 4.7, page 347)*. |

| | |
|---|---|
| **Toolbar** | Switches toolbar display on/off. |

### 4.1.3.5 Database - Menu Determinations

Program part: **Database**

| | |
|---|---|
| **Comment...** | Enter comment on the selected determination *(see Chapter 4.5.2.2, page 289)*. |
| **Search** | Open the window **Search** for searching for determinations *(see Chapter 4.5.2.3, page 289)*. |
| **Filter ▸** | |
| **Last filter** | Use last quick or special filter again *(see Chapter 4.5.2.4.2, page 292)*. |
| **Quick filter** | Use quick filter with the content of the selected table cell *(see Chapter 4.5.2.4.3, page 293)*. |
| **Special filter...** | Open the window **Special filter** for the definition of user-specific filters *(see Chapter 4.5.2.4.4, page 293)*. |
| **All statistics records** | Display all related statistics data sets of the focused determination *(see Chapter 4.5.2.4.5, page 294)*. |
| **Remove filter** | Removes current filter *(see Chapter 4.5.2.4.6, page 294)*. |
| **Sign ▸** | |
| **Signature 1...** | Sign selected determinations on level 1 *(see Chapter 2.3.3, page 21)*. |
| **Signature 2...** | Sign selected determinations on level 2 *(see Chapter 2.3.4, page 22)*. |
| **Show signatures...** | Show all signatures for the focused determination *(see Chapter 4.5.2.5.4, page 301)*. |
| **Delete signatures 2...** | Delete signatures at level 2 of the focused determination *(see Chapter 2.3.5, page 24)*. |
| **Send to...** | Send selected determinations per E-mail *(see Chapter 4.5.2.7, page 324)*. |
| **Export...** | Export selected determinations *(see Chapter 4.5.2.8, page 324)*. |
| **Import...** | Import selected determinations *(see Chapter 4.5.2.9, page 325)*. |
| **Show method...** | Show the method used for the focused determination *(see Chapter 4.5.2.13, page 328)*. |

| | |
|---|---|
| **Show history** | Show all versions of the focused determination in the determination overview *(see Chapter 4.5.2.14, page 329)*. |
| **Make current** | Make the old version selected in the history view the current version again *(see Chapter 4.5.2.15, page 329)*. |
| **Display calibration curve...** | Display the calibration or standard addition curve for the focused determination *(see Chapter 4.5.2.16, page 329)*. |
| **Control chart...** | Display control chart and statistical evaluation of the selected determination *(see Chapter 4.5.2.17, page 330)*. |
| **Overlay curves...** | Overlay curves of the selected determinations *(see Chapter 4.5.2.18, page 331)*. |
| **Reprocess...** | Reprocess selected determinations *(see Chapter 4.5.2.6.1, page 303)*. |
| **Delete** | Delete selected determinations *(see Chapter 4.5.2.10, page 325)*. |

### 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 207)*. |
| **Tabular report** | Open then window **Report template** with an empty tabular report *(see Chapter 4.4.1.3, page 207)*. |
| **Open...** | Open report template to edit *(see Chapter 4.4.1.3, page 207)*. |
| **Manager...** | Manage report templates *(see Chapter 4.4.1.1.1, page 205)*. |
| **Templates ▸** | |
| **Control chart templates...** | Manage templates for control charts *(see Chapter 4.4.2, page 240)*. |
| **Curve overlay templates...** | Manage curve overlay templates *(see Chapter 4.4.3.1, page 244)*. |
| **Export templates...** | Manage export templates *(see Chapter 4.4.4.1, page 250)*. |

### 4.1.3.7 Help Menu

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

| | |
|---|---|
| **tiamo Help** | Open tiamo Help. |
| **About** | Displays information about the program and the installation. |

## 4.1.4 Database - Toolbar

Program part: **Database**

| | |
|---|---|
| **Open...** | Open database *(see Chapter 4.2.1, page 194)*. |
| **Exit** | Close database *(see Chapter 4.2.6, page 197)*. |
| **Database manager...** | Manage determination databases *(see Chapter 4.3.1, page 197)*. |
| **Logout...** | Logout user *(see Chapter 2.2.3, page 18)*. |
| **Copy** | Copy the selected lines in the determination overview to the clipboard. |
| **Update** | Update determination overview. |
| **Change layout...** | Modify layout of loaded database view *(see Chapter 3.1.7.2, page 93)*. |
| **Load view...** | Load a saved database view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view...** | Save the loaded database view *(see Chapter 3.1.7.4, page 94)*. |
| **Split vertically** | Split database window vertically and display two databases side by side *(see Chapter 4.2.4, page 196)*. |
| **Split horizontally** | Split database window horizontally and display two databases, one above the other *(see Chapter 4.2.5, page 196)*. |
| **Unsplit** | Undo the splitting of the database window *(see Chapter 4.2.3, page 196)*. |
| **Comment** | Enter comment on the selected determination *(see Chapter 4.5.2.2, page 289)*. |
| **Search** | Open the window **Search** for searching for determinations *(see Chapter 4.5.2.3, page 289)*. |
| **Filter/Last filter** | Use last quick or special filter again *(see Chapter 4.5.2.4.2, page 292)*. |

| | |
|---|---|
| **Filter/Quick filter** | Use quick filter with the content of the selected table cell *(see Chapter 4.5.2.4.3, page 293)*. |
| **Filter/Special filter…** | Open the window **Special filter** for the definition of user-specific filters *(see Chapter 4.5.2.4.4, page 293)*. |
| **Filter/All statistics records** | Display all related statistics data sets of the focused determination *(see Chapter 4.5.2.4.5, page 294)*. |
| **Filter/Remove filter** | Removes current filter *(see Chapter 4.5.2.4.6, page 294)*. |
| **Sign/Signature 1…** | Sign selected determinations on level 1 *(see Chapter 2.3.3, page 21)*. |
| **Sign/Signature 2…** | Sign selected determinations on level 2 *(see Chapter 2.3.4, page 22)*. |
| **Show method…** | Show the method used for the focused determination *(see Chapter 4.5.2.13, page 328)*. |
| **Show history** | Show all versions of the focused determination in the determination overview *(see Chapter 4.5.2.14, page 329)*. |
| **Make current** | Make the old version selected in the history view the current version again *(see Chapter 4.5.2.15, page 329)*. |
| **Display calibration curve…** | Display the calibration curve for the focused determination *(see Chapter 4.5.2.16, page 329)*. |
| **Control chart…** | Display control chart and statistical evaluation of the selected determination *(see Chapter 4.5.2.17, page 330)*. |
| **Overlay curves…** | Overlay curves of the selected determinations *(see Chapter 4.5.2.18, page 331)*. |
| **Reprocess…** | Reprocess selected determinations *(see Chapter 4.5.2.6.1, page 303)*. |
| **Delete** | Delete selected determinations *(see Chapter 4.5.2.10, page 325)*. |
| **Report templates/ Open…** | Open report template to edit *(see Chapter 4.4.1.3, page 207)*. |
| **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 focused determination.
- *Result*
  Display of results for focused determination.
- *Curves 1...5*
  Display of curves for 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 database view*
- *Save database view*
- *Rename database view*
- *Delete database view*

### Database manager

- *Create new database*
- *Rename database*
- *Edit database properties*
- *Save database*
- *Restore database*
- *Delete database*

#### Determinations

- *Overview of functions*

#### Templates

- *Edit report template*
- *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*
  Defines the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.
- *Load view*
  Load view saved.
- *Rename view*
  Rename view saved.
- *Delete view*
  Delete view saved.

#### Automatic save

If in the programm part Configuration under **Tools ▸ Options** on the **Save** tab, the respective point under **Save on closing** is enabled, then the current view of the program will be saved automatically.

#### 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**

With the symbol or the menu item **View ▸ Change Layout...** the dialog window **Change layout** is opened.

**Select layout**

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

| Selection | **Selection of the possible combinations** |
|---|---|

**Available subwindows**

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

| Selection | **Subwindow selection** |
|---|---|

**Displayed subwindows**

Displays the subwindows that are shown in the view.

| Selection | **Subwindow** |
|---|---|

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 Load view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Load view… ▸ Load view**

With the symbol or the menu item **View ▸ Load view…** the dialog window **Load view** is opened.

**Name**

Name of the view that should be loaded.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Load]**

Load the selected view.

### 4.1.7.4 Save view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Save view… ▸ Save view**

With the symbol or the menu item **View ▸ Save view…** the dialog window **Save view** is opened.

**Name**

Name under which the view is to be saved.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Save]**

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

#### 4.1.7.5 Rename view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Rename view… ▸ Rename view**

To be able to rename a view, either open the dialog window **Load View** or **Save View** and press the **[Rename]** button. The **Rename View** window is opened.

**Rename view to**

Enter a new name for the view.

| Input | **50 characters** |
|---|---|

#### 4.1.7.6 Delete view

Function: **Workplace / Database / Configuration ▸ View ▸ Load/Save view… ▸ [Delete]**

To be able to delete a view, either open the dialog window **Load view** or **Save view** and press the **[Delete]** button. 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.

| Input | **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.

**Note**

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 Manage databases

### 4.3.1 Manage databases

Dialog window: **Database** ▸ **File** ▸ **Database manager…** ▸ **Database manager**

The symbol or the menu item **File** ▸ **Database manager…** is used to open the window **Database manager**, in which one user with corresponding access rights can administer databases.

#### 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.

**Last backup**

Shows the date and time of the last database backup.

**Next backup**

Shows the date and the time at which the next backup is to be carried out.

**Comment**

Shows remarks about the database.

### Window menus and functions

The menu **[Edit]** beneath the database table contains the following menu items:

| | |
|---|---|
| **New…** | Create new database *(see Chapter 4.3.2, page 198)*. |
| **Delete** | Delete the selected database *(see Chapter 4.3.4, page 199)*. |
| **Rename…** | Rename the selected database *(see Chapter 4.3.3, page 199)*. |

**[Properties]**

Opens the window **Database manager** for editing the database selected in the table *(see Chapter 4.3.5.1, page 199)*.

**[Backup]**

Opens the window **Backup the database** for backing up the database selected in the table *(see Chapter 4.3.6, page 203)*.

**[Restore:]**

Opens the window **Restoration of databases** for restoring backed-up databases *(see Chapter 4.3.7, page 204)*.

**[Exit]**

Closes the window **Database manager.**

## 4.3.2 Create new database

Dialog window: **Database ▸ File ▸ Database manager… ▸ Database manager ▸ [Edit] ▸ New… ▸ New database**

The menu item **[Edit] ▸ New…** can be used to open the window **New database**, in which a name for the new database must be entered.

**Name**

Name of the new database.

| | |
|---|---|
| Input | **50 characters** |
| Default value | **New database #** |

**Note**

The database name must be unambiguous in the whole Client/Server system.

Clicking on **[OK]** will open the window **Database properties** for editing the database properties.

### 4.3.3 Rename database

Dialog window: **Database ▸ File ▸ Database manager… ▸ Database manager ▸ [Edit] ▸ Rename… ▸ Rename database**

The menu item **[Edit] ▸ Rename…** is used to open the window **Rename database** for renaming the selected database.

**Rename database 'Name' to**

Entry of the new database name.

| Input | **50 characters** |
|---|---|

**Note**

The database name must be unambiguous in the whole Client/Server system.

### 4.3.4 Delete database

Menu item: **Database ▸ File ▸ Database manager… ▸ Database manager ▸ [Edit] ▸ Delete**

The menu item **[Edit] ▸ Delete** is used to delete the selected database.

**Note**

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*
  Access rights to the database for user groups.
- *Backup*
  Definition of backup monitoring and automatic backups.
- *Monitoring*
  Defines 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 remarks about the database.

| Input | **250 characters** |
|---|---|

**Number of records**

Shows the number of data sets in the database.

**Size**

Shows the size of the database in KB.

**Created**

Shows the date and time of the creation of the database.

**Created by**

Full name of the 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 (abbreviation) who carried out the modifications.

### 4.3.5.3 Database properties - Access rights

Tab: **Database ▸ File ▸ Database manager... ▸ Database manager ▸ [Edit] ▸ Properties - Database -'Database name' ▸ Access rights**

Access rights to the database for user groups.

**User group**

Shows the user groups defined in the user manager.

**Read**

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

Enables/disables the right 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**)

Enables/disables the right to edit the database. Records can be revised or deleted.

> **Note**
>
> If access for editing is enabled, then access rights for reading will also automatically be enabled. If access for editing is disabled, then access rights for reading will also automatically be disabled.

## 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**)

Enables/disables the backup monitoring for the selected database. If the check box **Backup monitoring** is enabled, then the field **Next backup** in the database table will be marked in **red** when the interval time elapses.

### Last backup

Shows the date and time of the last database backup.

### Next backup

Date at which the next backup must take place. The date can be selected by pressing [...] in the dialog window **Select date**.

| | |
|---|---|
| Input | **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 field **Next backup** will be automatically adjusted accordingly.

| | |
|---|---|
| Range | **1 ... 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 folder predefined in the **Program administration** for the automatic backup.

| | |
|---|---|
| Selection | **Selection of the backup directory \| Default backup directory** |
| Default value | **Default backup directory** |

**Note**

Make sure that you have read and write access rights on the selected directory.

## 4.3.5.5 Database properties - Monitoring

Tab: **Database ▸ File ▸ Database manager... ▸ Database manager ▸ [Properties] ▸ Properties - Database - 'Database name' ▸ Monitoring**

Defines database monitoring.

### Monitoring size

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

Enables/disables size monitoring for the selected database. If this check box is activated then the field **Size** in the Database table will be shown in **red** when the limit value has been exceeded. A corresponding message also appears when the database is opened.

### Maximum size

Maximum permitted database size in MB.

| | |
|---|---|
| Range | **1 ... 2147483647 MB** |
| Default value | **500 MB** |

### Monitoring number of records

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

Enables/disables the monitoring of the number of data sets for the selected database. If this check box is activated then the field **Number** in the Database table will be shown in **red** when the limit value has been exceeded. A corresponding message also appears when the database is opened.

### Maximum number

Maximum permitted number of data sets for database.

| | |
|---|---|
| Range | **1 ... 2147483647** |
| Default value | **1000** |

## 4.3.6 Backup database manually

Dialog window: **Database** ▸ **File** ▸ **Database manager...** ▸ **Database manager** ▸ **[Backup]** ▸ **Database backup**

**[Backup]** is used to open the dialog window **Backup database**:

### Backup target

### Backup directory

Selection of a folder predefined in **Program administration** for the backup.

| | |
|---|---|
| Selection | **Selection of the backup directory** \| **Default backup directory** |
| Default value | **Default backup directory** |

**Note**

Make sure that you have read and write access rights on the selected directory.

### Backup name

Selection of an existing name for the backup file or entry of a new name. If an existing backup file is selected it will be overwritten.

| | |
|---|---|
| Input | **50 characters** |
| Default value | **Backup-##** |

**Note**

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.

### [Start]

Starts manual database backup.

## 4.3.7 Restore database

Dialog window: **Database** ▸ **File** ▸ **Database manager…** ▸ **Database manager** ▸ **[Restore]** ▸ **Restoring databases**

**[Restore]** is used to open the dialog window **Restore databases**:

### Backup directory

Selection of a directory predefined in the **Program administration** that contains the backed up databases.

| | |
|---|---|
| Selection | **Selection of the backup directory** \| **Default backup directory** |
| Default value | **Default backup directory** |

### Backup name

Selection of a backup file.

| | |
|---|---|
| Selection | **Select backup files** |

### Backup date

Shows the time at which the database was backed up. If the backup file is located on a network drive, this information is not available.

### Database name

Shows the name of the database. If the backup file is located on a network drive, this information is not available.

### Number of records

Shows the number of data sets in the database. If the backup file is located on a network drive, this information is not available.

### Size

Shows the size of the database in KB.

### Save as

Name under which the database is to be restored.

| | |
|---|---|
| Input | **50 characters** |
| Default value | **New database ##** |

### [Start]

Start database recovery. After the start, a progress bar appears in the window. When the backup has been completed the dialog window closes automatically.

**Note**

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered 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 206)*. |
| **Copy** | Copy the selected report template(s) *(see Chapter 4.4.1.1.3, page 206)*. |

| | |
|---|---|
| **Delete...** | Delete the selected report template(s) *(see Chapter 4.4.1.1.4, page 206)*. |
| **Export...** | Export the selected report template(s) *(see Chapter 4.4.1.1.5, page 206)*. |
| **Import...** | Import report templates *(see Chapter 4.4.1.1.6, page 207)*. |

#### 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.

| | |
|---|---|
| Input | **50 characters** |

**Note**

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 Create new report template

Menu item: **Database ▸ Tools ▸ Report templates ▸ New**

#### New form report

With the menu item **Tools ▸ Report templates ▸ New ▸ Form report** the program window **Report template - New form report** opens with an empty report template, which can then be edited.

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.

#### New tabular report

With the menu item **Tools ▸ Report templates ▸ New ▸ Tabular report** the program window **Report template - New tabular report** opens with an empty report template, which can then be edited.

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.

### 4.4.1.3 Open report template

Dialog window: **Database ▸ Tools ▸ Report templates ▸ Open… ▸ Open report template**

With the symbol or the menu item **Tools ▸ Report templates ▸ Open...** the window **Open report template** opens 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. 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.

**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.

| Input | **50 characters** |
|---|---|

**[Open]**

Opens the program window **Report template**, in which the selected report template is shown and can be edited.

### 4.4.1.4 Edit report template

#### 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 221)*. |
| **Save as** | Save an opened report template under a new name *(see Chapter 4.4.1.4.2.11, page 221)*. |
| **Page setup...** | Set up the layout for the report template *(see Chapter 4.4.1.4.2.2, page 213)*. |
| **Page preview** | Set up the layout for the report template *(see Chapter 4.4.1.4.2.8, page 219)*. |
| **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 217)*. |
| **Copy** | Copy the selected items to the clipboard *(see Chapter 4.4.1.4.2.6, page 217)*. |
| **Insert** | Insert marked items from the clipboard *(see Chapter 4.4.1.4.2.6, page 217)*. |
| **Delete** | Delete the marked items *(see Chapter 4.4.1.4.2.6, page 217)*. |
| **Comment** | Enter comments on the report template *(see Chapter 4.4.1.4.2.9, page 220)*. |

### 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 216)*. |
| **Previous page** | Show the previous page of the report template *(see Chapter 4.4.1.4.2.4, page 216)*. |
| **Next page** | Show the next page of the report template *(see Chapter 4.4.1.4.2.4, page 216)*. |
| **Last page** | Shows the last page of the report template *(see Chapter 4.4.1.4.2.4, page 216)*. |

### 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 216)*. |
| **Page after** | Inserts a new page after the shown page *(see Chapter 4.4.1.4.2.4, page 216)*. |

### 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 220)*. |

### 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 221)*. |
| **Page preview** | Set up the layout for the report template *(see Chapter 4.4.1.4.2.8, page 219)*. |
| **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 217)*. |
| **Copy** | Copy the selected items to the clipboard *(see Chapter 4.4.1.4.2.6, page 217)*. |
| **Insert** | Insert marked items from the clipboard *(see Chapter 4.4.1.4.2.6, page 217)*. |
| **Delete** | Delete the marked items *(see Chapter 4.4.1.4.2.6, page 217)*. |
| 100 % | Select zoom level *(see Chapter 4.4.1.4.2.7, page 218)*. |
| **Grid** | Switch the grid display on and off *(see Chapter 4.4.1.4.2.10, page 220)*. |
| **Snap to grid** | Switch snap at grid on and off *(see Chapter 4.4.1.4.2.10, page 220)*. |

#### 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 212)*.

#### 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 217)*. |
| **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 222)*. |
| **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 223)*. |
| **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 225)*. |
| **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 227)*. |
| **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 229)*. |
| **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 230)*. |
| **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 232)*. |
| **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 233)*. |
| **Image** | If this option is enabled then **images** can be inserted in the report template *(see Chapter 4.4.1.4.3.9, page 234)*. |

| | |
|---|---|
| **Line** | If this option is enabled then **lines** can be inserted in the report template *(see Chapter 4.4.1.4.3.10, page 235)*. |
| **Rectangle** | If this option is enabled then **rectangles** can be inserted in the report template *(see Chapter 4.4.1.4.3.11, page 237)*. |
| **Curve** | If this option is enabled then **curves** can be inserted in the report template *(see Chapter 4.4.1.4.3.12, page 238)*. |
| **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 239)*. |

### 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*

**Settings**

| | |
|---|---|
| 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.

### Page format

**Page 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**

| | |
|---|---|
| Range | **0.0 ... 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**

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **15.0 mm** |

**Bottom**

Lower page margin.

| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **15.0 mm** |

**Left**

Left-hand page margin.

| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **20.0 mm** |

**Right**

Right-hand page margin.

| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **20.0 mm** |

**Layout**

**Header**

Height of header.

| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **15.0 mm** |

**Footer**

Height of footer.

| | |
|---|---|
| Range | **0.0 ... 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*

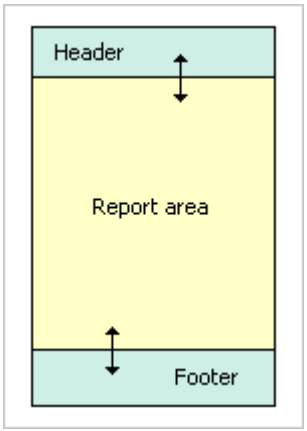
| | |
|---|---|
| Range | **0.0 ... 499.0 mm** |
| Default value | **25.0 mm** |

### 4.4.1.4.2.3 Report template - Define sections

Program window: **Database** ▸ **Report template**

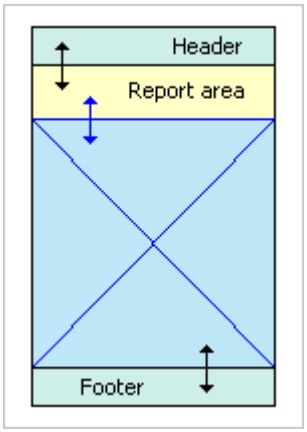
**Define sections for form report**

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 - Insert pages

Menu item: **Report template ▸ Insert ▸ Page before / Page after**

**Note**

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.

### Insert 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 - Insert 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 - Edit 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**

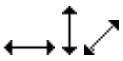
Single modules are selected with a click of the left mouse button. This automatically shows the corresponding properties of the module below the toolbar.

**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.

Delete 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.

| | |
|---|---|
| Input | **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 template** 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.

| | |
|---|---|
| Range | **1.0 ... 100.0 mm** |
| Default value | **5.0 mm** |

**Y distance**

Grid distance in Y-direction.

| | |
|---|---|
| Range | **1.0 ... 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.

**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.

| Input | **50 characters** |
|---|---|

**Note**

The name of the report template must be unambigous 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.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Y pos.**

y-position within the permitted section.

| Range | **0.0000 ... (max. page height) mm** |
|---|---|

**Width**

Width of image field.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Height**

Height of image field.

| Range | **0.0000 ... (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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of data field.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of data field.

| | |
|---|---|
| Range | **0.0000 ... (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.

| Input | **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.

| Input | **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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of date field.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of date field.

| | |
|---|---|
| Range | **0.0000 ... (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.

| | |
|---|---|
| Input | **50 characters** |

**Suffix**

Text placed after the date field contents.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| Range | **0.0000 ... (max. page height) mm** |
|---|---|

**Width**

Width of time field.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Height**

Height of time field.

| Range | **0.0000 ... (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.

| Input | **50 characters** |
|---|---|

**Suffix**

Text to be placed after the contents of the time field.

| Input | **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 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.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Y pos.**

y-position within the permitted section.

| Range | **0.0000 ... (max. page height) mm** |
|---|---|

**Width**

Width of the page number field.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Height**

Height of the page number field.

| Range | **0.0000 ... (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.

| | |
|---|---|
| Input | **50 characters** |

**Suffix**

Text placed after the page number field.

| | |
|---|---|
| Input | **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.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Y pos.**

y-position within the permitted section.

| Range | **0.0000 ... (max. page height) mm** |
|---|---|

**Width**

Width of the field.

| Range | **0.0000 ... (max. page width) mm** |
|---|---|

**Height**

Height of the field.

| Range | **0.0000 ... (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.

| | |
|---|---|
| Input | **50 characters** |

**Suffix**

Text placed after the field contents.

| | |
|---|---|
| Input | **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 producing predefined part-reports of the determination in the report.

#### Insert

In order to insert a fixed report 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

**X pos.**

Shows the predefined x-position for the fixed report.

**Y pos.**

Y position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

### Width

Shows the predefined width of the fixed report.

### Height

Height of fixed report.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

### Fixed report

Selection of a predefined fixed report.

| | |
|---|---|
| Selection | **Calculations** \| **Calibration data** \| **Curves** \| **List of meas. points** \| **Messages** \| **Method parameters** \| **Monitoring report** \| **Raw data (endpoints)** \| **Result list** \| **Signature list Determination** \| **Signature list Method** \| **Standard addition** \| **Statistics data (full)** \| **Statistics data (brief)** \| **Titration and measuring parameters** \| **Common variables used** \| **Devices used** \| **Global variables used** \| **Sample solution used (TC conductivity)** \| **Sensors used** \| **Solutions used** \| **Variables** |
| Default value | **Calculations** |

### Command name

Name of the command 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**.

| | |
|---|---|
| Input | **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.

**Note**

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.

| Range | **0.0000 ... (max. page height) mm** |
|---|---|

**Width**

Shows the predefined width of the fixed report.

**Height**

Height of the field

| Range | **0.0000 ... (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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of image field.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of image field.

| | |
|---|---|
| Range | **0.0000 ... (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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Length**

Length of the line.

| | |
|---|---|
| Range | **0.0 ... (max. page width) mm** |

**Angle**

Angle of the line.

| | |
|---|---|
| Range | **0 ... 360.000 °** |

**Thickness**

Thickness of the line.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of the rectangle.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of the rectangle.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Thickness**

Thickness of the line for the rectangle.

| | |
|---|---|
| Range | **0.1 ... 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

**Note**

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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of curve field.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of curve field.

| | |
|---|---|
| Range | **0.0000 ... (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.

**Note**

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.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Y pos.**

y-position within the permitted section.

| | |
|---|---|
| Range | **0.0000 ... (max. page height) mm** |

**Width**

Width of calibration curve field.

| | |
|---|---|
| Range | **0.0000 ... (max. page width) mm** |

**Height**

Height of calibration curve field.

| | |
|---|---|
| Range | **0.0000 ... (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 Templates for control chart

### 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 for the control chart template which is saved in the configuration database per client.

| Input | **50 characters** |
|---|---|

### Tabs

The properties of a control chart template can be set on the following 4 tabs:

- *Graphical parameters*
  Parameters for the graphical display of the control chart.
- *Limits*
  Definition of warning and intervention limits for the control chart.
- *Statistics*
  Display of statistics data on the control chart.
- *Comment*
  Enter comment on the template.

#### 4.4.2.2.2 Control chart template - Graphical 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.

**y axis**

**Result**

Selection of the result column whose value is to be shown 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.

| | |
|---|---|
| Input | **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.

### 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 always in **orange** on the control chart.

**Lower limit**

Lower warning limit.

| | |
|---|---|
| Input | **10 digits** |
| Range | **-1.0E8 ... 1.0E8 (max. 10 digits)** |

**Upper limit**

Upper warning limit.

| | |
|---|---|
| Input | **10 digits** |
| Range | **-1.0E8 ... 1.0E8 (max. 10 digits)** |

#### Intervention limits

Intervention limits are displayed in **red** on the control chart.

**Lower limit**

Lower intervention limit.

| | |
|---|---|
| Input | **10 digits** |
| Range | **-1.0E8 ... 1.0E8 (max. 10 digits)** |

**Upper limit**

Upper intervention limit.

| | |
|---|---|
| Input | **10 digits** |
| Range | **-1.0E8 ... 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 the statistics data**

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

If this check box is activated, then below the graph the statistics data for **Mean value**, **Standard deviation**, **Number of measuring points** and **Minimum and maximum values** will be shown.

**Draw in mean value**

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

If this check box activated, then the **Mean value** will be shown on the control chart as a continuous line in the color of the measured value.

**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 comment on the control chart template.

**Comment**

Comment on control chart.

| Input | **1000 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.

| Input | **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** \| **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** \| **CAL MEAS Conc** \| **CAL Cond** \| **MEAS T/Flow** \| **MEAS TC Cond** \| **MEAS Ref** \| **MEAS Spec** \| **MEAS Opt** \| **CAL Spec** \| **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.

| | |
|---|---|
| Input | **25 characters** |
| Default value | **auto** |

### Scaling

#### Start value

Initial value for scaling the x axis.

| | |
|---|---|
| Range | **-1.0 E12 ... 1.0 E12** |
| Default value | **0.0** |

#### End value

End value for scaling the x axis.

| | |
|---|---|
| Range | **-1.0 E12 ... 1.0 E12** |
| 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.

| | |
|---|---|
| Input | **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.

**Note**

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.

| | |
|---|---|
| Range | **-1.0 E12 ... 1.0 E12** |
| Default value | **0.0** |

**End value**

End value for scaling the y-axis.

| | |
|---|---|
| Range | **-1.0 E12 ... 1.0 E12** |
| 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.

| | |
|---|---|
| Input | **1000 characters** |

## 4.4.4 Export templates

### 4.4.4.1 Export templates manager

Dialog window: **Database ▸ Tools ▸ Templates ▸ Export templates... ▸ Export templates**

With the menu item **Tools ▸ Templates ▸ Export templates**, the dialog window **Export templates** opens 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 sequence 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]**

Creates a new export template. The dialog window **Export template** opens in which the properties for the new template can be defined.

**[Properties]**

The dialog window **Export template** opens, in which the properties of the template selected in the table can be edited.

**[Delete]**

Delete the selected export template.

**[Copy]**

Copies the selected export template and saves under the name **Copy of...**.

## 4.4.4.2 Edit 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 export template.

| | |
|---|---|
| Input | **50 characters** |

**Comment**

Freely definable comment on the export template.

| | |
|---|---|
| Input | **250 characters** |

**Target directory**

Entry or selection (with ...) of the path for the folder in which the export file is to be saved.

| | |
|---|---|
| Input | **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, which 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 export can be selected, arranged in the required sequence and renamed.

**Note**

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.

**Note**

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 folder 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 folder then the data will be appended to this file.

**Note**

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 - Select fields

Dialog window: **Database ▸ Tools ▸ Templates ▸ Export templates... ▸ Export templates ▸ [Properties] ▸ Export templates ▸ [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**

Shows all the fields that can be exported.

**Selected fields**

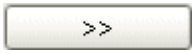
Shows all the fields that will be exported.

**Default name**

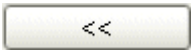
Non-editable name of the field to be exported.

**Displayed name**

Field name that can be edited 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 selected field.




Remove selected field.

Modifies the sequence of the exported fields by moving the selected field up.

Modifies the sequence of the exported fields by moving the selected field down.

#### 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 measurement 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 251)*, then before the export of a determination the dialog **File export** is displayed.

**Target directory**

Shows the target directory for the export file, which has been defined in the properties of the export templates *(see Chapter 4.4.4.2.1, page 251)* used.

**File name**

Name under which the export file is to be saved în 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 when 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" encod-
ing="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 |
| **+ <usedDevices dynamic="">** | Device data |
| **+ <usedSensors dynamic="">** | Sensor data |
| **+ <TcSampleSolutions dynamic="">** | Sample solutions (TC conductivity) |
| **+ <Method params dynamic="">** | Method parameters |
| **+ <Statistics>** | Statistical data |
| **–<System>** | System data |
| **<userName val="" />** | User name (abbreviation) |
| **<userNameFull val="" />** | User name (full name) |
| **<clientName val="" />** | Client name |
| **<progVersion val="" />** | Program version - Build number |
| **<licenseRoot val="" />** | License code |
| **</Sytem>** | |
| **</DeterminationReport>** | |

**Note**

**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:<br><br>Unambiguous and unmistakable identification for the statistically linked determinations. |
| **<determinationID val=""/>** | Determination ID:<br><br>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=""/>** | Name of the client with which the determination was recorded. |
| **<detCounter val=""/>** | **Sample number** which was 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 termination in s. |
| **<determinationEndState val=""/>** | Determination run (way in which the determination was ended):<br><br>**regular without remarks**<br><br>The determination was finished automatically after the method was processed normally and without any remarks.<br><br>**regular with remarks**<br><br>The determination was finished automatically after the method was processed normally but with remarks.<br><br>**abort**<br><br>The determination was stopped manually with **[Stop]**, by a stop criterion or with a **SEND** command.<br><br>**abort by error**<br><br>Due to an error, the determination was canceled automatically. |

| | |
|---|---|
| **<userName val=""/>** | Short name of user logged in at start of determination. |
| **<userNameFull val=""/>** | Full name of 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 user logged in when determination was reprocessed. |
| **<recalcedByuserFull val=""/>** | Full name of user logged in when determination was reprocessed. |
| **<recalcReason val=""/>** | Reason for the determination modification. |
| **<changeComment val=""/>** | User comment on the determination modification. |
| **</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:<br>Shows from where the message comes:<br>**Program**<br>Message that cannot be assigned to a particular command.<br>**Track 'Track name' - Command 'Command name'**<br>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 **JJJJ-MM-TT hh:mm:ss UTC...**). |
| **<msgTitle val=""/>** | Message title and number. |
| **</data>** | |
| **</runMessages>** | |
| **– <DetermVars dynamic="">** | Determination variables |
| **– <data>** | Determination variable |
| **<vt val=""/>** | Variable type:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**NA** = Unknown |
| **<vn val=""/>** | *Variable identification* |
| **<vr val=""/>** | Variable value. |
| **</data>** | |
| **</DetermVars>** | |
| **– <SystemVars dynamic="">** | System variables |
| **– <data>** | System variable |

| | |
|---|---|
| **<vt val=""/>** | Variable type:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**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 signed the determination. |
| **– <userNameFull>...</userNameFull>** | Full name of the user who 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 method group to which the method belonged when the determination was carried out. |

| | |
|---|---|
| **<methodID val=""/>>** | Method ID: |
| | Unambiguous and unmistakable identification for the method. |
| **<methodComment val=""/>** | Method comment (**Command comment** on **START** command). |
| **</Identification>** | |
| **– <Version>** | Information about 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 user logged in when modified method was saved. |
| **<savingUserFull val=""/>** | Full name of user logged in when modified method was saved. |
| **<changeReason val=""/>** | Reason for the method modification. |
| **<changeComment val=""/>** | User comment on the method modification. |
| **</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 signed the method. |
| **– <userNameFull>...</userNameFull>** | Full name of the user who 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:<br>**OK** = The value is ok and has not been monitored.<br>**OKL** = The value is ok and has been monitored.<br>**LE** = The value exceeded the limit and has not been monitored.<br>**LEL** = The value exceeded the limit and has been monitored..<br>**NV** = The value is invalid and has not been monitored.<br>**NVL** = The value is invalid and has been monitored. |

| | |
|---|---|
| **<vt val=""/>** | Variable type:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**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:<br>**manual** = manual data input.<br>**'Device name'** = Data input from balance or barcode reader (with Sartorius balances with their own data memory the memory number in parentheses is displayed additionally to the balance name).<br>**'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:<br>**OK** = The value is ok and has not been monitored.<br>**OKL** = The value is ok and has been monitored.<br>**LE** = The value exceeded the limit and has not been monitored.<br>**LEL** = The value exceeded the limit and has been monitored..<br>**NV** = The value is invalid and has not been monitored.<br>**NVL** = The value is invalid and has been monitored. |
| **<vt val=""/>** | Result type:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**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 exceeded the limit and has not been monitored. |
| | **LEL** = The value 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:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**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:<br>**XML_PORT_DEVICE_DOS** = Dosing/Exchange unit<br>**XML_PORT_DEVICE_REMOTE** = Remote Box<br>**XML_PORT_DEVICE_STIR** = Stirrer |
| **– <dosPortName> ... </dosPortName>** | 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 exchange/dosing unit. |
| **– <exdosOrder> ... </exdosOrder>** | Order number of exchange/dosing unit. |
| **– <exdosSerial> ... </exdosSerial>** | Serial number of the exchange / dosing unit. |
| **– <cylVol> ... </cylVol>** | Volume of buret cylinder. |
| **– <cylSerial> ... </cylSerial>** | Serial number of buret cylinder. |
| **– <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 Remote Box was connected to. |
| **– <stirrerType> ... </stirrerType>** | Type of stirrer. |
| **– <serialStirrer> ... </serialStirrer>** | Stirrer serial number. |
| **– <remotePortName> ... </remotePortName>** | Number of the MSB connector the Remote Box was connected to. |
| **– <remoteType> ... </remoteType>** | Type of Remote Box. |
| **</Port>** | |
| **</devicePorts>** | |
| **– <Sensor>** | Data on sensor. |
| **<subtype val="" />** | Type of sensor:<br>**XML_SENSOR_OTHER** = Other sensor<br>**XML_SENSOR_PH** = pH sensor<br>**XML_SENSOR_ION** = ISE sensor<br>**XML_SENSOR_METAL** = Metal sensor<br>**XML_SENSOR_TEMP** = Temperature sensor<br>**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 sensor. |
| **<sensorSerialNo val="" />** | Serial number of 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. |
| **– <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>** | |
| **– <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 valency. |
| **<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>** | Event 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:<br>**OK** = The value is ok and has not been monitored.<br>**OKL** = The value is ok and has been monitored.<br>**LE** = The value exceeded the limit and has not been monitored.<br>**LEL** = The value exceeded the limit and has been monitored..<br>**NV** = The value is invalid and has not been monitored.<br>**NVL** = The value is invalid and has been monitored. |
| **<vt val="" />** | Variable type:<br>**TX** = Text<br>**NR** = Number<br>**DT** = Date/Time<br>**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 - 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 reference spectrum. |

| | |
|---|---|
| **– <methodRecDarkRefSpec> ... </methodRecDarkRefSpec>** | Method during recording of the dark and 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. |
| **– </spectroData>** | |
| **– <devicePorts dynamic="">** | Data on the peripheral devices connected. |
| **– <Port>** | |
| **<subtype val="" />** | Type of the device connected to the port:<br>**XML_PORT_DEVICE_DOS** = Dosing/Exchange unit<br>**XML_PORT_DEVICE_REMOTE** = Remote Box<br>**XML_PORT_DEVICE_STIR** = Stirrer |
| **– <dosPortName> ... </dosPortName>** | 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 exchange/dosing unit. |
| **– <exdosOrder> ... </exdosOrder>** | Order number of 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>** | Type of stirrer. |
| **– <serialStirrer> ... </serialStirrer>** | Serial number. |
| **– <remotePortName> ... </remotePortName>** | Number of the MSB connector the Remote Box was connected to. |
| **– <remoteType> ... </remoteType>** | Type of Remote Box. |
| **</Port>** | |
| **</devicePorts>** | |
| **</Device>** | |
| **</usedDevices>** | |

#### 4.4.4.3.9 XML export - Sensor data

XML export

| | |
|---|---|
| **– <usedSensors dynamic="">** | Sensor data |
| **– <Sensor>** | Data on sensor. |
| **<subtype val="" />** | Type of sensor:<br>**XML_SENSOR_OTHER** = Other sensor<br>**XML_SENSOR_PH** = pH sensor<br>**XML_SENSOR_ION** = ISE sensor<br>**XML_SENSOR_METAL** = Metal sensor<br>**XML_SENSOR_TEMP** = Temperature sensor<br>**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 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. |
| **<sensorCalMeasInput val="" />** | Measuring input at calibration. |
| **</sensorData>** | |
| **</Sensor>** | |
| **</usedSensors>** | |

#### 4.4.4.3.10 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>**

#### 4.4.4.3.11 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. |
| **</'Parameter name'>** | |
| **</Command>** | |
| **</MethodParams >** | |

#### 4.4.4.3.12 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 separate 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**.

**Note**

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

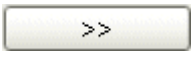
Shows all the fields that will be shown as columns in the determination table.

### 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.

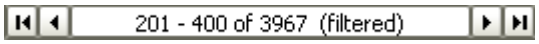
| | |
|---|---|
| Selection | **All** \| **Last** |

**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

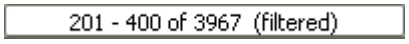
Subwindow: **Database ▸ Determination overview**




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.

**Note**

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 an existing comment can be edited.

Comments entered this way appear automatically as a Tooltip text when the cursor line 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**.

### 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*

| | |
|---|---|
| Input | **256 characters**<br>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*

| | |
|---|---|
| Input | **all possible date values**<br>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*

| | |
|---|---|
| Range | **-9999 ... 9999** |
| Default value | **0**<br>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*

| | |
|---|---|
| Input | **all possible numerical values**<br>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 Filter determinations

#### 4.5.2.4.1 Filter determinations - Overview

Subwindow: **Database ▸ Determination overview**

The following possibilities exist for filtering determinations in the Determination table:

- *Search filter selection in the filter list*
- *Quick filter*
- *Special filter*
- *Last filter*
- *Remove filter*

#### 4.5.2.4.2 Determinations - Last filter

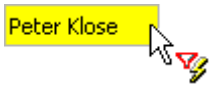
Menu item: **Database ▸ Determinations ▸ Filter ▸ Last filter**

With the menu item **Determinations ▸ Filter ▸ Last filter** or the symbol the most recently used filter will be activated.

#### 4.5.2.4.3 Determinations - Quick filter

Menu item: **Database** ▸ **Determinations** ▸ **Filter** ▸ **Quick filter**

With the menu item **Determinations** ▸ **Filter** ▸ **Quick filter** or the symbol a quick filtering for the content of the selected tabular field can be carried out. After this function has been selected the field in the determination table in which the cursor is located will be shown with a colored background during navigation. At the same time the following special filter symbol appears:




By double-clicking with the left mouse button set the content of the selected field as filter criterion and apply directly on the table.

**Note**

The quick filter can be used 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"**

With the menu item **Determinations** ▸ **Filter** ▸ **Special filter...** or the symbol the dialog window **Special filter - Database** opens for defining user-specific filters.

**Filter**

Selects the filter to be loaded for processing.

| | |
|---|---|
| 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 dialog window **Save filter** in which the filter criteria entered in the table can be saved as a special filter under the required name.

**[Delete filter]**

Deletes the special filter that is currently loaded.

### Table view

The overview table shows all the defined filter criteria and cannot be directly edited. The filter conditions will be numbered automatically in 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

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.

For the meaning of the columns, *see Edit filter criterion*.

### Functions

The menu **[Edit]** beneath the filter table contains the following menu items:

| | |
|---|---|
| **Edit line** | Open the dialog window **Edit filter criterion** 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 dialog window **Edit filter criterion** opens automatically. |
| **Cut lines** | Transfer selected lines to clipboard. |
| **Copy lines** | Copies selected lines to the clipboard. |
| **Paste lines** | Insert lines from the clipboard above the selected line. |
| **Delete lines** | Deletes the selected lines. |

### [Apply filter]

Applies filter criteria to Determination table.

## 4.5.2.4.5 Determinations - All statistics data sets

Menu item: **Database ▸ Determination ▸ Filter ▸ All statistics sets**

With the menu item **Determinations ▸ Filter ▸ All statistics data sets** or the symbol all determinations statistically linked with the selected determination are displayed.

## 4.5.2.4.6 Determinations - Delete filter

Menu item: **Database ▸ Determinations ▸ Filter ▸ Remove filter**

With the menu item **Determinations ▸ Filter ▸ Delete filter** or the symbol the most recently used filter will be deleted and all determinations will be displayed.

### 4.5.2.4.7 Determinations - Save filter

Dialog window: **Database** ▸ **Determinations** ▸ **Filter** ▸ **Special filter...** ▸ **Special filter - Database "Database name"** ▸ **[Save filter]** ▸ **Save filter**

With the button **[Save filter]** in the dialog window **Special filter - Database "Database name"** the dialog window **Save filter** opens 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.

| | |
|---|---|
| Input | **50 characters** |

**[Save]**

Saves filter under given name.

**Note**

The filters are saved globally in the configuration database and are therefore available for all clients.

### 4.5.2.4.8 Determinations - Edit filter condition

Dialog window: **Database** ▸ **Determinations** ▸ **Filter** ▸ **Special filter** ▸ **Special filter - Database "Database name"** ▸ **[Edit]** ▸ **Edit line** ▸ **Edit filter criterion 'Filter name'**

With the command **Edit** ▸ **Edit line** in the dialog window **Special filter - Database "Database name"** the dialog window **Edit filter criterion #** opens, in which the filter criterion selected in the filter table can be edited.

**Link**

Selection of the logic operator with the previous filter criterion.

| | |
|---|---|
| Selection | **AND** \| **OR** |
| Default value | **AND** |

**AND**
Logical "AND" link

**OR**
Logical "OR" link

**Field**

Selection of a data field for which a condition is to be formulated.

| | |
|---|---|
| Selection | **'Field name'**<br>Filtering is carried out only for the selected field. The 10 most recently selected fields are always available for selection. |

**[Other...]**

Open the dialog window **Filter - Field selection**. Herein all fields that can be used for filtering are listed in tree-form. A field can be adopted by marking it and then closing the dialog with **[OK]**.

### Details

Depending on the data field, further selection fields are 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. For fields with a fixed type only this type will be shown.

| | |
|---|---|
| Selection | **Text** \| **Number** \| **Date** |
| Default value | **Text** |

**Operator**

Selection of the comparison operator for the filter criterion.

*Only for fields of the type = text*

| | |
|---|---|
| Selection | **=** \| **<>** |
| Default value | **=** |

*Only for fields of the type = date*

| | |
|---|---|
| Selection | **=** \| **<>** \| **<** \| **<=** \| **>** \| **>=** \| **Today** |
| Default value | **=** |

**Today**
A search is made for the current date. In addition, a range of days can also be defined the field **Comparison value** in which, starting from the current date, the filtering is to be carried out.

*For fields of the type = number*

| | |
|---|---|
| Selection | **=** \| **<>** \| **<** \| **<=** \| **>** \| **>=** \| **empty** \| **not empty** \| **invalid** \| **out of limits** |
| Default value | **=** |

**invalid**
Filtering is carried out for values with the entry **invalid**.

**out of limits**
Values that are out of the defined limits for the selected fields will be filtered for (values shown in red).

### Comparative value

Selection or entry of the comparative value for the filter criterion. For fields where **Type** = **Date**, the date can be selected by pressing **[...]** in the dialog window **Select date**.

*Only for fields of the type = text*

| | |
|---|---|
| Input | **256 characters**<br>Definition of a text expression as comparison value. ***** can be used as a wildcard for any sequence of characters if the option **Use asterisk (*) as wildcard** is enabled. |

*Only for fields of the type = date*

| | |
|---|---|
| Input | **all possible date values**<br>Definition of a date as comparison value. |

*For fields of the type = date and operator = today.*

| | |
|---|---|
| Range | **-9999 ... 9999** |
| Default value | **0**<br>Definition of a numerical value as a range in days in which, starting from the current date, the filtering is to be carried out. |

*For fields of the type = number*

| | |
|---|---|
| Input | **all possible numerical values**<br>Definition of a numerical value as comparison value. |

### Match case

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

If this check box is activated then upper/lower case will be differentiated when filtering **Text**-type fields.

### Use asterisk (*) as wildcard

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

If this check box is activated then when filtering **Text**-type fields the asterisk ***** can be used as a wildcard for any character strings.

### 4.5.2.5 Sign determinations

#### 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**
  Signature levels for 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.
- **Sign at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.
- **Sign 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. A further comment can also be entered.
- **Saved data**
  The signature date, user name, full name, reason and comments are saved for each signature.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when compiling a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Sign 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**

or

**Dialog window:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 1... ▸ Signature Level 1**

Methods or determinations can be signed at Level 1 in the **Signature Level 1** window.

**Note**

Methods or determinations which have been signed at Level 1 can be changed and deleted. If the altered 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

Information display 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).

| Input | **24 characters** |
|---|---|

### Password

Password entry.

| Input | **24 characters** |
|---|---|

### Reason

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

| Selection | **Selection from the Default reasons** |
|---|---|

### Comment

Entry of comment on the signature.

| Input | **1000 characters** |
|---|---|

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 2... ▸ Signature Level 2**

or

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

Methods or determinations can be signed at Level 2 in the **Signature Level 2** window.

**Note**

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be edited 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).

| Input | **24 characters** |
|---|---|

**Password**

Password entry.

| Input | **24 characters** |
|---|---|

**Reason**

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

| Selection | **Selection from the Default reasons** |
|---|---|

**Comment**

Entry of comment on the signature.

| Input | **1000 characters** |
|---|---|

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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 Signature Level 2

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

or

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

The **Delete Level 2 signatures** window allows you to delete all signatures on Level 2 for the selected methods or determination.

**User**

Entry of the user name (short name).

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Delete]**

Delete Signatures 2.

**Note**

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: **Reprocess**

#### 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.

**Note**

Determinations that have a signature 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 . When the window is opened the first of the selected determinations is always shown as standard.

#### Closing the reprocessing window

The dialog window **Reprocessing** is closed with **[OK], [Cancel]** or with the Windows button for closing.

**Note**

The reprocessing window cannot be closed while recalculations are still running.

### 4.5.2.6.2 Reprocessing - Window

Dialog window: **Reprocess**

#### Subwindow

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 current results

### Functions

If determinations have been edited in the subwindow **Modifications** then the following functions can be triggered:

**[Recalc]**

Recalculate selected determination(s) with the modifications on variables, method, statistics or curve evaluation made in the subwindow **Modifications**.

During the recalculating a progress bar appears; the recalculating can be interrupted thereby by means of the next to the bar. The results of this recalculation are entered automatically in the subwindow **Result 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 when the recalculation has not yet been triggered and if not all 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.

**Note**

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: **Reprocess**

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).

**Note**

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, 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 1266)* 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 - Variables

Tab: **Database ▸ Determination overview ▸ Determinations ▸ Reprocess... ▸ Reprocessing ▸ Modifications ▸ Variables**

On the tab **Variables** the variables used in the determination can be modified.

#### Variable table

The variable table shows those variables used that are present in all the selected determinations and cannot be edited directly. With a click on the column title (columns **Variable**, **Value**) the table can be sorted according to the selected column in increasing or decreasing order.

**Variable**

Shows the name of the variable. This shows the method variables (**MV.'Name'**) defined in the START command, the common variables (**CV.'Name'**) used in calculation and other commands as well as the command variables **'Name'.TITER**, **'Name'.CONC**, **'Name'.SLO**, **'Name'.ENP** and **'Name'.BLV**.

**Value**

Display of the variable value. If a fixed value is defined for a variable, the value will be presented *in italics*.

**[Modify]**

Open the dialog window **Modify variable** to modify the value of an existing variable.

**Note**

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 modified).

### 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 394)*. 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 321)*.

**[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]**.

**Note**

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 83)*.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0 E+99 (max. 15 digits)**<br>(for **Type** = **Number**) |
| Input | **100 characters**<br>(for **Type** = **Text**) |
| Selection | **'Date'**<br>(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.

**Note**

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.

**Note**

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.*

| Range | **-1.0E12 ... 1.0E12** |
|---|---|
| Default value | **-1.0E12** |

**End value**

End value for scaling the x axis.

*Only editable when the option Autoscaling is disabled.*

| | |
|---|---|
| Range | **-1.0E12 ... 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.*

| | |
|---|---|
| Range | **-1.0E12 ... 1.0E12** |
| Default value | **-1.0E12** |

### End value

End value for scaling the y-axis.

*Only editable when the option Autoscaling is disabled.*

| | |
|---|---|
| Range | **-1.0E12 ... 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.

**Note**

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.

| | |
|---|---|
| Range | **0.01 ... 1000** |
| Default value | **0.01** |

**Smoothing factor y-axis**

Factor for smoothing on the y axis.

| | |
|---|---|
| Range | **0.01 ... 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.

**Note**

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.

| | |
|---|---|
| Range | **0.01 ... 1000** |
| Default value | **0.01** |

#### Smoothing factor y-axis

Factor for smoothing on the y axis.

| | |
|---|---|
| Range | **0.01 ... 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 view** ▸ **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.

Per **CALC** command the following elements are shown:

**Title**

Name of the calculation command.

**Result**

Result name, result value with defined number of decimal places, units.

**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 showing the results of the individual determinations:

Jump to first determination.

Jump to previous determination.

Jump to next determination.

Jump to last determination.

**Note**

If a result value is 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 view** ▸ **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 showing the results of the individual determinations:

Jump to first determination.

Jump to previous determination.

Jump to next determination.

Jump to 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.

| | |
|---|---|
| Input | **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 menu item**Determinations ▸ Export...** 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**

With the menu item **Determinations** ▸ **Import...** the dialog window **Import determination** opens, in which the determinations to be imported must be selected. These determinations are then imported into the open Database.

**Note**

Exported determinations can only be imported in the file format ***.mdet**.

**Note**

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.

**Note**

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**.

**Note**

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.

**Note**

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.

**Note**

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 - Show 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 calibration selected in the dialog window **Calibration curve/Calibration data**.

#### Calibration curve for CAL LOOP pH

In the dialog window **Calibration curve/Calibration data** 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 5.6.5.4, page 1021)*. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Listed below are the individual measured values and the results for **Slope**, **E(0)** and **Variance**.

#### Calibration curve for CAL LOOP Conc

In the dialog window **Calibration curve/Calibration data** 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 1040)*. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated

from these measured values. Listed below are the individual measured values and the results for **Slope**, **E(0)**, **c(blank)** and **Variance**. Calibration curve for CAL LOOP Conc

### Standard addition curve for STDADD

In the dialog window **Calibration curve/Calibration data** a tab marked with the command name showing the standard addition curve and evaluation data will be displayed for each **STDADD** command *(see Chapter 5.6.4.15.1, page 994)*. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Listed below are the individual measured values and the results for **Determination, Show calibration curve...**, **E(0)**, **Determination, Show calibration curve...** and **Variance**.

### Calibration data for CAL Cond

In the dialog window **Calibration curve/Calibration data** a tab marked with the command name showing the calibration data will be displayed for each **CAL Cond** command *(see Chapter 5.6.5.8.1, page 1048)*. Displayed are the command type, the measured values and the cell constant calculated with these measured values.

**Note**

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 239)*.

## 4.5.2.17 Determinations - Control chart

Dialog window: **Database** ▸ **Determinations** ▸ **Control chart...** ▸ **Control chart**

With the menu item **Determinations, Control chart...** or the symbol the dialog window **Control chart - 'Template name'** opens in which a control chart is shown for the selected determinations containing statistical evaluation (mean value, number of determinations, absolute and relative standard deviation) according to the loaded template.

### Template

| | |
|---|---|
| Selection | **Standard** \| **'Template name'** |
| Default value | **Standard** |

**Standard**
Selection of the saved templates for control charts *(see Chapter 4.4.2.2.1, page 241)*. When the dialog window is opened, the last template to have been loaded will be shown. If a new template is selected then the display will be updated automatically.

**[Templates]**

Open the dialog window **Templates for control charts**.

**Graphics presentation**

Shows the measured values together with warning and intervantion limits and statistical values according to the settings on the selected control chart. If the cursor is moved to a point then the number, date and value appear as a tooltip. The sorting and the date and time for the first and last point are shown as the legend.

**[Print (PDF)]**

Open dialog window **Print control chart (PDF)***(see Chapter 4.5.2.20, page 333)*. 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**

With the menu item **Determinations, Overlay curves…** or the symbol the dialog window **Overlay curves** opens 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**<br>If a new template is selected then the display will be updated automatically. |

**Note**

In the template the **Command type** is defined for which the overlaying of curves is possible. 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"**<br>This selection is only necessary if the method contains several commands of the same **Command type**. |

**[Templates]**

Open the dialog window **Curve overlay templates**.

**Graphics presentation**

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, which identifies the curves if the same command has been executed several times during a determination.

**[Print (PDF)]**

Open the dialog window **Print curves (PDF)** *(see Chapter 4.5.2.19, page 332)*. The content of the curve overlay with legend can be shown as a PDF file in the required format.

### 4.5.2.19 Print overlaid curves

Dialog window: **Database ▸ Determinations ▸ Overlay curves... ▸ Overlay curves ▸ [Print (PDF)] ▸ Print curves (PDF)**

With **[Print (PDF)]** in the dialog window **Overlay curves** the dialog window **Print curves (PDF)** is openend.

**Orientation**

| | |
|---|---|
| Selection | **Portrait** \| **Landscape** |
| Default value | **Landscape** |

**Portrait**
Produces overlaid curves in portrait format.

**Landscape**
Produces overlaid curves in landscape format.

**Comment**

Possibility of entering comments on the overlaid curves which will be produced together with the overlaid curves.

| | |
|---|---|
| Input | **1000 characters** |

**[OK]**

Close dialog window. The overlaid curves are 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.

#### 4.5.2.20 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.

| | |
|---|---|
| Input | **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 determination.
- *Method*
  Shows general information about the method used.
- *Sample*
  Shows general information about the sample used.

- *Configuration*
  Shows general information about the devices, sensors and common variables used.
- *Messages*
  Shows messages about the determination.
- *Determination comment*
  Shows the comment on the determination.

## 4.6.2 Information - Determination

Tab: **Database** ▸ **Information** ▸ **Determination**

Display of general information about 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.

**Client name:**

Computer name of the client the determination was recorded with.

**Sample number:**

Shows the **Sample number** entered in the run window.

**Start counter:**

Shows 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.

**Determination duration:**

Duration of the determination from its start to its end or termination in s.

**Determination run:**

Way in which the determination was ended:

| Selection | **Regular without messages** \| **Regular with remarks** \| **Stop** \| **Stop by error** |
|---|---|

**Regular without messages**
The determination was finished automatically after the method was processed normally and without any remarks.

**Regular with remarks**
The determination was finished automatically after the method was processed normally but with remarks.

**Stop**
The determination was stopped manually with **[Stop]**, by a stop criterion or with a **SEND** command.

**Stop by error**
Due to an error, the determination was canceled automatically.

**User (short name):**

Short name of the user.

**Note**

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings *(see Chapter 6.2.2.2, page 1213)*.

| | |
|---|---|
| **Active** | User who started the determination. |
| **Inactive** | User logged in when finishing determination. |

**User (full name):**

Full name of the user.

**Note**

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings *(see Chapter 6.2.2.2, page 1213)*.

| | |
|---|---|
| **Active** | User who started the determination. |
| **Inactive** | User logged in when finishing determination. |

**Remarks:**

Shows 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 was recorded.

**License ID**

Display of the license serial number with which the determination was 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 user logged in when determination was reprocessed. If a new version was generated automatically by reprocessing statistically linked determinations without modification of determination data, *tiamo* will be displayed here.

**Reprocessed by (full name):**

Full name of user logged in when determination was reprocessed. If a new version was 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 was 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 user who signed the determination.

**Signed by (full name):**

Full name of user who signed the determination.

**Signature reason:**

Reason for signature selected by user.

**Signature comment:**

User comments on signing the determination.

### 4.6.3 Information - Method

Tab: **Database** ▶ **Information** ▶ **Method**

Shows general information about the method used.

**Identification**

Information about the identification of the method.

**Method name:**

Name of the method.

**Method group:**

Name of method group to which the method belonged when the determination was carried out.

**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 was created with.

**Method saving date:**

Date and time when the modified method version was saved.

**Method saved by (short name):**

Short name of user logged in when modified method was saved.

**Method saved by (full name):**

Full name of user logged in when modified method was saved.

**Modification reason method:**

Reason for the method modification.

**Modification comment method:**

User comment on the method modification.

**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 signed the method.

**Signed by (full name):**

Full name of user who signed the method.

**Signature reason:**

Reason for signature selected by user.

**Signature comment:**

User comments on signing the method.

### 4.6.4 Information - Sample

Tab: **Database** ▸ **Information** ▸ **Sample**

Shows 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 for the sample size.

**Sample size unit:**

Unit of 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.

**Note**

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.

#### Identification

Information about the sample identifications.

**ID1…ID16**

Shows the sample identifications entered for the sample. The identifications will only be shown when a value is present.

**Note**

If for the sample data variables **ID1 … ID16, Sample size, Sample size unit, Sample position** a different name is defined from that given in the method variables 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 on modification of sample data.

### 4.6.5 Information - Configuration

Tab: **Database** ▸ **Information** ▸ **Configuration**

Shows 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 instrument.

**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 attached to tower.

**Swing Head serial number:**

Serial number of Swing Head attached to tower.

**Measuring input:**

Number of the measuring input (+ designation **iConnect** for intelligent sensors).

**ADC type:**

Type of analog/digital converter.

**ADC serial number:**

Serial number of measuring input.

**Temperature sensor:**

Type of connected temperature sensor.

**Stirrer:**

Stirrer connection at device.

**Stirrer type:**

Type of stirrer.

**Serial number:**

Serial number of stirrer.

**Dosing device:**

Dosing connection at device.

**Dosing device type:**

Dosing device type.

**Dosing device serial number:**

Serial number of 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 units of the solution.

**Date titer det.:**

Date of the titer determination.

**Titer method:**

Method with which the titer was determined.

**Exchange/Dosing unit:**

Type of exchange or dosing unit.

**Name:**

Designation of exchange or dosing unit.

**Order number:**

Order number of exchange or dosing unit.

**Serial number:**

Serial number of exchange or dosing unit.

**Cylinder volume:**

Cylinder volume of exchange or dosing unit.

**Cylinder serial number:**

Serial number of cylinder.

**Remote Box:**

Connection to 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 were recorded.

**Determination ID dark/reference spectrum:**

Determination in which the dark spectrum and reference spectrum were 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 was carried out.

**Determination ID calibration:**

Determination in which the wavelength calibration of the spectrometer was 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 sensor.

**Sensor serial number:**

Serial number of sensor.

**Device:**

Name of 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:**

Temperature during the calibration.

**Calibration method:**

Shows the method with which the calibration was carried out.

**User:**

Shows the user logged in during the calibration or who entered the calibration data manually.

**Measuring input**

Shows the measuring input with which the calibration was carried out.

**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 was 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 was assigned.

**Sample solution (TC conductivity) 'Name'**

Information on the sample solution used.

**Assignment date:**

Date and time of last value assignment.

**Assignment method:**

Method with which the value was assigned.

**Start temperature:**

Temperature at the start of the determination of the temperature coefficient:

**Stop temperature:**

Temperature at the stop of the determination of the temperature coefficient.

**c0:**

Coefficient of the Chebyshev polynomial of the zeroth order

**c1:**

Coefficient of the Chebyshev polynomial of the first order

**c2**

Coefficient of the Chebyshev polynomial of the second order

**c3**

Coefficient of the Chebyshev polynomial of the third order

**c4**

Coefficient of the Chebyshev polynomial of the fourth order

**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.

### 4.6.6 Information - Messages

Tab: **Database ▸ Information ▸ Messages**

Shows messages generated during the determination run.

**'Time'**

Shows 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:**

Shows the message title and number.

**Message text:**

Shows 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**

Shows the comment on the determination.

**Determination comment:**

Shows 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.

**Note**

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.

**Note**

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**

Shows the variable designation for the raw data.

**Columns 3-6**

Shows 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** |
| 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** |

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| 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 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 10 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 11 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** | | | |
| 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 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 13 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 14 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 15 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 16 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 17 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** , **"leer"** , **3** | |

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| 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 18 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** , **"leer"** , **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 19 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 20 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 21 Command MEAS U*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| EME | **EME** , **mV** , **1** | | | |
| ETE | **ETE** , **°C** , **1** | | | |

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| 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 22 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 23 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 24 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 25 Command MEAS T/Flow*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| EME | **EME** , **°C** , **1** | | | |
| EGF | **EGF**, **mL/min**, **1** | | | |

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| MI | **MI.MEA** , **°C** , **1** | **MI.GFL** , **mL/min** , **1** | **MI.TIM** , **s** , **1** | |
| MA | **MA.MEA** , **°C** , **3**MA.MEA, °C, 3 | **MA.GFL** , **mL/min** , **1** | **MA.TIM**, **s**, **1** | |

*Table 26 Command MEAS Conc*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| EME | **EME** , **"gewählte Einheit"** , **3** | | | |
| ETE | **ETE** , **°C** , **1** | | | |

*Table 27 Command MEAS Cond*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| EME | **EME** , **mS/cm** , **2** | | | |
| RTE | **RTE** , **°C** , **1** | | | |
| ETE | **ETE** , **°C** , **1** | | | |
| FP# | **FP#.MEA** , **mS/cm** , **2** | **FP#.TIM** , **s** , **1** | **FP#.TEM** , **°C** , **1** | |
| MI | **MI.MEA** , **mS/cm** , **2** | **MI.TIM** , **s** , **1** | **MI.TEM** , **°C** , **1** | |
| MA | **MA.MEA** , **mS/cm** , **2** | **MA.TIM**, **s**, **1** | **MA.TEM** , **°C** , **1** | |
| BP# | **BP#.MEA** , **mS/cm** , **2** | **BP#.TIM** , **s** , **1** | **BP#.TEM** , **°C** , **1** | |

*Table 28 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 29 Command MEAS Ref*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| PK# | **PK#.WVL**, **nm**, **1** | **PK#.MEA**, **mAU**, **1** | | |

*Table 30 Command MEAS Spec*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| PK# | **PK#.WVL**, **nm**, **1** | **PK#.MEA**, **mAU**, **1** | | |

*Table 31 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 32 Command CAL LOOP pH*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| SLO | **SLO** , **%** , **1** | | | |
| ENP | **ENP** , **–** , **3** | | | |

*Table 33 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 34 Befehl CAL Cond*

| Column 2: Variable | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|
| CLC | **CLC** , **/cm** , **3** | | | |
| RTE | **RTE** , **°C** , **1** | | | |

*Table 35 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** | |
| WL | **WL.C0** , **–** , **4** | | | |
| | **WL.C1** , **–** , **4** | | | |
| | **WL.C2** , **–** , **4**WL.C2, –, 4 | | | |
| | **WL.C3** , **–** , **4** | | | |
| | **WL.C4** , **–** , **4** | | | |

*Table 36 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** , **"leer"** , **3** | | | |

*Table 37 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** , **"leer"** , **3** | |

*Table 38 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** , **"leer"** , **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.

**Note**

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.

**Note**

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.

**Note**

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

Dialog window: **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 execution of a measuring command; their sequence is determined by the method.

### Show 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**.

**Note**

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**.

### Show 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 exceeded.

**¯Meas.v.**
Upper limit value for measured value monitoring exceeded.

**_Dos.r.**
Lower limit value for dosing rate monitoring exceeded.

**¯Dos.r.**
Upper limit value for dosing rate monitoring exceeded.

**_Temp.**
Lower limit value for temperature monitoring exceeded.

**¯Temp.**
Upper limit value for temperature monitoring exceeded.

*****
Dosing stopped.

### 4.8.2 Curves - Measuring point list

Dialog window: **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

Dialog window: **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 is inside limits again.

**[pH]/[U]**

Measured value limit.

**Meas.v. [pH]/Meas.val. [U]**

Measured value at limit violation time.

**Volume [mL]**

Dosing volume at limit violation time.

**Temp. [°C]**

Temperature at limit violation time.

**Action**

| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
|---|---|

**Stop determination**
The running **STAT** command was quit, then the determination was stopped.

**Stop command (only Titrando)**
The running **STAT** command was quit, then the next command was started.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command was interrupted until it was continued by a manual command.

**Wait for limit ok**
Reagent dosing in the current **STAT** command was interrupted until the monitored measured value was again within the limits (including hysteresis). Afterwards reagent dosing was resumed automatically.

**none**
No action was taken.

## 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 5 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 graphical display of curves.
- *Measuring point list*
  Parameters for showing the measuring point list.

### 4.8.4.2 Curve properties - x axis

Dialog window: **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 Opt** \| **MEAS Spec** \| **CAL Spec** \| **KFT** \| **KFC** \| **BRC** \| **STAT** \| **DOS** \| **TET** |
| Default value | **DET** |

**Note**

When the dialog window is opened, those **Command type** will be selected as standard 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.

**Size**

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]** |

*Für TET-Befehle*

| | |
|---|---|
| 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 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** |
| 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 disabled.*

| | |
|---|---|
| Range | **-1.00E+12 ... +1.00E+12** |
| Default value | **-1.00E+12** |

**End value**

End value for scaling the x axis.

*Only editable when autoscaling is disabled.*

| | |
|---|---|
| Range | **-1.00E+12 ... +1.00E+12** |
| Default value | **+1.00E+12** |

### 4.8.4.3 Curve properties - y1 axis

Dialog window: **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 Opt** \| **MEAS Spec** \| **CAL Spec** \| **KFT** \| **KFC** \| **BRC** \| **STAT** \| **DOS** \| **TET** |
| Default value | **DET** |

**Note**

When the dialog window is opened, those **Command type** will be selected as standard 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.

**Size**

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]** |

*Für TET-Befehle*

| | |
|---|---|
| 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 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** |
| 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 disabled.*

| | |
|---|---|
| Range | **-1.00E+12 ... +1.00E+12** |
| Default value | **-1.00E+12** |

### End value

End value for scaling the y1 axis.

*Only editable when autoscaling is disabled.*

| | |
|---|---|
| Range | **-1.00E+12 ... +1.00E+12** |
| Default value | **+1.00E+12** |

## 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 | ● \| ✕ \| ✷ \| ■ \| ▲ \| **No symbol** |
| Default value | **No symbol** |

**No symbol**
Measuring points are not shown.

**Note**

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.

| | |
|---|---|
| Range | **0.01 ... 1000** |
| Default value | **0.01** |

### Smoothing factor y-axis

Factor for smoothing on the y axis.

| | |
|---|---|
| Range | **0.01 ... 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

Dialog window: **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 Opt** \| **MEAS Spec** \| **CAL Spec** \| **KFT** \| **KFC** \| **BRC** \| **STAT** \| **DOS** \| **TET** |
| Default value | **DET** |

**Note**

When the dialog window is opened, those **Command type** will be selected as standard 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.

### Size

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** |

*Für TET-Befehle*

| | |
|---|---|
| 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 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** \| **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 the color for the curve line.

| | |
|---|---|
| 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.

**Note**

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.

*Not editable for MEAS Ref and MEAS Spec commands*

| | |
|---|---|
| Selection | **13 colors** \| **pink** |
| Default value | **pink** |

### Smoothing

#### Smoothing

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

Enables/disables the smoothing for curves.

#### Smoothing factor x axis

Factor for smoothing on the x axis.

| | |
|---|---|
| Range | **0.01 ... 1000** |
| Default value | **0.01** |

### Smoothing factor y-axis

Factor for smoothing on the y axis.

| | |
|---|---|
| Range | **0.01 ... 1000** |
| Default value | **0.01** |

## 4.8.4.5 Curve properties - Options

Dialog window: **Database** ▸ **Curves** ▸ **Properties curves #** ▸ **Options**

Options for 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 Opt** \| **MEAS Spec** \| **CAL Spec** \| **KFT** \| **KFC** \| **BRC** \| **STAT** \| **DOS** \| **TET** |
| Default value | **DET** |

**Note**

When the dialog window is opened, those **Command type** will be selected as standard 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.

### 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 | **Line types** \| **dotted** |
| Default value | **dotted** |

### 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** |

## 4.8.4.6 Curve properties - Measuring point list

Dialog window: **Database** ▸ **Curves** ▸ **Properties curves #** ▸ **Options**

Parameters for showing 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 Opt** \| **MEAS Spec** \| **CAL Spec** \| **KFT** \| **KFC** \| **BRC** \| **STAT** \| **DOS** \| **TET** |
| Default value | **DET** |

**Note**

When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

### Autoscaling

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

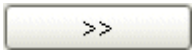
If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

### Available columns

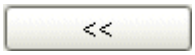
Shows all fields that can be displayed as columns in the measuring point list.

### Displayed columns

Shows all fields that will be shown 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

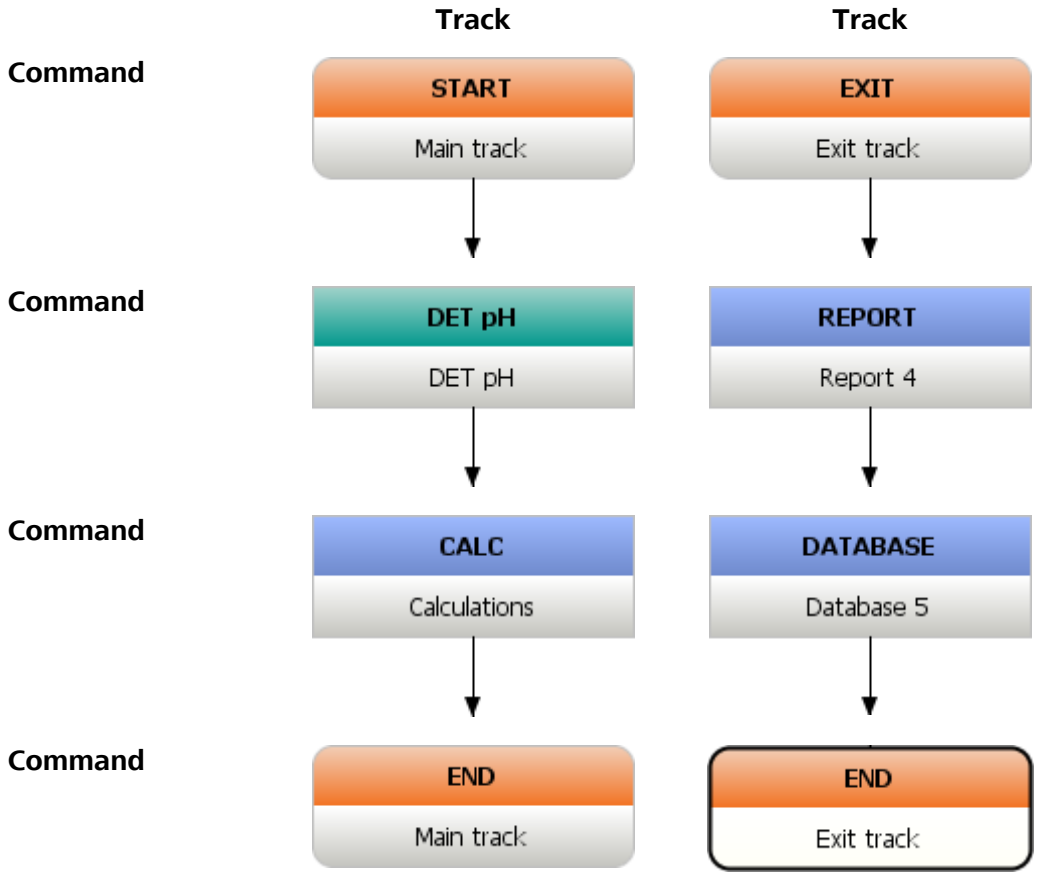
Program part: **Method**

#### 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 387)*.

### 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 toolbar on and off.
- *Insert*
  Command, track.
- *Help*
  Open MagIC Net 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 385)*. |
| **Open...** | Opens an existing method *(see Chapter 5.2.2, page 385)*. |
| **Save** | Save the selected method *(see Chapter 5.2.6, page 394)*. |
| **Save as...** | Save the selected method under a new name *(see Chapter 5.2.6, page 394)*. |
| **Close all** | Close all opened methods *(see Chapter 5.2.9, page 397)*. |
| **Exit** | Close the selected method *(see Chapter 5.2.9, page 397)*. |
| **Method check** | Check the selected method for plausibility *(see Chapter 5.2.5, page 394)*. |
| **Method manager...** | Opens the method manager *(see Chapter 5.3.1, page 398)* |
| **Method groups...** | Opens the method groups manager *(see Chapter 5.4.1, page 409)*. |
| **Print (PDF)...** | PDF file output of the method report *(see Chapter 5.2.8, page 397)*. |
| **Logout...** | Logs out the user. The dialog window **Login** opens *(see Chapter 2.2.3, page 18)*. |
| **Exit** | End program. |
| **1 'Method name'** | Opens the selected method |

### 5.1.3.3 Method - Menu Edit

Program part: **Method**

| | |
|---|---|
| **Properties...** | Opens the properties window of the command selected in the method *(see Chapter 5.2.4.2.8, page 393)*. |
| **Undo:** | Undoes the last modification of the method. |
| **Restore:** | Restores the last undone modification of the method. |
| **Cut** | Cuts selected elements (commands, tracks) and copy them to the clipboard. |
| **Copy** | Copies selected elements (commands, tracks) to the clipboard. |

| | |
|---|---|
| **Insert** | Inserts the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track. |
| **Delete** | Deletes selected elements (commands, tracks). |
| **Comment...** | Newly enter or edit a comment on the selected command.*(see Chapter 5.2.4.2.9, page 393)*. |

### 5.1.3.4 Method - Menu View

Program part: **Method**

| | |
|---|---|
| **Split vertically** | Splits method window vertically and display two methods side by side *(see Chapter 5.2.3.2, page 388)*. |
| **Split horizontally** | Splits method window horizontally and display two methods below each other *(see Chapter 5.2.3.3, page 388)*. |
| **Unsplit** | Undoes the splitting of the method window *(see Chapter 5.2.3.1, page 388)*. |
| **Toolbar** | Switches toolbar display on/off. |

### 5.1.3.5 Method - Menu Insert

Program part: **Method**

| | |
|---|---|
| **New command...** | Inserts a new command above the selected command *(see Chapter 5.2.4.2.1, page 391)*. |
| **New track...** | Inserts a new track on the right hand side of the selected track *(see Chapter 5.2.4.1.1, page 389)*. |

### 5.1.3.6 Help Menu

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

| | |
|---|---|
| **tiamo Help** | Open tiamo Help. |
| **About** | Displays 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 385)*. |
| **Open...** | Opens an existing method *(see Chapter 5.2.2, page 385)*. |

| | |
|---|---|
| **Save** | Save the selected method *(see Chapter 5.2.6, page 394)*. |
| **Exit** | Close the selected method *(see Chapter 5.2.9, page 397)*. |
| **Method manager...** | Opens the method manager *(see Chapter 5.3.1, page 398)* |
| **Method groups...** | Opens the method groups manager *(see Chapter 5.4.1, page 409)*. |
| **Print (PDF)...** | PDF file output of the method report *(see Chapter 5.2.8, page 397)*. |
| **Method check** | Check the selected method for plausibility *(see Chapter 5.2.5, page 394)*. |
| **Properties...** | Opens the properties window of the command selected in the method *(see Chapter 5.2.4.2.8, page 393)*. |
| **Undo:** | Undoes the last modification of the method. |
| **Restore:** | Restores the last undone modification of the method. |
| **Cut** | Cuts selected elements (commands, tracks) and copy them to the clipboard. |
| **Copy** | Copies selected elements (commands, tracks) to the clipboard. |
| **Insert** | Inserts the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track. |
| **Delete** | Deletes selected elements (commands, tracks). |
| **Comment...** | Newly enter or edit a comment on the selected command.*(see Chapter 5.2.4.2.9, page 393)*. |
| **New command...** | Inserts a new command above the selected command *(see Chapter 5.2.4.2.1, page 391)*. |
| **New track...** | Inserts a new track on the right hand side of the selected track *(see Chapter 5.2.4.1.1, page 389)*. |
| 100 % **Zoom method** | Select zoom level *(see Chapter 5.2.3.4, page 388)*. |
| **Manual Control** | Manual control of the connected devices *(see Chapter 8.1, page 1458)*. |
| **Split vertically** | Splits method window vertically and display two methods side by side *(see Chapter 5.2.3.2, page 388)*. |

| | |
|---|---|
| **Split horizontally** | Splits method window horizontally and display two methods below each other *(see Chapter 5.2.3.3, page 388)*. |
| **Unsplit** | Undoes the splitting of the method window *(see Chapter 5.2.3.1, page 388)*. |
| **Logout...** | Logout user *(see Chapter 2.2.3, page 18)*. |
| **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 new method*
- *Opening method*
- *Select method*
- *Edit tracks*
- *Checking method*
- *Saving method*
- *Closing method*

### Managing methods

- *Managing methods*
- *Renaming method*
- *Copying method*
- *Moving method*
- *Deleting method*
- *Exporting a method*
- *Importing method*
- *Signing methods*
- *Showing method history*

### Managing method groups

- *Managing methods*
- *Edit method groups*

# 5.2 Method editor

## 5.2.1 Creating new method

Menu item: **Method ▸ File ▸ New...**

With the symbol or with the menu item **File ▸ New...** the window **New method** is opened in which a method template can be selected for the new method.

**Templates**

| | |
|---|---|
| Selection | **Method templates** \| **Blank method** |
| Default value | **Blank method** |

**Method templates**
Selecting a method template as a basis for creating a new method.

**Blank method**
A template, containing only the commands **START** and **END**, is loaded.

**Description**

Description of the selected method template.

**[OK]**

Opens the selected method to edit.

## 5.2.2 Opening method

Menu item: **Method ▸ File ▸ Open...**

With the symbol or the menu item **File ▸ Open** the window **Open method** is opened. One of the globally available methods can be selected and opened.

**Method group**

**Method group**

Selection of the Method group whose methods will be displayed in the method table *(see Chapter 5.4.1, page 409)*.

| | |
|---|---|
| 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. 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 saved the method.

**Version**

Version number of the method.

**Signed**

Display if 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 also deleted.

**Level 1**
The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited 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 edited nor deleted.

**Method comment**

Comment on the method entered as *(see Chapter 5.2.4.2.9, page 393)* in the command **START**.

### Opening the 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.

| Input | **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 symbol.

**Note**

A maximum of 9 methods can be opened but only two can be displayed at the same time *(see Chapter 5.2.3.1, page 388)*.

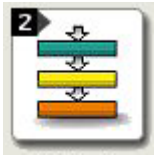
## 5.2.3 Select method

Program part: **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 388)* or *(see Chapter 5.2.3.3, page 388)* 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 *(see Chapter 5.2.3.2, page 388)* or *(see Chapter 5.2.3.3, page 388)*.

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 %**<br>Zooms in the view to 200%. |
| Selection | **150 %**<br>Zooms in the view to 150%. |
| Selection | **100 %**<br>Adjusts view to 100%. |
| Selection | **75 %**<br>Zooms out of the view to 75%. |
| Selection | **50 %**<br>Zooms out of the view to 50%. |
| Selection | **25 %**<br>Zooms out of the view to 25%. |
| Selection | **Fit to width**<br>Adjust to width of the window. |
| Selection | **To height**<br>Adjust to height of the window. |

| | |
|---|---|
| Selection | **Fit to window**<br>Adjust to both height and width of the window. |

## 5.2.4 Edit method

### 5.2.4.1 Edit tracks

Program part: **Method**

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*

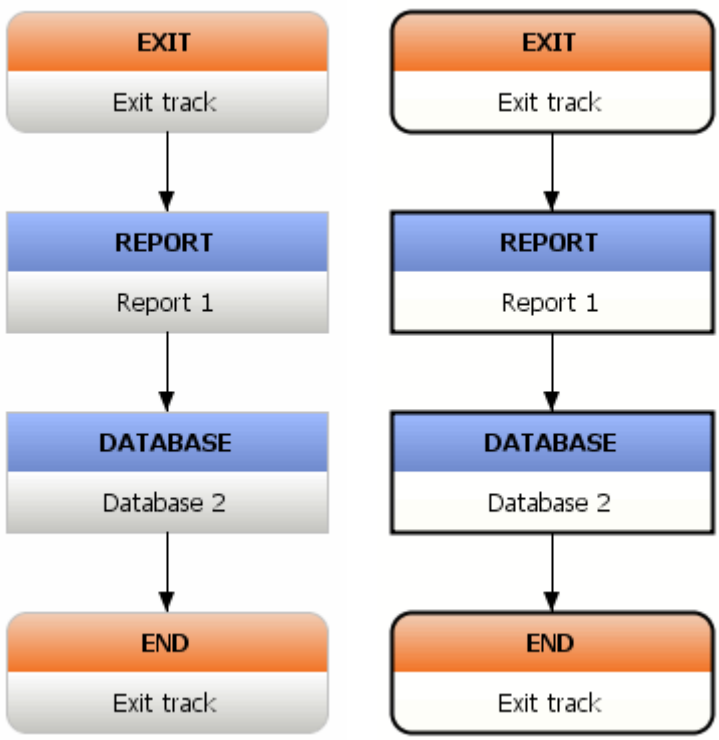
The new track is inserted to the right of the selected track after confirming the selection with **[OK]**.

#### 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 Edit commands

Subwindow: **Method**

The following processing functions for commands are available for a method currently opened in the main window:

#### 5.2.4.2.1 Insert 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*
- **Measure**
  *MEAS*, *STDADD*
- **Calibration**
  *CAL LOOP pH*, *CAL MEAS pH*, *CAL LOOP Conc*, *CAL MEAS Conc*, *CAL Cond*, *CAL Spec*
- **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 Select command

Subwindow: **Method**

A command is 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 Move command

Subwindow: **Method**

##### Move 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.

##### Move 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 Copy command

Subwindow: **Method**

##### Copy 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.

##### Copy 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 Cut 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 Insert 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 Delete 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.

**Note**

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**

Enter a 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 method

Menu item: **Method ▸ File ▸ Method check**

With the symbol or menu item **File ▸ Method check** 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 defined in calculation 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 message is displayed for each error found. The method 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 method

Menu item: **Method ▸ File ▸ Save / Save as…**

With the symbol or the menu item **File ▸ Save** an existing focused method is saved again under its name without the window **Save method** being opened.

When saving a **newly** created method with **File ▸ Save** or when saving an existing method with **File ▸ Save as…** the dialog window **Save method** 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 409)*.

| | |
|---|---|
| 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. 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 saved the method.

**Version**

Version number of the method.

**Signed**

Display if 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 also deleted.

**Level 1**
The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited 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 edited nor deleted.

**Method comment**

Comment on the method entered as *(see Chapter 5.2.4.2.9, page 393)* in the command **START**.

### Saving method

**Method name**

Name under which the Method is to be saved.

| Input | **50 characters** |
|---|---|

**Note**

The method name must be unique in the whole Client/Server system.

**[Save]**

Save the selected 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 394)*. 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 for devices etc. which are not yet configured in the system can be created. 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 identification is created each time a modified method is saved *(see Chapter 5.3.11, page 408)*. If the option **Comment on modification of methods** is activated in the **Security settings ▶ Audit Trail ▶ Changes** in the program part **Configuration** *(see Chapter 6.2.2.4, page 1218)*, then the window **Modification comment method** *(see Chapter 5.2.7, page 396)* is displayed before the method is saved.

## 5.2.7 Modification comment on method

Menu item: **Method ▶ File ▶ Save / Save as...**

If the option **Comment on modification of methods** is activated in the **Security settings ▶ Audit Trail ▶ Modifications** in the program part **Configuration** *(see Chapter 6.2.2.4, page 1218)* when saving a modified method or when deleting methods, the dialog window **Modification comment method** 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 1220)*.

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of a comment for modifying the method.

| | |
|---|---|
| Input | **1000 characters** |

## 5.2.8 Print method report

Menu item: **Method ▸ File ▸ Print (PDF)…**

With menu item **File ▸ Print (PDF)…** or the symbol 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 method

Menu item: **Method ▸ File ▸ Close / Close all**

### Closing single method

The focused method is closed with the symbol or the menu item **File ▸ Close**. If the method has been modified, there will be a prompt asking whether or not to save the method as a new version.

### Closing all methods

All the opened methods are closed with the menu item **File ▸ Close all**. A prompt asking whether or not 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 409)*.

### 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 saved the method.

**Version**

Version number of the method.

### Signed

Display if 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 also deleted.

**Level 1**
The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited 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 edited nor deleted.

### Method comment

Comment on the method entered as *(see Chapter 5.2.4.2.9, page 393)* in the command **START**.

### Window menus

The menu **[Edit]** below the method table contains the following menu items:

| | |
|---|---|
| **Rename…** | Renames selected method *(see Chapter 5.3.2, page 400)*. |
| **Copy** | Copies selected method(s) in the same method group *(see Chapter 5.3.3, page 400)*. |
| **Move…** | Moves selected method(s) to a different method group *(see Chapter 5.3.4, page 400)*. |
| **Delete…** | Deletes selected method(s) *(see Chapter 5.3.5, page 401)*. |
| **Send to…** | Exports the selected method(s) and attaches it(them) to an E-mail *(see Chapter 5.3.6, page 401)*. |
| **Export…** | Exports selected method(s) *(see Chapter 5.3.7, page 402)*. |
| **Import…** | Imports selected method(s) *(see Chapter 5.3.8, page 402)*. |

The menu **[Sign]** below the method table contains the following menu items:

| | |
|---|---|
| **Signature 1…** | Sign selected method on level 1 *(see Chapter 2.3.3, page 21)*. |
| **Signature 2…** | Sign selected method on level 2 *(see Chapter 2.3.4, page 22)*. |

| | |
|---|---|
| **Show signatures...** | Show all signatures of the selected method *(see Chapter 5.3.10.4, page 406)*. |
| **Delete signatures 2...** | Delete all signatures at level 2 of the selected method *(see Chapter 2.3.5, page 24)*. |

**[History]**

Opens the dialog window **Method history** of the selected method *(see Chapter 5.3.11, page 408)*.

**[Exit]**

Closes the dialog window and saves entries.

## 5.3.2 Renaming method

Dialog window: **Method ▸ File ▸ Manage method... ▸ Method manager ▸ [Edit] ▸ Rename... ▸ Rename method**

The dialog window **Rename method** for renaming the selected method is opened with the menu item **Edit ▸ Rename...**.

**Rename method 'Method name' after**

entering the new method name.

| | |
|---|---|
| Input | **50 characters** |

**Note**

The method name must be unique in the whole 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 method

Menu item: **Method ▸ File ▸ Manage method... ▸ Method manager ▸ [Edit] ▸ Copy**

With 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 method

Dialog window: **Method ▸ File ▸ Manage method... ▸ Method manager ▸ [Edit] ▸ Move... ▸ Move method(s)**

The selected methods are moved to the desired method group with the menu item **Edit ▸ Move...**. 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** |
|---|---|

**Note**

Locked methods (methods signed at **Level 2**) cannot be moved.

## 5.3.5 Deleting method

Menu item: **Method ▸ File ▸ Method manager... ▸ Method manager ▸ [Edit] ▸ Delete**

The selected methods and all method versions are deleted with the menu item **[Edit] ▸ Delete...**.

If the option **Comment on modification of methods** is activated in the **Security settings** *(see Chapter 6.2.2.4, page 1218)*, then the dialog window **Modification comment method** *(see Chapter 5.2.7, page 396)* is displayed when methods are deleted.

**Note**

Locked methods (methods signed at **Level 2**) cannot be deleted.

## 5.3.6 Sending method to

Menu item: **Method ▸ File ▸ Method manager... ▸ Method manager ▸ [Edit] ▸ Send to...**

The selected methods are each exported as a file with the name **'Method name'.mmet** with the menu item **Edit ▸ Send to...**.

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.

**Note**

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

## 5.3.7 Exporting a method

Menu item: **Method ▸ File ▸ Method manager... ▸ Method manager ▸ [Edit] ▸ Export...**

The selected methods can each be exported as a file named **'Method name'.mmet** with the menu item **Edit ▸ Export...**. The window **Select directory for export** opens in which the directory for export must be selected.

**Note**

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

## 5.3.8 Importing 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 groups 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 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' after**

entering the new method name.

| | |
|---|---|
| Input | **50 characters** |

**Note**

The method name must be unique in the whole 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**
  Signature levels for 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.
- **Sign at Level 1**
  If Level 2 has been signed then no more signatures are possible at Level 1.
- **Sign 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. A further comment can also be entered.
- **Saved data**
  The signature date, user name, full name, reason and comments are saved for each signature.
- **Deleting signatures 1**
  Signatures at Level 1 are automatically deleted again when compiling a new version.
- **Deleting signatures 2**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Sign 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**

or

**Dialog window:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 1... ▸ Signature Level 1**

Methods or determinations can be signed at Level 1 in the **Signature Level 1** window.

**Note**

Methods or determinations which have been signed at Level 1 can be changed and deleted. If the altered 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**

Information display 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).

| Input | **24 characters** |
|---|---|

**Password**

Password entry.

| Input | **24 characters** |
|---|---|

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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:Method ▸ File ▸ Method Manager... ▸ Method Manager ▸ [Sign] ▸ Signature 2... ▸ Signature Level 2**

or

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

Methods or determinations can be signed at Level 2 in the **Signature Level 2** window.

**Note**

Methods or determinations signed at level 2 are **locked**, i.e. they can neither be edited 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).

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Sign]**

Sign method or determination. The window remains open.

**Note**

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 Signature Level 2

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

or

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

The **Delete Level 2 signatures** window allows you to delete all signatures on Level 2 for the selected methods or determination.

**User**

Entry of the user name (short name).

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password entry.

| | |
|---|---|
| Input | **24 characters** |

**Reason**

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

| | |
|---|---|
| Selection | **Selection from the Default reasons** |

**Comment**

Entry of comment on the signature.

| | |
|---|---|
| Input | **1000 characters** |

**[Delete]**

Delete Signatures 2.

**Note**

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

### 5.3.11 Showing 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 button **History**.

**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 saved the method.

**Modification reason**

Reason entered when saving the modified method.

**Modification comment**

Comment entered when saving the modified method.

**[Show method]**

Opens the dialog window **Method 'Method name' - Version #** in which the method for the selected method version is displayed.

**[Make current]**

Restores the selected method version as 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 410)*.

**[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 410)*.

**[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.

| Input | **50 characters** |
|---|---|

**Number**

Number of methods in the method group.

**Comment**

Freely definable remarks about the user group.

| Input | **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.

**Note**

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

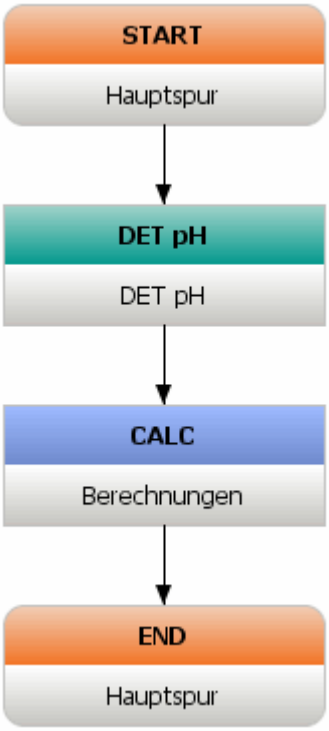
Subwindow: **Method**

### Definition

A **track** is a partial sequence of a **method** comprised of **commands**. In addition to the **main track** that is present in each method, there are also **normal tracks** which are generated by the user and called up with a **CALL** command and **special tracks** (series start track, series end track, exit track and error track), which cannot be called up but which are started automatically with certain events.

### Structure

Each track contains a **START** or **TRACK** command respectively and an **END** command, between which as many commands can be inserted as needed.




**Presentation**

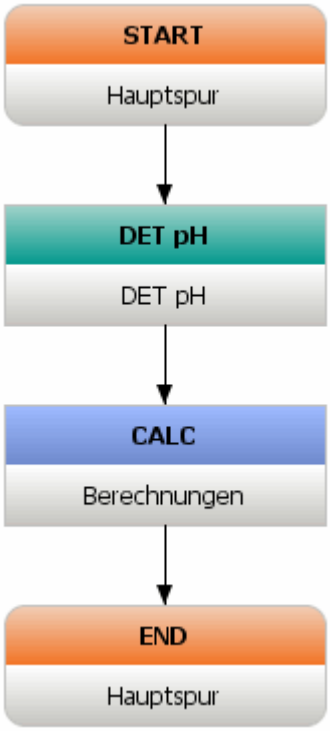
The individual tracks are arranged side by side in the method window. The track name is displayed in the **START** or **TRACK** command, respectively, as well as in the **END** command.

## 5.5.2 Track types

### 5.5.2.1 Main track

Subwindow: **Method**

The **main track** contains the main sequence of the method and exists in each method. It starts with a *(see Chapter 5.6.2.2, page 422)* and finishes with an *(see Chapter 5.6.2.8, page 436)*. The method variables required are defined in the **START** command. The **END** command indicates the end of the method run. The main track can neither be deleted nor moved.




### 5.5.2.2 Normal track

Subwindow: **Method**

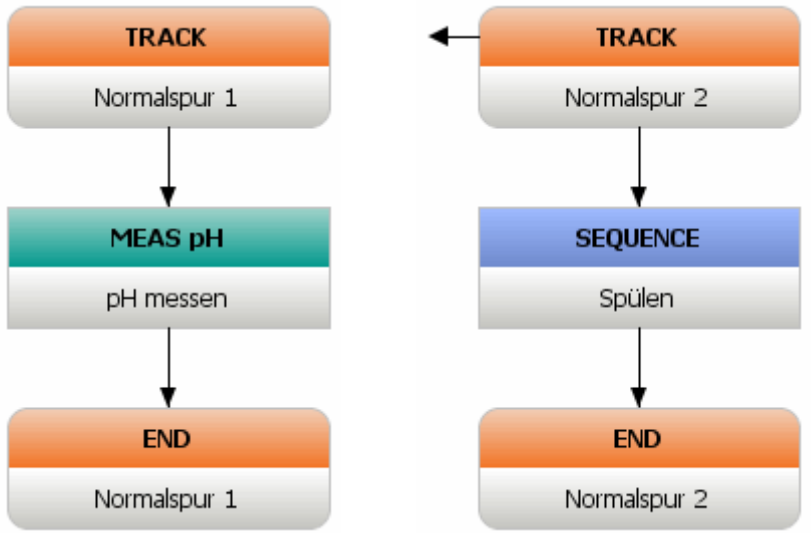
A **normal track** is a track that can be created manually by the user with **Paste** ▸ **New track...** ▸ **Normal track** or with the icon. It starts with a start command *(see Chapter 5.6.2.3, page 432)* and finishes with an end command *(see Chapter 5.6.2.8, page 436)*.

Normal tracks can be called up with the command **CALL** and entering the corresponding name. Branching and parallel processes can be implemented this way. A distinction is made between the following two cases when calling up normal tracks:

- **Sequential running normal track**
  If the **Return immediately** check box in the *(see Chapter 5.6.2.3, page 432)* command is deactivated, then all of the commands of this track will be executed in sequence. Afterwards, the track sends an acknowledgement to the *(see Chapter 5.6.10.3, page 1183)* command that did the calling up, and the run is continued there.

- **Parallel running normal track**
  If the check box **Return immediately** in the *(see Chapter 5.6.2.3, page 432)* command is activated, then the corresponding command will be be highlighted with an arrow (see below). The execution of the commands in the normal track is started when this track is called, but it sends an acknowledgement immediately to the track containing the corresponding *(see Chapter 5.6.10.3, page 1183)* command. This means the execution of the calling track will also be continued, i.e. the two tracks will be executed simultaneously.

**Sequential running normal track** **Parallel running normal track**

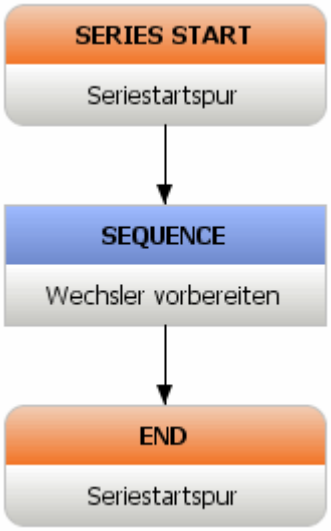



### 5.5.2.3 Series start track

Subwindow: **Method**

A **series start track** is a track that the user can create manually with **Paste ▸ New track... ▸ Series start track** or with the icon . It starts with the start command *(see Chapter 5.6.2.4, page 433)* and finishes with an end command *(see Chapter 5.6.2.8, page 436)*. Only one series start track can be inserted per method.

The series start track is executed only once during the run: at the beginning of the first determination of a series and even before the *(see Chapter 5.5.2.1, page 412)*. Sample Processors can, for example, be initialized with it at the beginning of a determination series.

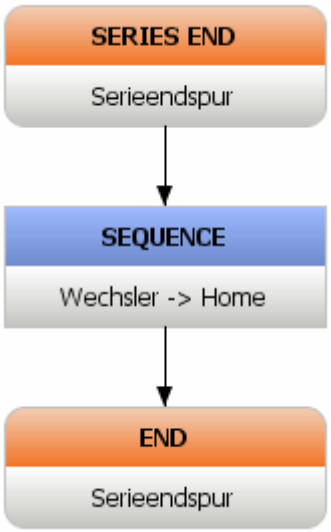



### 5.5.2.4 Series end track

Subwindow: **Method**

A **series end track** is a track that can be created manually with **Paste** ▸ **New track...** ▸ **Series end track** or with the icon . It starts with a start command *(see Chapter 5.6.2.5, page 434)* and finishes with an end command *(see Chapter 5.6.2.8, page 436)*. Only one series end track can be inserted per method.

The series end track is executed only once during the run: at the end of the last determination of a series after the *(see Chapter 5.5.2.1, page 412)*. It can be used, for example, at the end of a series to put Sample Processors in the desired condition.

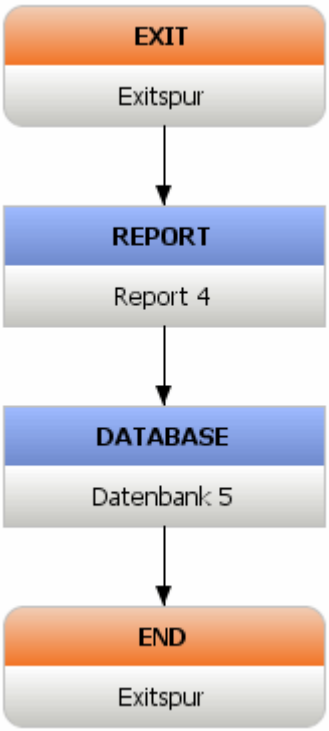


### 5.5.2.5 Exit track

Subwindow: **Method**

An **exit track** is a track that can be created manually with **Paste ▸ New track... ▸ Exit track** or with the icon . It starts with the start command *(see Chapter 5.6.2.6, page 435)* and finishes with a end command *(see Chapter 5.6.2.8, page 436)*. Only one exit track can be inserted per method.

The exit track is executed as soon as all **normal tracks** and the **main track** have finished or if the determination has been stopped manually. If a new **exit track** is created, then a *(see Chapter 5.6.8.4, page 1155)* command and a *(see Chapter 5.6.8.3, page 1153)* and a REPORT command will be automatically inserted into this track. With these commands it can be guaranteed that a database entry and a report are created for each determination, even if the determination has been stopped either manually or due to an error.

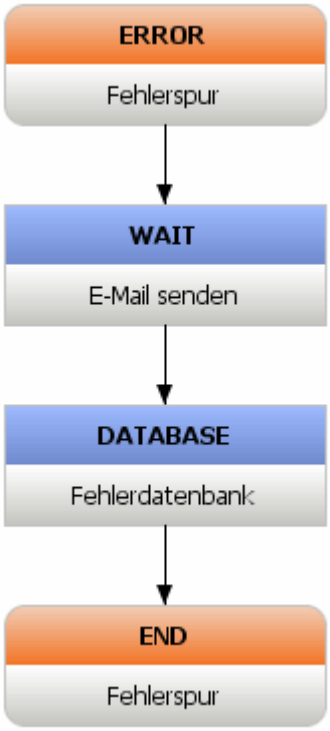



### 5.5.2.6 Error track

Subwindow: **Method**

An **error track** is a track that can be created manually with **Paste ▸ New track... ▸ Error track** or with the icon . It begins with a start command *(see Chapter 5.5.2.6, page 416)* and finishes with an end command *(see Chapter 5.6.2.8, page 436)*. Only one error track can be inserted per method.

The error track is executed if the determination is stopped due to an error. In this case the error track takes over the function of the Main track. Normal tracks can be called from error tracks as well.




### 5.5.3 Edit tracks

Subwindow: **Method**

The following 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 design-qtion 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 unique within the method.

**Note**

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 new command*
- *Select command*
- *Move command*
- *Copy command*
- *Cut command*
- *Insert command*
- *Delete 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 MEAS pH*
  Measuring command for calibrating pH electrodes.
- *CAL MEAS Conc*
  Measuring command for calibrating ion-selective electrodes (ISE 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.
- *EMPTY*
  Emptying a dosing unit.
- *END*
  End command for all tracks.
- *ERROR*
  Start command for error track.
- *EXIT*
  Start command for 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*
  Command to release a device for using it in other parallel running methods.
- *RLS DOS*
  Command to release 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 series end track.
- *SERIES START*
  Start command for series start track.
- *SEQUENCE*
  Combines several commands to one command.
- *SET*
  Set Endpoint Titrations.
- *START*
  Start command for 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 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 different tracks:

- *START*
  Start command for *(see Chapter 5.5.2.1, page 412)*.
- *TRACK*
  Start command for *(see Chapter 5.5.2.2, page 413)*.
- *SERIES START*
  Start command for *(see Chapter 5.5.2.3, page 414)*.
- *SERIES END*
  Start command for *(see Chapter 5.5.2.4, page 415)*.
- *EXIT*
  Start command for *(see Chapter 5.5.2.5, page 416)*.
- *ERROR*
  Start command for *(see Chapter 5.5.2.6, page 416)*.
- *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.

| | |
|---|---|
| Input | **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'** |

**Note**

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.

**Note**

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.

| | |
|---|---|
| Range | **1 ... 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.

| Input | **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 84)*.

#### 5.6.2.2.4 START - Method variables (Table)

Tab: **Method ▸ START ▸ Properties... ▸ START 'Command name' ▸ Method variable**

**Command name**

Name of the command.

| Input | **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 427*.

**[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 427)*.

**[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 427)*.

**[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.

| | |
|---|---|
| Input | **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** |

**Note**

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* | |
|---|---|
| Range | **-1.0E-99 ... 1.0E+99** |

| *Type = Text* | |
|---|---|
| Input | **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.

**Note**

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.

| Input | **1000 characters** |
|---|---|

### Variable monitoring

**Note**

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* | |
|---|---|
| Input | **10 digits** |

| *Type = Date/Time* | |
|---|---|
| Selection | **'Date'** |

### Upper limit

Upper limit for the variable.

| *Type = Number* | |
|---|---|
| Input | **10 digits** |

| *Type = Date/Time* | |
|---|---|
| Selection | **'Date'** |

### Message

**Note**

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-clicking into the text field *(see Chapter 2.5.2, page 84)*. The formula editor can also be called up inside the text field *(see Chapter 2.4, page 25)*.

| Input | **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 430)*.

**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**

**Note**

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **200 characters** |

**Subject**

Subject to describe the message.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **200 characters** |

**Password**

Password for the access to the mail server. This password does not necessarily have to be identical to the Windows password.

| | |
|---|---|
| Input | **200 characters** |

**Mail from**

E-Mail address of the sender.

| | |
|---|---|
| Input | **200 characters** |

**SMTP server**

Address of SMTP mail server.

| | |
|---|---|
| Input | **200 characters** |

**POP3 server**

Address of POP3 mail server.

| Input | **200 characters** |
|---|---|

### 5.6.2.3 TRACK

Dialog window: **Method** ▸ **TRACK** ▸ **Properties..** ▸ **TRACK 'Command name'**

Start command for normal track.

#### Appearance

The command has the following appearance:

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

**Live display**

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

If this option is enabled, then the track will be shown 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 sends an acknowledgement 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**)

All data previously generated by a track will be deleted at each new start of this track when this option is activated.

#### Command variables

The following command variables are generated in the method run by the command **TRACK** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identifi-cation | 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 series start track.

#### Appearance

The command has the following appearance:

#### Parameters

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

**Live display**

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

If this option is enabled, then the track will be shown in the live display.

#### Command variables

The following command variables are generated in the method run by the command **SERIE START** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identifi-cation | Description |
|---|---|
| .BSY | Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not available) **=** Command has never been started |

| Identifi-cation | Description |
|---|---|
| **.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 series end track.

#### Appearance

The command has the following appearance:

#### Parameters

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

**Live display**

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

If this option is enabled, then the track will be shown in the live display.

#### Command variables

The following command variables are generated in the method run by the command **SERIES END** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identifi-cation | 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 exit track.

#### Appearance

The command has the following appearance:

#### Parameters

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

**Live display**

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

If this option is enabled, then the track will be shown in the live display.

#### Command variables

The following command variables are generated in the method run by the command **EXIT** 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 error track.

#### Appearance

The command has the following appearance:

### Parameters

#### Command name

Name of the command.

| Input | **25 characters** |
|---|---|

#### Live display

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

If this option is enabled, then the track will be shown in the live display.

### Command variables

The following command variables are generated in the method run by the command **START** 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** |

## 5.6.2.8 END

Dialog window: **Method** ▸ **END** ▸ **END -'Command name'**

End command for all tracks.

### Appearance

The command has the following appearance:

### Parameters

The **END** command does not have any parameters. It is created automatically at the end of a track when a new 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**

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.
- *(see Chapter 5.6.3.4.1, page 648)*
  Command for Set 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

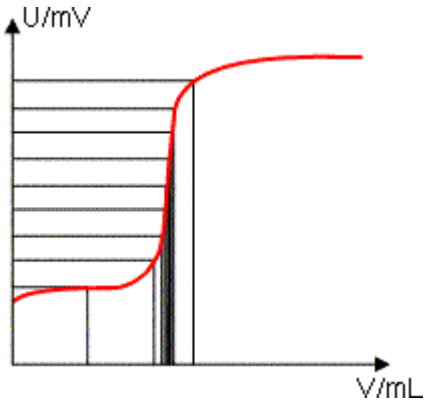
### 5.6.3.2.1 DET - Overview

Menu item: **Method ▶ Paste ▶ 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 achieve constant measured value modifications with each dosing. The optimal volume for dosing is determined from the measured value modifications of the previous dosings. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting time.

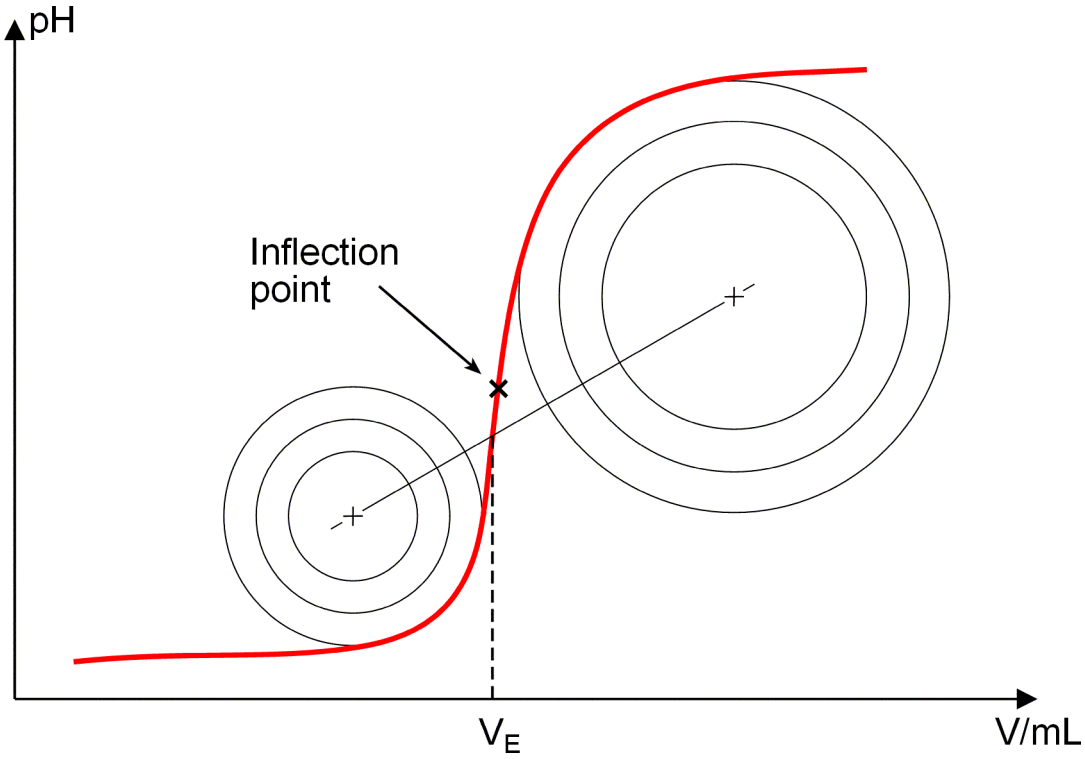



**Note**

As the reagent addition in **DET** depends on the measuring data, the titration curve should not vary too much from an S-shaped curve.

### Evaluation

Equivalence points **EP** are determined atuomatically 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 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 also requires measuring points from the measuring point list after the equivalence point as well.

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 U*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *DET Upol*
  Amperometric measurement with selectable polarization voltage (measured value 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 command **DET pH** are configured on the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 **DET pH** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identification | Description |
|---|---|
| **.BP{x}.ERC** | ERC or first derivative for the break point × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 s |

| Identification | Description |
|---|---|
| **.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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (1…9) in mL |
| **.HP{x}.MEA** | Measured value for the HNP × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 |

| Identification | Description |
|---|---|
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1…3) for the last measuring point on the measuring point list |
| **.LP.ERC** | ERC for the last measuring point in 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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the measuring point list |

| Identification | Description |
|---|---|
| **.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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 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** |
| Default value | **pH electrode** |

### 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*

| | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-20.000 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |

| | |
|---|---|
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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 measured value drift and a higher EP criterion at the same time.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **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**

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 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*

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-20.00 ... 20.00** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0.01000 ... 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*

| | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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 evaluations**

**Command name**

Name of the command.

| Input | **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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 200** |
| Default value | **5** |

**[New]**

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.2.9, page 462)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.2.9, page 462)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume 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 464)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.2.2.11, page 465)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.2.2.11, page 465)*.

**[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 875)*.

### 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 20.0 pH/mL** |
| Default value | **1.0 pH/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

#### Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |
| Default value | **-20.000 pH** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

*Window = Measured value pH*

| | |
|---|---|
| Range | **-20.0 ... 20.0 pH** |
| Default value | **20.0 pH** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

**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.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.0 mL** |

**Lower limit pH**

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **-20.000** |

**Upper limit pH**

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-20.000 ... 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.

| | |
|---|---|
| Input | **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 pre-

sented 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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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.

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **-20.000** |

### Upper limit pH

Upper limit for the measured value window.

| | |
|---|---|
| Range | **-20.000 ... 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*

| | |
|---|---|
| Range | **0 ... 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 sub-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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

#### Upper limit

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **0 ... 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 - Fix endpoint evaluation

Dialog window: **Method ▸ DET pH ▸ Properties... ▸ Additional evaluations ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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 command **DET U** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 **DET 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}.ERC** | ERC or first derivative for the break point × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (1…9) in mL |

| 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 s |
| **.EME** | End measured value (measured value after processing of the command) in the unit of the measured value |
| **.ENP** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |
| **.EP{x}.ERC** | ERC for the endpoint × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (1…9) in mL |

| Identification | Description |
|---|---|
| **.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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1…3) for the last measuring point on the measuring point list |
| **.LP.ERC** | ERC for the last measuring point in 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 in 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 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 with maximum measured value in mL |

| Identification | Description |
|---|---|
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on all three start conditions) in mL |
| **.TITER** | Titer value of the solution used for the command |

#### 5.6.3.2.3.2 DET U - General/Hardware

Tab: **Method** ▸ **DET U** ▸ **Properties...** ▸ **General/Hardware**

### Command name

Name of the command.

| Input | **25 characters** |
|---|---|

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

### 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* | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

## Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

#### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

#### 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 measured value drift and a higher EP criterion at the same time.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.1 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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* | |
|---|---|
| Range | **0.01000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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.

| | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0 ... 200** |
| Default value | **5** |

**[New]**

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.3.9, page 489)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.3.9, page 489)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.3.10, page 490)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.3.10, page 490)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.2.3.11, page 491)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.2.3.11, page 491)*.

**[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 875)*.

### 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/mL** |
| Default value | **25.0 mV/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

#### Initial volume

Volume which must be present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

#### Lower limit

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

#### Upper limit

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

#### Upper limit

Upper limit for the measured value window.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 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* | |
|---|---|
| Range | **0 ... 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 sub-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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

#### Upper limit

Upper limit for the volume window.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00000 ... 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.

| | |
|---|---|
| Range | **0 ... 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 - Fix endpoint evaluation

Dialog window: **Method ▸ DET U ▸ Properties... ▸ Additional evaluations ▸ Fix 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** |

### Fix value

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

| *Volume* | |
|---|---|
| Range | **0.00000 ... 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 voltage).

**Devices**

This command can be executed with the following devices:

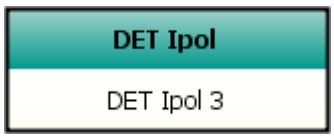
**Titrando:** 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

**Titrino:** 716, 721, 736, 751, 785, 794, 798, 799

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:




**Parameters**

The parameters for the command **DET Ipol** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 **DET Ipol** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identification | Description |
|---|---|
| **.BP{x}.ERC** | ERC or first derivative for the break point × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |

| Identification | Description |
|---|---|
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.ERC** | ERC for the last measuring point in the measuring point list |
| **.LP.EXx** | External value × (1...3) for the last measuring point of 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 of 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) in mL |
| **.SVS** | Start volume slope (volume that was added according to the start condition "start slope") in mL |

| Identification | Description |
|---|---|
| **.SVT** | Total start volume (volume that was added in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*855, 888*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 127 µA** (Increment: **1**) |
| Default value | **5 µA** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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*

| | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |

| | |
|---|---|
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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 measured value drift and a higher EP criterion at the same time.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The conditions for stopping the titration are defined on this tab. 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**

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0.01000 ... 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*

| | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 200** |
| Default value | **5** |

**[New]**

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.4.9, page 515)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.4.10, page 516)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.4.10, page 516)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.2.4.11, page 518)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.2.4.11, page 518)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/mL** |
| Default value | **25.0 mV/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Window = Volume* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

| *Window = Time* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

| *Window = Measured value* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Window = Volume* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

| *Window = Time* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

### Initial volume

Volume which must be present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

**Lower limit**

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

**Upper limit**

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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.

**[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 880)*.

**[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 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*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

**Upper limit**

Upper limit for the measured value window.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 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* | |
|---|---|
| Range | **0 ... 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 sub-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 addi-

tionally 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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

### Upper limit

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **0 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **DET Ipol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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 command **DET Upol** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 **DET Upol** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identification | Description |
|---|---|
| **.BP{x}.ERC** | ERC or first derivative for the break point × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1…3) for the last measuring point on the measuring point list |
| **.LP.ERC** | ERC for the last measuring point in 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 in the unit of the measured value of the measuring point list |
| **.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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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* | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

| *855, 888* | |
|---|---|
| Selection | **1** |
| Default value | **1** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

| *Titrando, 855* | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

| *Titrino* | |
|---|---|
| Range | **-1270 ... 1270 mV** (Increment: **10**) |
| Default value | **400 mV** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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*

| | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

#### Initial measured value

**Note**

Is displayed only 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*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **0.05 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **0.05 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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 measured value drift and a higher EP criterion at the same time.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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* | |
|---|---|
| Range | **0.1 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **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

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 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.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Selection | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0.01000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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.

| | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0 ... 200** |
| Default value | **5** |

**[New]**

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.5.9, page 542)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.5.9, page 542)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.2.5.10, page 543)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.2.5.10, page 543)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

### Fix endpoint evaluation

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.2.5.11, page 544)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.2.5.11, page 544)*.

**[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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Range | **0.5 ... 10.0 µA/mL** |
| Default value | **5.0 µA/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

##### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **200.0 µA** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

#### Initial volume

Volume which is present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

#### Lower limit

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

#### Upper limit

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

#### Upper limit

Upper limit for the measured value window.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Range | **0 ... 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 sub-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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

#### Upper limit

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **0 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **DET Upol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation #** ▸ **[New]/[Property]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |

### 5.6.3.3 MET

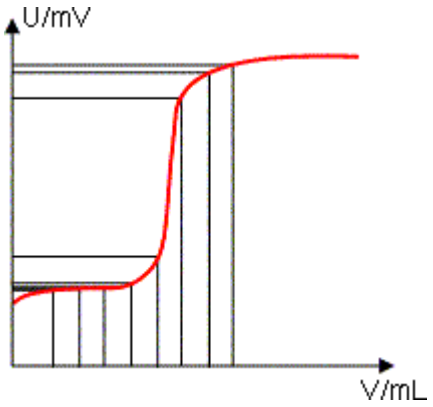
#### 5.6.3.3.1 MET - Overview

Menu item: **Method** ▸ **Paste** ▸ **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.




**Note**

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 localized by a procedure based on the Fortuin method which has been adapted by Metrohm for numerical methods. A search is made for the largest measured value modification ($\Delta_n$). The exact EP is determined by using an interpolation factor$\rho$ which depends on the $\Delta$ values before and after $\Delta_n$.

$$V_{EP} = V_0 + \rho\ \Delta V$$

$V_{EP}$ = EP volume, $V_0$ = total volume added before $\Delta_n$, $\Delta V$ = volume increment,$\rho$ = 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 modifications 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.

### Commands

Depending on the measured value one of the following four **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 value current I).

#### 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:

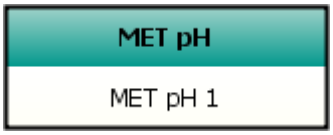
**Titrando:** 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

**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 command **MET pH** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (1…9); **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift** |

| Identification | Description |
|---|---|
| **.EP{x}.TEM** | Temperature for the endpoint × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1…3) for the last measuring point on the measuring point list |
| **.LP.DME** | Measured value differential for the last measuring point on 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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 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** |
| Default value | **pH electrode** |

**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*

| | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-20.000 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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* | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| *Titrando, 855* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

| *Titrino* | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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* | |
|---|---|
| Range | **0.0001 ... 9.9999 mL** |
| Default value | **0.05 (slow), 0.10 (optimal), 0.20 (fast) mL** |

*Titrino*

| | |
|---|---|
| Range | **0.001 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **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

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 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*

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-20.00 ... 20.00** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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* | |
|---|---|
| Range | **0.01000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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.

| | |
|---|---|
| Range | **0.10 ... 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 dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.2.9, page 569)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.2.9, page 569)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.2.10, page 570)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.2.10, page 570)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

### Fix endpoint evaluation

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.3.2.11, page 571)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.3.2.11, page 571)*.

**[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 875)*.

### 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 20.0 pH/mL** |
| Default value | **1.0 pH/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |
| Default value | **-20.000 pH** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

*Window = Measured value pH*

| | |
|---|---|
| Range | **-20.0 ... 20.0 pH** |
| Default value | **20.0 pH** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

#### 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.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.0 mL** |

#### Lower limit pH

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **-20.000** |

#### Upper limit pH

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-20.000 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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.

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **-20.000** |

#### Upper limit pH

Upper limit for the measured value window.

| | |
|---|---|
| Range | **-20.000 ... 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*

| | |
|---|---|
| Range | **0.1 ... 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 sub-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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

**Upper limit**

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **0.1 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **MET pH** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Properties]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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:

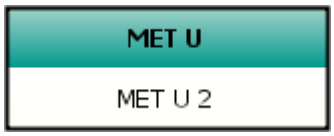
**Titrando:** 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

**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 command **MET U** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 × (1…9) |

| | |
|---|---|
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 s |
| **.EME** | End measured value (measured value after processing of the command) in the unit of the measured value |
| **.ENP** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |
| **.EP{x}.DME** | Measured value differential for the endpoint × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |

| | |
|---|---|
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.DME** | Measured value differential for the last measuring point on 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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on all three start conditions) in mL |
| **.TITER** | Titer value of the solution used for the command |

### 5.6.3.3.3.2 MET U - General/Hardware

Tab: **Method** ▸ **MET U** ▸ **Properties...** ▸ **General/Hardware**

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

### 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*

| | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| Range | **0.1 ... 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.

| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

## Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

## Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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**

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

**Measured value drift**

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

#### 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*

| | |
|---|---|
| Range | **0.0001 ... 9.9999 mL** |
| Default value | **0.05 (slow), 0.10 (optimal), 0.20 (fast) mL** |

*Titrino*

| | |
|---|---|
| Range | **0.001 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0.01000 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **1 ... 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 dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.3.9, page 594)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.3.9, page 594)*.

**[Delete]**

Deletes the window selected in the table.

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.3.10, page 595)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.3.10, page 595)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 up (changes the sequence).

Moves the selected line down (changes the sequence).

**[New]**

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.3.3.11, page 597)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.3.3.11, page 597)*.

**[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 875)*.

### 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/mL** |
| Default value | **25.0 mV/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Window = Volume* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

| *Window = Time* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

| *Window = Measured value* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Window = Volume* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

| *Window = Time* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

### Initial volume

Volume which must be present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

**Lower limit**

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

**Upper limit**

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

**Upper limit**

Upper limit for the measured value window.

*Titrando, 855*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 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.

| | |
|---|---|
| Range | **1 ... 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 sub-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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

### Upper limit

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **1 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **MET U** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Properties]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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.

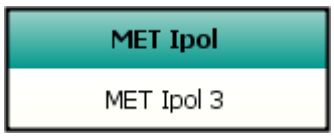
**Titrando:** 808, 809, 835, 836, 852, 857, 888, 904, 905, 906, 907

**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 command **MET Ipol** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 Ipol** 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 × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 |

| Identification | Description |
|---|---|
| **.DSC** | Time for processing all start conditions 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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |

| Identification | Description |
|---|---|
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.DME** | Measured value differential for the last measuring point on 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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |

| Identification | Description |
|---|---|
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*855, 888*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

#### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

#### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 127 µA** (Increment: **1**) |
| Default value | **5 µA** |

#### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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* | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

## Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

#### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 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*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

#### 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*

| | |
|---|---|
| Range | **0.0001 ... 9.9999 mL** |
| Default value | **0.05 (slow), 0.10 (optimal), 0.20 (fast) mL** |

*Titrino*

| | |
|---|---|
| Range | **0.001 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **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

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Selection | **off** |
| Default value | **off** |

### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0.01000 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **1 ... 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 (Upol)**

**[New]**

Opens the dialog window in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.4.9, page 620)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.4.9, page 620)*.

**[Delete]**

Deletes 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.

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **30** |

**Evaluation with volume window (mL)**

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.4.10, page 621)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.4.10, page 621)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fix endpoint *(see Chapter 5.6.3.3.4.11, page 622)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table *(see Chapter 5.6.3.3.4.11, page 622)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/mL** |
| Default value | **25.0 mV/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

#### Upper limit

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

#### Gran evaluation

**Note**

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 878)*.

#### Initial volume

Volume which must be present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

#### Lower limit

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

#### Upper limit

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-2000.0 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

**Upper limit**

Upper limit for the measured value window.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 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.

| | |
|---|---|
| Range | **1 ... 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 sub-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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

### Upper limit

Upper limit for the volume window.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00000 ... 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.

| | |
|---|---|
| Range | **1 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **MET Ipol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Properties]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

| *Volume* | |
|---|---|
| Range | **0.00000 ... 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.

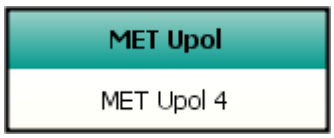
**Titrando:** 808, 809, 835, 836, 852, 857, 888, 904, 905, 906, 907

**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 command **MET Upol** are configured in the following 7 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*
  Definitions of conditions which cause the stop of the titration.
- *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 Upol** 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 × (1…9) |
| **.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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |
| **.BP{x}.VOL** | Volume for the break point × (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 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 × (1…9) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |

| Identification | Description |
|---|---|
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (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 × (1…9) in mV (HNP = half neutralization potential) |
| **.HP{x}.TEM** | Temperature for the HNP × (1…9) in °C |
| **.HP{x}.TIM** | Time in s until the HNP × (1…9) is reached |
| **.HP{x}.VOL** | Volume for the HNP × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.DME** | Measured value differential for the last measuring point on the measuring point list |

| Identification | Description |
|---|---|
| **.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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 which was added according to the start measured value given in the start conditions) 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*855, 888*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

*Titrino*

| | |
|---|---|
| Range | **-1270 ... 1270 mV** (Increment: **10**) |
| Default value | **400 mV** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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* | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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:

#### Messwertdrift

Der Messwert wird erst übernommen, wenn die Messwertdrift den hier eingegebenen Wert unterschreitet.

| | |
|---|---|
| Bereich | **0.01 ... 99.90 µA/min** |
| Auswahl | **aus** |
| Standardwert | **aus** |

**aus**
Die Messwerte werden erst nach der maximalen Wartezeit übernommen.

#### 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### Start measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **5.00 mL/min** |
| Selection | **maximum** |

### Start slope

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Measured value drift

Drift for the measured value acceptance during the titration.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **0.05 ... 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*

| | |
|---|---|
| Range | **0 (slow, optimal, fast) ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 9999 s** |
| Default value | **38.0 (slow), 26.0 (optimal), 21.0 (fast) s** |

### Dosing of increments

**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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* | |
|---|---|
| Range | **0.0001 ... 9.9999 mL** |
| Default value | **0.05 (slow), 0.10 (optimal), 0.20 (fast) mL** |

| *Titrino* | |
|---|---|
| Range | **0.001 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **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

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 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.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Selection | **off** |

#### Stop EP

The titration is stopped when the specified number of equivalence points has been found.

| | |
|---|---|
| Range | **1 ... 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* | |
|---|---|
| Range | **0.01000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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.

| | |
|---|---|
| Range | **0.1 ... 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* | |
|---|---|
| Range | **0.1 ... 99.9 µA** |
| Default value | **2.0 µA** |

**[New]**

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.5.9, page 646)*.

**[Properties]**

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.5.9, page 646)*.

**[Delete]**

Deletes the window selected in the table.

### Evaluation with volume window (mL)

**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered *(see Chapter 5.6.3.3.5.10, page 647)*.

**[Properties]**

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited *(see Chapter 5.6.3.3.5.10, page 647)*.

**[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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

#### Fix endpoint evaluation

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.3.5.11, page 648)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.3.5.11, page 648)*.

**[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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Range | **0.5 ... 10.0 µA/mL** |
| Default value | **5.0 µA/mL** |

### Break-point evaluation

**Note**

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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **200.0 µA** |

*Window = Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **9999.99 mL** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

### Gran evaluation

**Note**

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 878)*.

#### Initial volume

Volume which is present in the measuring vessel before the command is started.

| | |
|---|---|
| Range | **0.01 ... 9999.99 mL** |
| Default value | **50.00 mL** |

#### Lower limit

Value for the lower limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

#### Upper limit

Value for the upper limit of the Gran evaluation range.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 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.

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

#### Upper limit

Upper limit for the measured value window.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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 sub-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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

**Upper limit**

Upper limit for the volume window.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 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* | |
|---|---|
| Range | **0.1 ... 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 - Fix endpoint evaluation

Dialog window: **Method** ▸ **MET Upol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Properties]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |

### 5.6.3.4 SET

#### 5.6.3.4.1 SET - Overview

Menu item: **Method** ▸ **Paste** ▸ **New command...**

Command **set endpoint titrations**..

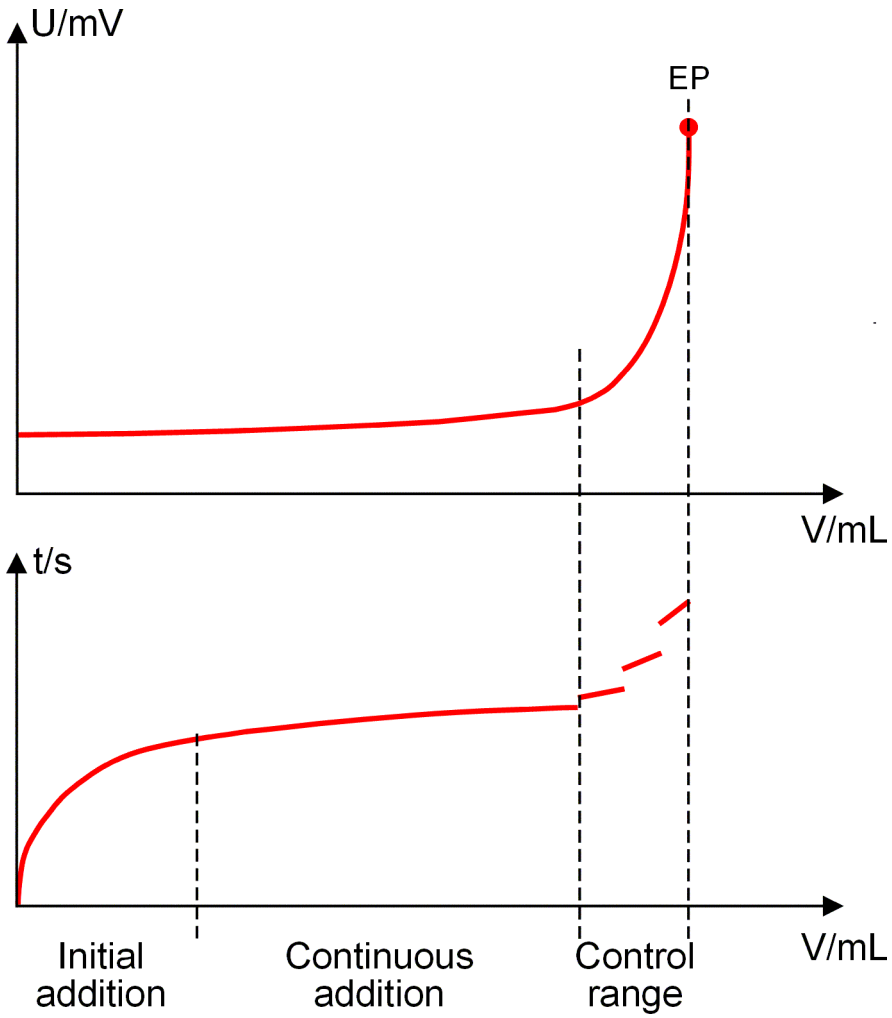
**Principle**

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 added when the endpoint is reached gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**
  During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
  In this phase addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Dynamics**
  Dosing is finely controlled in this range. Shortly before the endpoint is reached addition is only carried out at the **Min. rate** (*Control range*).



**Note**

This command is used for rapid routine determinations when the endpoint does not change throughout a series or when an excess of reagent must be avoided.

**Commands**

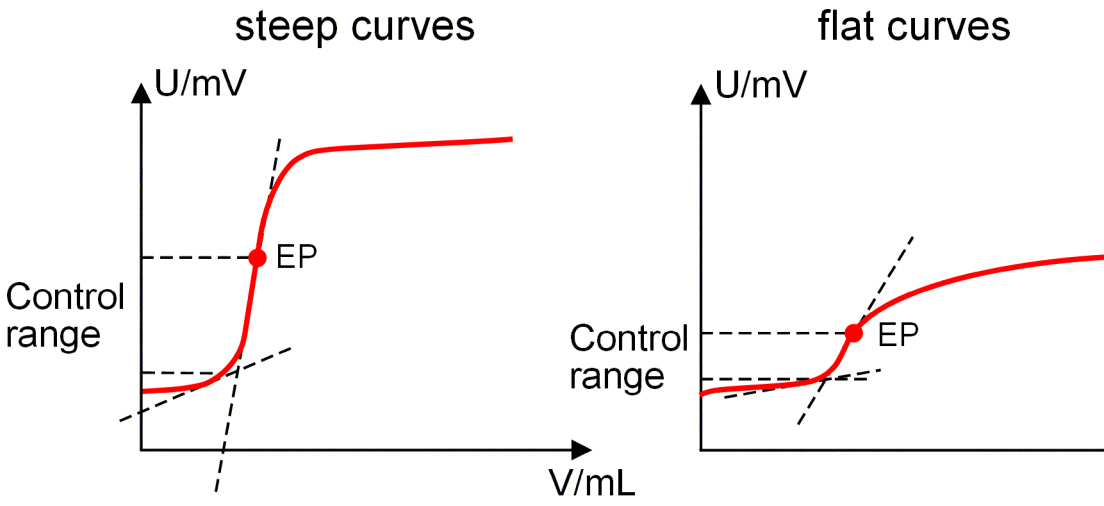
Depending on the measured value one of the following four **SET** commands can be selected:

- *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 value 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 **Set 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

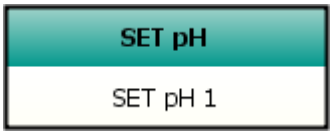
**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

**Robotic Titrosampler:** 855

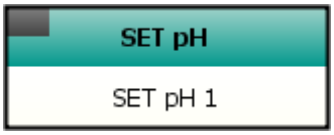
#### Appearance

The command has the following appearance:

without conditioning




with conditioning




#### Parameters

The parameters for the command **SET pH** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **SET pH** 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 = Condition requirement fulfilled**, **0** = **Condition requirement 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 s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end 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) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |

| Identification | Description |
|---|---|
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1…3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.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 in 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 in the measuring point list is reached |
| **.LP.VOL** | Volume for the last measuring point on 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 in dependence on 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.

| Input | **25 characters** |
|---|---|

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 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** |
| Default value | **pH electrode** |

#### 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* | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| Input | **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*

| Range | **-20.000 ... 20.000** |
|---|---|
| Selection | **off** |
| Default value | **off** |

*Titrino*

| Range | **-20.00 ... 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Dynamics pH

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In 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 range the dosing takes place with **Max. rate** *(see Chapter 5.6.3.4.2, page 650)*.

| *Titrando, 855* | |
|---|---|
| Range | **0.001 ... 20.000** |
| Default value | **5.000 (slow), 2.000 (optimal), 0.500 (fast)** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 20.00** |
| Default value | **5.00 (slow), 2.00 (optimal), 0.50 (fast)** |
| Selection | **off** |

### 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 150.00 (fast) 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 slower the titration.

| | |
|---|---|
| Range | **0.01 ... 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**.

**Note**

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**.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

| *Titrino* | |
|---|---|
| Range | **0 … 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* | |
|---|---|
| Range | **0 … 999999 s** |
| Selection | **off** |
| Default value | **off** |

### Endpoint 2

**Note**

Is activated only for **EP1 with** ≠ **off**.

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

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

### EP2 at pH

Measured value for the second endpoint.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 … 20.0** |
| Selection | **off** |
| Default value | **off** |

| *Titrino* | |
|---|---|
| Range | **-20.00 … 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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.

| Input | **25 characters** |
|---|---|

The conditions for stopping the titration are defined on this tab. 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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **25 characters** |
|---|---|

**Conditioning**

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

Enable/Disable the conditioning. If the 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* | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 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*

| | |
|---|---|
| Range | **0.000000 ... 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*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

**Sample addition time**

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

**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.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for the evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.4.3.10, page 671)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.4.3.10, page 671)*.

**[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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.4.3.10 SET pH - Fix endpoint evaluation

Dialog window: **Method ▸ SET pH ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Properties] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |

### 5.6.3.4.4 SET U

#### 5.6.3.4.4.1 SET U - Overview

Dialog window: **Dialog window ▸ SET U ▸ Properties... ▸ SET U - 'Command name'**

Command for **Set 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 command **SET U** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **SET 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 |

| Identification | Description |
|---|---|
| **.CBY** | Command status; **1 = Conditioning activated**, **0 = Conditioning deactivated** |
| **.COK** | Command status; **1 = Condition requirement fulfilled**, **0** = **Condition requirement 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 s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end 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 slope of the sensor used for the command (in mV for ISE sensors) |
| **.EP{x}.MEA** | Measured value for the endpoint × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |

| Identification | Description |
|---|---|
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1…3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.LP.EXx** | External value × (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 of 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the measuring point list |

| 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 of 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| 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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

### 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*

| | |
|---|---|
| Range | **-15 ... 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 listed sequence before the titration is started.

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| Input | **25 characters** |
|---|---|

The control parameters can be set for each endpoint separately.

#### Endpoint 1

**EP1 with**

Measured value for the first endpoint.

*Titrando, 855*

| Range | **-2000.0 ... 2000.0 mV** |
|---|---|
| Selection | **off** |
| Default value | **off** |

*Titrino*

| Range | **-2000 ... 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 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In 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 range the dosing takes place with **Max. rate** *(see Chapter 5.6.3.4.2, page 650)*.

| *Titrando, 855* | |
|---|---|
| Range | **0.1 ... 2000.0 mV** |
| Default value | **300.0 (slow), 100.0 (optimal), 30.0 (fast) mV** |

| *Titrino* | |
|---|---|
| Range | **1.00 ... 2000 mV** |
| Default value | **300.0 (slow), 100.0 (optimal), 30.00 (fast) mV** |

### 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 150.00 (fast) 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 slower the titration.

| | |
|---|---|
| Range | **0.01 ... 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**.

**Note**

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**.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### Endpoint 2

**Note**

Is activated only for **EP1 with ≠ off**.

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

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

### EP2 at pH

Measured value for the second endpoint.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 20.0** |
| Selection | **off** |
| Default value | **off** |

| *Titrino* | |
|---|---|
| Range | **-20.00 ... 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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.

| Input | **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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **25 characters** |
|---|---|

**Conditioning**

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

Enable/Disable the conditioning. If the 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* | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 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*

| | |
|---|---|
| Range | **0.000000 ... 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*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

**Sample addition time**

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

**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.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.4.4.10, page 692)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.4.4.10, page 692)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.4.4.10 SET U - Fix endpoint evaluation

Dialog window: **Method ▸ SET U ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Properties] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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 **Set 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 command **SET Ipol** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **SET Ipol** 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** |

| Identification | Description |
|---|---|
| **.COK** | Command status; **1 = Condition requirement fulfilled**, **0** = **Condition requirement 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 s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end of the command) in s |
| **.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 × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (1…9) in mL |

| 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 × (1…3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the measuring point list |
| **.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 of 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*855, 888*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 127 µA** (Increment: **1**) |
| Default value | **5 µA** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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* | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| Input | **25 characters** |
|---|---|

The control parameters can be set for each endpoint separately.

**Endpoint 1**

**EP1 with**

Measured value for the first endpoint.

*Titrando, 855*

| Range | **-2000.0 ... 2000.0 mV** |
|---|---|
| Selection | **off** |
| Default value | **off** |

*Titrino*

| Range | **-2000 ... 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 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In 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 range the dosing takes place with **Max. rate** *(see Chapter 5.6.3.4.2, page 650)*.

| *Titrando, 855* | |
|---|---|
| Range | **0.1 ... 2000.0 mV** |
| Default value | **300.0 (slow), 100.0 (optimal), 30.0 (fast) mV** |

| *Titrino* | |
|---|---|
| Range | **1.00 ... 2000 mV** |
| Default value | **300.0 (slow), 100.0 (optimal), 30.00 (fast) mV** |

### 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 150.00 (fast) 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 slower the titration.

| | |
|---|---|
| Range | **0.01 ... 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**.

**Note**

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**.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

## Endpoint 2

**Note**

Is activated only for **EP1 with** ≠ **off**.

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

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

### EP2 with

Measured value for the second endpoint.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000** |
| 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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.

| Input | **25 characters** |
|---|---|

The conditions for stopping the titration are defined on this tab. 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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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* | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 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*

| | |
|---|---|
| Range | **0.000000 ... 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*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

**Sample addition time**

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

**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.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.4.5.10, page 713)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.4.5.10, page 713)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| Input | **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]**

Opens the dialog window **Calc. measured value #***(see Chapter 5.6.3.11.1, page 879)* in which the parameters for the additional measured value can be entered.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.4.5.10 SET Ipol - Fix endpoint evaluation

Dialog window: **Method ▸ SET Ipol ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Properties] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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 **Set 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

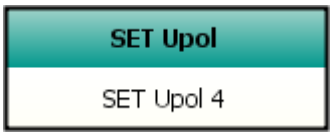
**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

**Robotic Titrosampler:** 855

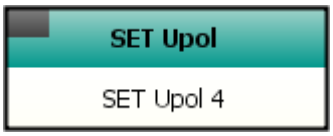
### Appearance

The command has the following appearance:

without conditioning




with conditioning




### Parameters

The parameters for the command **SET Upol** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **SET Upol** 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** |

| Identification | Description |
|---|---|
| **.COK** | Command status; **1 = Condition requirement fulfilled**, **0** = **Condition requirement 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 s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end of the command) in s |
| **.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 × (1…9) in the unit of the measured value |
| **.EP{x}.MEP** | Quantity of endpoints in the window × (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 × (1…9) in °C |
| **.EP{x}.TIM** | Time in s until the endpoint × (1…9) is reached |
| **.EP{x}.VOL** | Volume for the endpoint × (1…9) in mL |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.FP{x}.VOL** | Volume for the fixed endpoint × (1…9) in mL |

| 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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.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 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 of 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*855, 888*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

*Titrino*

| | |
|---|---|
| Range | **-1270 ... 1270 mV** (Increment: **10**) |
| Default value | **400 mV** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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* | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

#### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The control parameters can be set for each endpoint separately.

### Endpoint 1

**EP1 with**

Measured value for the first endpoint.

| | |
|---|---|
| Range | **-200.0 ... 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**

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

**Control range**

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In 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 range the dosing takes place with **Max. rate** *(see Chapter 5.6.3.4.2, page 650)*.

| *Titrando, 855* | |
|---|---|
| Range | **0.01 ... 200.00 µA** |
| Default value | **40.0 (slow), 10.0 (optimal), 5.0 (fast) µA** |

| *Titrino* | |
|---|---|
| Range | **0.1 ... 200.0 µA** |
| Default value | **40.0 (slow), 10.0 (optimal), 5.0 (fast) µA** |

**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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), 10.00 (optimal), 150.00 (fast) 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 slower the titration.

| | |
|---|---|
| Range | **0.01 ... 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**.

**Note**

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**.

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### Endpoint 2

**Note**

Is activated only for **EP1 with** ≠ **off**.

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

Check box for switching endpoint 2 on/off. If this is deactivated, then the associated parameters will not be displayed.

#### EP2 with

Measured value for the second endpoint.

| | |
|---|---|
| Range | **-200.0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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.

| Input | **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

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.000 ... 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* | |
|---|---|
| Range | **0 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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* | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 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*

| | |
|---|---|
| Range | **0.000000 ... 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*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

### Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

### 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.

**Note**

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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

### Fix endpoint evaluation

### Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.4.6.10, page 734)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.4.6.10, page 734)*.

**[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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Range | **0.5 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.4.6.10 SET Upol - Fix endpoint evaluation

Dialog window: **Method ▸ SET Upol ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Properties] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |

### 5.6.3.5 KFT

#### 5.6.3.5.1 KFT - Overview

Menu item: **Method ▸ Paste ▸ New command...**

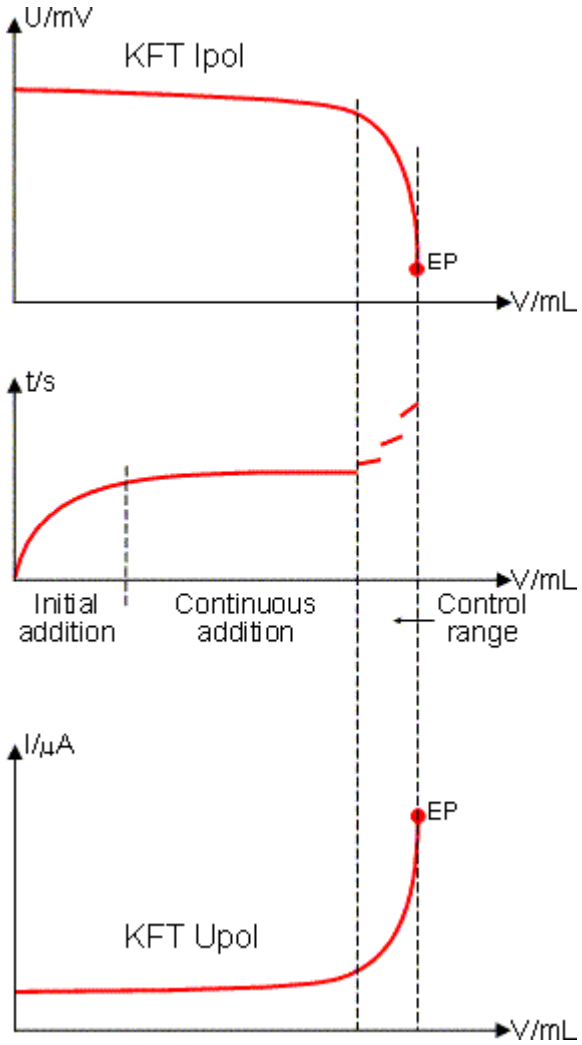
Command for volumetric **Karl Fischer Titrations**.

**Principle**

With this command, volumetric titrations for determining the water content by the Karl Fischer method with automatic conditioning are carried out. A typical feature of the Karl Fischer titration is the controlled reagent addition, 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 endpoint takes place either drift-controlled or after a waiting period. The volume added up to the endpoint gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**
  During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
  In this phase, addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Dynamics**
  Dosing is finely controlled in this range. Shortly before the endpoint is reached. addition is carried out only at the **Min. rate**.




## Commands

Depending on the measured value, one of the following two **KFT** commands can be chosen:

- *KFT Ipol*
  Voltametric measurement with selectable polarization current (measured quantity voltage U).

- *KFT Upol*
  Amperometric measurement with selectable polarization voltage (measured value 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, 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 command **KFT Ipol** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **KFT Ipol** 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 = Condition requirement fulfilled**, **0** = **Condition requirement 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 s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end of the command) in s |
| **.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** | Quantity of endpoints **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 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 following processing of the command) 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}.MEA** | Measured value for the fixed endpoint × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1…3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point in 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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value in the unit of the measured value |

| Identification | Description |
|---|---|
| **.MI.TEM** | Temperature with minimum measured value in °C |
| **.MI.TIM** | Time for the minimum measured value in s |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 852)*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*852*

| | |
|---|---|
| Selection | **2** |
| Default value | **2** |

#### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

#### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 127 µA** (Increment: **1**) |
| Default value | **5 µA** |

#### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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** |

**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* | |
|---|---|
| Range | **-15 ... 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.

**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, 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

**Initial measured value**

**Note**

Is displayed only 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.

| Range | **0.1 ... 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.

| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 999999 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

### Endpoint

**Ep with**

Measured value for the endpoint.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Dynamics

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. In the control range, dosing is controlled by the **Minimum rate**. The closer the endpoint, the slower the dosing until the **Minimum rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Maximum rate**.

| *Titrando* | |
|---|---|
| Range | **0.1 ... 2000.0 mV** |
| Default value | **300.0 (slow), 100.0 (optimal), 30.0 (fast) mV** |

| *Titrino* | |
|---|---|
| Range | **1 ... 2000 mV** |
| Default value | **300 (slow), 100 (optimal), 30 (fast) mV** |

### 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), maximum (optimal), maximum (fast) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), maximum (optimal), maximum (fast) mL/min** |

### Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

| | |
|---|---|
| Range | **0.1 ... 9.9 µL/min** |
| Default value | **minimum (slow), minimum (optimal), 5.0 (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**.

*Titrino*

| | |
|---|---|
| Selection | **drift** \| **time** |
| Default value | **drift** |

*Titrando*

| | |
|---|---|
| Selection | **drift** \| **rel. drift** \| **off** \| **time** |
| Default value | **drift** |

**drift**
The titration is stopped when the **stop drift** has been reached.

**rel. drift**
The titration is stopped when the relative stop drift (drift value at time of start + **relative stop drift**) has been reached.

**off**
The titration will not be stopped.

**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.

**Note**

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled 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**.

| | |
|---|---|
| Range | **1 ... 999 µL/min** |
| Default value | **20 µL/min** |

### Relative stop drift

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

*Titrando*

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |
| Selection | **inf.** |

### Stop time

The titration is stopped if the absolute 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*

| | |
|---|---|
| Range | **1 ... 999999 s** |

## 5.6.3.5.2.5 KFT Ipol - Titration parameters

Tab: **Method** ▸ **KFT Ipol** ▸ **Properties...** ▸ **Titration parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **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 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). The entry of an extraction time may be advisable, e.g. for the titration of sparingly soluble samples.

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 16200 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.

| Input | **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

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.00 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

#### Filling rate

Rate at which the dosing cylinder is to be filled after titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

| *Titrando* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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 less 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**.

| *Titrando* | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 99.9 µL/min** |
| Default value | **0.0 µL/min** |

### Stop volume

Determination stops 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*

| | |
|---|---|
| Range | **0.000000 ... 9999.99 mL** |
| Default value | **20,000 mL** |
| Selection | **off** |
| Default value | **off** |

### Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

*Titrando*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

### Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

### 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.

**Note**

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.

| Input | **25 characters** |
|---|---|

The following additional methods for the evaluation of the titration curves can be activated and defined on these tabs:

**Fix endpoint evaluation**

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.5.2.10, page 756)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.5.2.10, page 756)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.5.2.10 KFT Ipol - Fix endpoint evaluation

Dialog window: **Method** ▸ **KFT Ipol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Property]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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.

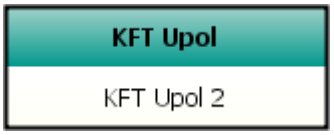
**Titrando:** 835, 836, 841, 852, 857, 890, 901, 906, 907

**Titrino:** 720, 736, 751, 758, 784, 795, 799

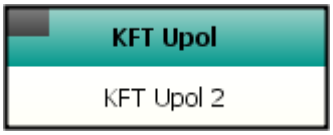
**Appearance**

The command has the following appearance:

without conditioning




with conditioning



### Parameters

The parameters for the command **KFT Upol** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Conditioning*
  Enable/Disable the conditioning. Definition of the 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 in the method run by the command **KFT Upol** 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 = Condition requirement fulfilled**, **0** = **Condition requirement 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 |

| Identification | Description |
|---|---|
| **.DRI** | Current and/or last drift for drift correction in µL/min |
| **.DSC** | Time for processing all start conditions s |
| **.DTI** | Time for drift correction (time from the start of the titration to the end of the command) in s |
| **.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** | Quantity of endpoints **1 = 1 endpoint**, **2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 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 following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1...3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point in the measuring point list |

| Identification | Description |
|---|---|
| **.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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for minimum measured value in mL |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 of 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 in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 852)*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*852*

| | |
|---|---|
| Selection | **2** |
| Default value | **2** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

**U(pol)**

The polarization voltage is the voltage applied to the polarized electrode during an amperometric measurement.

*Titrando*

| | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

*Titrino*

| | |
|---|---|
| Range | **-1270 ... 1270 mV** (Increment: **10**) |
| Default value | **400 mV** |

**Electrode test**

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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 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** |

**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* | |
|---|---|
| Range | **-15 ... 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.

### 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, 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 999999 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

**Endpoint**

**Ep with**

Measured value for the endpoint.

| | |
|---|---|
| Range | **-200.0 ... 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

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Dynamics

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. In the control range, dosing is controlled by the **Minimum rate**. The closer the endpoint, the slower the dosing until the **Minimum rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Maximum rate**.

*Titrando*

| | |
|---|---|
| Range | **0.01 ... 200.0 µA** |
| Default value | **40.0 (slow), 10.0 (optimal), 5.0 (fast) µA** |

*Titrino*

| | |
|---|---|
| Range | **0.1 ... 200.0 µA** |
| Default value | **40.0 (slow), 10.0 (optimal), 5.0 (fast) µA** |

### 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **1.00 (slow), maximum (optimal), maximum (fast) mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **1.00 (slow), maximum (optimal), maximum (fast) mL/min** |

### Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

| | |
|---|---|
| Range | **0.1 ... 9.9 µL** |
| Default value | **minimum (slow), minimum (optimal), 5.0 (fast) µL** |

## 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**.

*Titrino*

| | |
|---|---|
| Selection | **drift** \| **time** |
| Default value | **drift** |

*Titrando*

| | |
|---|---|
| Selection | **drift** \| **rel. drift** \| **off** \| **time** |
| Default value | **drift** |

**drift**
The titration is stopped when the **stop drift** has been reached.

**rel. drift**
The titration is stopped when the relative stop drift (drift value at time of start + **relative stop drift**) has been reached.

**off**
The titration will not be stopped.

**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.

**Note**

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled 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**.

| | |
|---|---|
| Range | **1 ... 999 µL/min** |
| Default value | **20 µL/min** |

### Relative stop drift

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

*Titrando*

| | |
|---|---|
| Range | **1 ... 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*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **10 s** |
| Selection | **inf.** |

### Stop time

The titration is stopped if the absolute 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* | |
|---|---|
| Range | **1 ... 999999 s** |

## 5.6.3.5.3.5 KFT Upol - Titration parameters

Tab: **Method** ▸ **KFT Upol** ▸ **Properties...** ▸ **Titration parameters**

### Command name

Name of the command.

| Input | **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 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). The entry of an extraction time may be advisable, e.g. for the titration of sparingly soluble samples.

| Range | **0 ... 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* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 16200 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.

| Input | **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**

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* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0.00 ... 9999.99 mL** |
| Default value | **100.00 mL** |
| Selection | **off** |

### Stop time

| *Titrando* | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

**off**
Stops when the preset time (including start conditions) has elapsed since the start of the titration.

### Filling rate

Rate at which the dosing cylinder is to be filled after titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

| *Titrando* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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 less 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**.

*Titrando*

| | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 99.9 µL/min** |
| Default value | **0.0 µL/min** |

### Stop volume

Determination stops 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*

| | |
|---|---|
| Range | **0.000000 ... 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*

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

### Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

### 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.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.5.3.10, page 776)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.5.3.10, page 776)*.

**[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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

### 5.6.3.5.3.10 KFT Upol - Fix endpoint evaluation

Dialog window: **Method ▸ KFT Upol ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Property] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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.

**Note**

The coulometric water determination is mainly used to determine small amounts of water.

#### Devices

This command can be executed with the following devices.

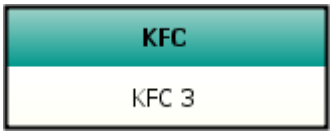
**Coulometer:** 756, 831

**Titrandos:** 851, 852

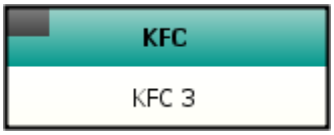
#### Appearance

The command has the following appearance:

without conditioning




with conditioning




#### Parameters

The parameters for the command **KFC** are configured in the following 8 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 the 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 command **KFC** 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 = Condition requirement fulfilled**, **0** = **Condition requirement not fulfilled** |
| **.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 for drift correction (time from the start of the titration to the end of the command) in s |
| **.EME** | End measured value (measured value after processing of the command) in the unit of the measured value |
| **.EP.CHA** | Load 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 following processing of the command) 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 × (1…9) in µg/min |

| Identification | Description |
|---|---|
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (1…9) in the unit of the measured value |
| **.FP{x}.QTY** | Measured value (water) for the fixed endpoint × (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 × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.CHA** | Load for the last measuring point of the measuring point list in mA s |
| **.LP.DVT** | dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.LP.EXx** | External value × (1...3) for the last measuring point of 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 of 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** |

| Identification | Description |
|---|---|
| **.NMP** | Number of measuring points in the 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 of 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.

| | |
|---|---|
| Input | **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** \| **Ttitrando** |
| Default value | **Ttitrando** |

## Sensor

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### I(pol)

Polarization current at the indicator electrode.

| | |
|---|---|
| Selection | **2 µA** \| **5 µA** \| **10 µA** \| **20 µA** \| **30 µA** |
| Default value | **10 µA** |

**Note**

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 783)*.

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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 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.

*für 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 in the region of the endpoint the current will be controlled at smaller values

*für 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 in the region of the endpoint the current will be controlled at smaller values

**Note**

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 direction in which the stirring is done.

*851, 852*

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

**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.

### 5.6.3.6.3 KFC - Start conditions

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Start conditions**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

**Pause**

**Pause**

Waiting time before the start of the titration.

| | |
|---|---|
| Range | **0 ... 999999 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.

| | |
|---|---|
| Input | **25 characters** |

### End point

**EP at**

Measured value for the endpoint.

*756, 831*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **50.0 mV** |

*851, 852*

| | |
|---|---|
| Range | **-1250.0 ... 1250.0 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**
Editing the individual titration parameters which affect the titration rate.

**Control**

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

## Dynamics

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**.

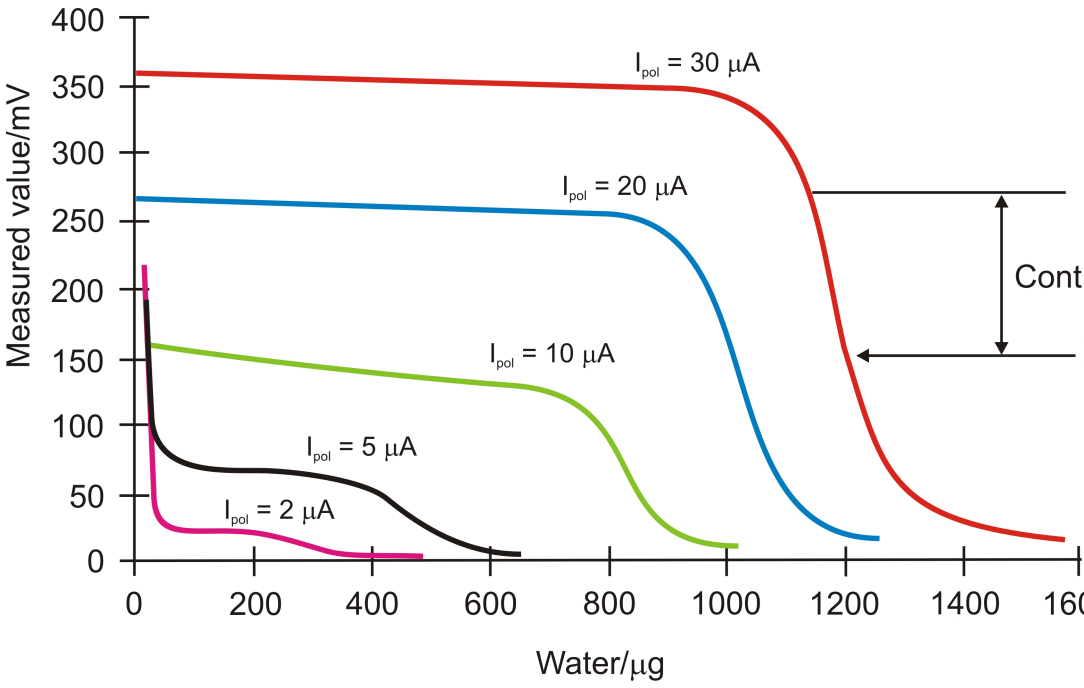
The standard control parameters are optimal for most applications and should not be modified. If you nevertheless need to modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

*756, 831*

| | |
|---|---|
| Range | **1.0 ... 2000 mV** |
| Default value | **120.0 (slow), 70.0 (optimal), 30.0 (fast) mV** |

*851, 852*

| | |
|---|---|
| Range | **0.1 ... 1250.0 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. 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 |
| Dynamics | 70 mV | 100 mV | 120 mV |

**Max. rate**

Maximum rate with which iodine is generated outside the **Control range**.

| | |
|---|---|
| Range | **1.5 ... 2240.0 µg/min** |
| Default value | **1000.0 (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*

| | |
|---|---|
| Range | **0.3 ... 999.9 µg/min** |
| Default value | **0.3 (slow), 15.0 (optimal), 30.0 (fast) µg/min** |
| Selection | **minimum** |

*851, 852*

| | |
|---|---|
| Range | **0.3 ... 999.0 µg/min** |
| Default value | **0.3 (slow), 15.0 (optimal), 30.0 (fast) µg/min** |
| Selection | **minimum** |

### Stop criterion

**Stop criterion**

Switches off titration when the endpoint has been reached and the stop criterion has been met.

*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 stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

| | |
|---|---|
| Range | **1 ... 999 µg/min** |
| Default value | **5 µg/min** |

**Relative stop drift**

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

| | |
|---|---|
| Range | **0 ... 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**.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the running of the titration are defined on this tab.

**Extraction time**

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, e.g. for the titration of sparingly soluble samples.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

**Temperature**

Manually entered titration temperature.

*756, 831*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **25.0 °C** |

*851, 852*

| | |
|---|---|
| Range | **-20.0 ... 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*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **2 s** |

*851, 852*

| | |
|---|---|
| Range | **0.1 ... 999999.0 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.

| | |
|---|---|
| Input | **25 characters** |

The conditions for stopping the titration are defined on this tab.

**Stop time**

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### 5.6.3.6.7 KFC - Conditioning

Tab: **Method** ▸ **KFC** ▸ **Properties...** ▸ **Conditioning**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

**Conditioning**

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

Enable/Disable the conditioning. If the 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 **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**.

| | |
|---|---|
| Range | **1 … 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**.

| | |
|---|---|
| Range | **0.0 … 99.9 µg/min** |
| Default value | **0.0 µg/min** |

### Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

| | |
|---|---|
| Range | **1 … 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.

| | |
|---|---|
| Range | **0 … 999 s** |
| Default value | **0 s** |

### Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

### 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*

| | |
|---|---|
| Range | **0 ... 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.

**Note**

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.

| Input | **25 characters** |
|---|---|

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 up (changes the sequence).

Moves the selected line down (changes the sequence).

**[New]**

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.6.10, page 793)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.6.10, page 793)*.

**[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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.6.10 KFC - Fix endpoint evaluation

Dialog window: **Method** ▸ **KFC** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Property]** ▸ **Fix 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** \| **Water** |
| Default value | **Measured value** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Water*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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**

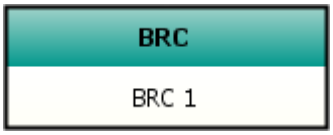
This command can be executed with the following devices.

**Titrandos:** 851, 852

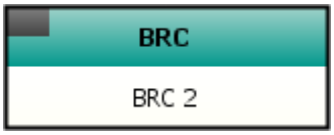
**Appearance**

The command has the following appearance:

without conditioning




with conditioning



### Parameters

The parameters for the command **BRC** are configured in the following 8 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 the 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 command **BRC** 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 = Condition requirement fulfilled**, **0** = **Condition requirement 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 for drift correction (time from the start of the titration to the end of the command) in s |

| Identification | Description |
|---|---|
| **.EME** | End measured value (measured value after processing of the command) in mV |
| **.EP.CHA** | Load 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 |
| **.EQT** | End quantity following processing of the command in µg |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in µg/min |
| **.FP{x}.MEA** | Measured value for the fixed endpoint × (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 × (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 × (1...3) for the last measuring point on the measuring point list |
| **.LP.CHA** | Load 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 × (1...3) for the last measuring point of 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 of 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 the measuring point list |
| **.SME** | Start measured value (measured value after processing the start conditions) in mV |
| **.STE** | Start temperature (temperature after processing of 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.

| | |
|---|---|
| Input | **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'** \| **Titrando** |
| Default value | **Titrando** |

## Sensor

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### I(pol)

Polarization current at the indicator electrode.

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **1.0 µA** |

**Note**

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 800)*.

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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 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 in the region of 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

### 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.

## 5.6.3.7.3 BRC - Start conditions

Tab: **Method** ▸ **BRC** ▸ **Properties...** ▸ **Start conditions**

### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **15 s** |

**Pause**

**Pause**

Waiting time before the start of the titration.

| | |
|---|---|
| Range | **0 ... 999999 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.

| | |
|---|---|
| Input | **25 characters** |

**Endpoint**

**Ep with**

Measured value for the endpoint.

| | |
|---|---|
| Range | **-1250.0 ... 1250.0 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**
Editing the individual titration parameters which affect the titration rate.

### Control

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### 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.

| | |
|---|---|
| Range | **0.1 ... 1250.0 mV** |
| Default value | **400.0 mV** |

### Max. rate

Maximum rate with which bromine is generated outside the **Control range**.

| | |
|---|---|
| Range | **10.0 ... 19876.0 µg/min** |
| Default value | **500.0 (slow), 1000.0 (optimal), 2000.0 (fast) µg/min** |
| Selection | **maximum** |
| Default value | **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.

| | |
|---|---|
| Range | **1.0 ... 999.0 µg/min** |
| Default value | **15.0 (slow), 25.0 (optimal), 50.0 (fast) µg/min** |
| Selection | **minimum** |

**Stop criterion**

**Stop criterion**

Switches off titration when the endpoint has been reached and the stop criterion has been met.

| | |
|---|---|
| Selection | **drift** \| **rel. drift** \| **time** \| **drift & time** \| **off** |
| Default value | **drift & time** |

**Stop drift**

The titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift** or **drift & time**.

| | |
|---|---|
| Range | **1 ... 999 µg/min** |
| Default value | **15 µg/min** |

**Relative stop drift**

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion** = **rel. drift**.

| | |
|---|---|
| Range | **0 ... 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**.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the running of the titration are defined on this tab.

**Extraction time**

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, e.g. for the titration of sparingly soluble samples.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

**Temperature**

Manually entered titration temperature.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

**Time interval measuring point**

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 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.

| | |
|---|---|
| Input | **25 characters** |

The conditions for stopping the titration are defined on this tab.

**Stop time**

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### 5.6.3.7.7 BRC - Conditioning

Tab: **Method** ▸ **BRC** ▸ **Properties...** ▸ **Conditioning**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

### Conditioning

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

Enable/Disable the conditioning. If the 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 **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**.

| | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **0.0 ... 999.9 µg/min** |
| Default value | **0.0 µg/min** |

### Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0 ... 999 s** |
| Default value | **0 s** |

### Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

| | |
|---|---|
| Range | **0 ... 99 s** |
| Default value | **0 s** |

### 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.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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 **bromine**) 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.7.10, page 807)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.7.10, page 807)*.

**[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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

## 5.6.3.7.10 BRC - Fix endpoint evaluation

Dialog window: **Method ▸ BRC ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Property] ▸ Fix 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** \| **Bromine** |
| Default value | **Measured value** |

**Fix value**

Value of the fix endpoint.

| *Measured value* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

| *Bromine* | |
|---|---|
| Range | **0.0 ... 999999.9 µg** |

### 5.6.3.8 STAT

#### 5.6.3.8.1 STAT - Overview

Menu item: **Method ▸ Paste ▸ New command...**

Command for **STAT Titrations** (**STAT**).

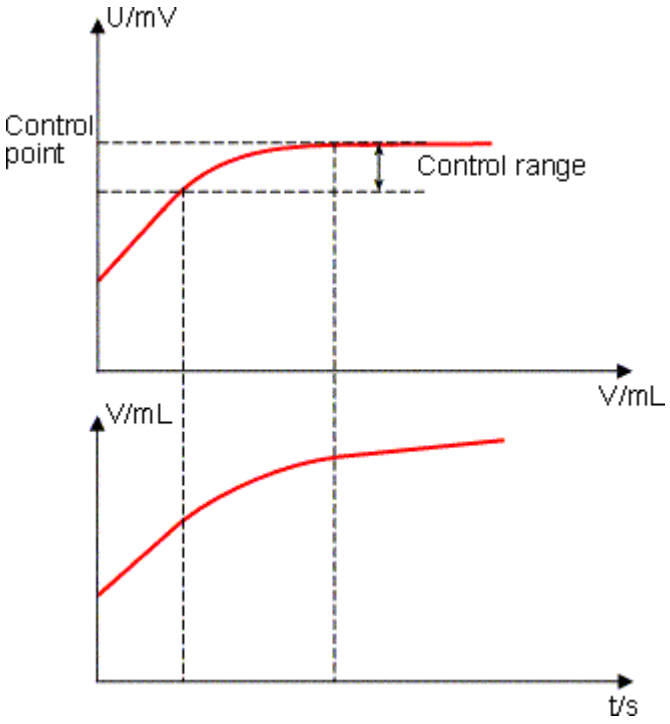
**Principle**

In **STAT** titrations, reagent is added until a preset measured value (control point) has been reached, which is then maintained at a constant level. The substance released by the reaction is immediately titrated off with the reagent in order to maintain the control point. The STAT titration keeps the control point constant until the preset stop criterion has been reached.

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 addition takes place in two phases during the titration:

- **Dosing outside the control range**
  The dosing is carried out at the **Max. rate** until the **Control range** is reached.
- **Dosing inside the control range**
  Dosing is finely controlled in this range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached.




**Commands**

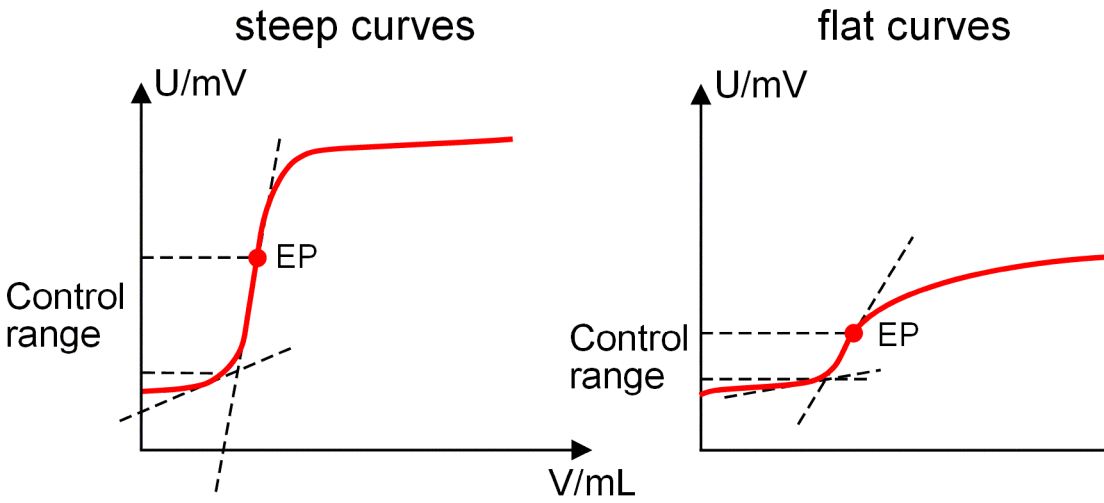
Depending on the measured value, one of the following two**STAT** commands can be chosen:

- *STAT pH*
  STAT titration with pH electrodes (measured quantity pH)
- *STAT U*
  STAT Titration with metal electrodes (measured quantity 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 of evaluation window.

| | |
|---|---|
| Range | **0.0 ... 99999.9 s** |
| Default value | **0.0 s** |

#### Upper limit

Upper limit of evaluation window.

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |
| Default value | **999999.9 s** |

### 5.6.3.8.4 STAT - Track call

Dialog window: **Method** ▸ **STAT/STAT pH/STAT U** ▸ **Properties...** ▸ **Monitoring** ▸ **[New]/[Properties]** ▸ **Track call #**

#### Monitoring

Selects the quantity at which a track is to be started when its limit value is exceeded.

| | |
|---|---|
| Selection | **Measured value** \| **Dosing rate** \| **Temperature** \| **Any** |
| Default value | **Measured value** |

**Any**
Means one or another of the three sizes.

### Limit exceeding

Selects 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 exceeded.

**OK**
The track is started when the monitored quantities are once again within the limit values (including hysteresis).

### Track name

Selects the track that is to be started automatically.

| | |
|---|---|
| Selection | **'Track name'** |

**Note**

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 check box **Tandem dosing** is activated for the commands **STAT**, **ADD** or **DOS**, then a second dosing device can be defined in order to enable continuous 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 continuous 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. Please note the viscosity and density of the liquid.
- **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 ≧ Filling rate 1 • ($V_{\text{Dosing cylinder 2}}$/$V_{\text{Dosing cylinder 1}}$)
- **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 the maximum filling rate):

| Cylinder volume | Max. 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 mL10 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:

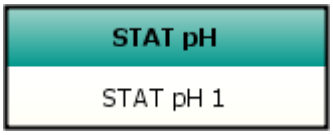
**Titrando:** 835, 836, 842, 857, 902, 906, 907

**Titrino:** 718, 736, 751, 799

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:




**Parameters**

The parameters for the command **STAT** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Monitoring*
  Definition of measured value, dosing rate, and temperature monitoring.
- *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 in the method run by the command **STAT** 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 |
| **.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 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 following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1...3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point onthe measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.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 in 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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value in the unit of the measured value |

| Identification | Description |
|---|---|
| **.MI.TEM** | Temperature with minimum measured value in °C |
| **.MI.TIM** | Time for the minimum measured value in s |
| **.MI.VOL** | Volume for 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 the measuring point list |
| **.RE{x}.DRC** | Correlation coefficient for mean dosing rate in window × (1…9) |
| **.RE{x}.DRS** | Standard deviation for mean dosing rate in window × (1…9) in mL/min |
| **.RE{x}.DRT** | Mean dosing rate in window × (1…9) in mL/min |
| **.RE{x}.RWL** | Lower limit of the evaluation window × (1…9) in s |
| **.RE{x}.RWH** | Upper limit of the evaluation window × (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 of 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 in dependence on 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.

| Input | **25 characters** |
|---|---|

The general parameters for the control device, the dosing device, 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 (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 811)*. This parameter is displayed only for Titrandos and 855.

### Dosing device

Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

*Titrando*

| | |
|---|---|
| Selection | **1** \| **2** \| **3** \| **4** |
| Default value | **2** |

*855*

| | |
|---|---|
| Selection | **1** \| **2** \| **3** |
| Default value | **2** |

### 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 run 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.

*Titrando, 855*

| | |
|---|---|
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

### Filling rate

Speed with 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 dosing to the largest possible value*(see Chapter 5.6.3.8.5, page 811)*.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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 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** |
| Default value | **pH electrode** |

### 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* | |
|---|---|
| Range | **-15 ... 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.

| Input | **25 characters** |
|---|---|

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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, 855*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

### Control point

### Control point at pH

Definition of the pH value to be controlled.

*Titrando, 855*

| | |
|---|---|
| Range | **-20,000 ... 20,000** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-20.00 ... 20.00** |
| Selection | **off** |
| Default value | **off** |

## Titration rate

### Titration rate

Three predefined rates, for which the parameters for **Control** are not displayed, can selected for the titration rate. The **User** setting must be selected in order to be able to edit these parameters.

| | |
|---|---|
| Selection | **50 µL/min** \| **100 µL/min** \| **500 µL/min** \| **User** |
| Default value | **100 µL/min** |

### Control

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

### Dynamics pH

The control range defines the measured value range before the given control point. It has a decisive influence on the titration rate and thus also on the accuracy. The dosing is also monitored by the **Min. rate** within the control range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing proceeds continuously at the **Max. rate**.

*Titrando, 855*

| | |
|---|---|
| Range | **0.001 ... 20,000** |
| Default value | **1,000** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 20.00** |
| Default value | **1.00** |
| Selection | **off** |

### 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. The following rule of thumb should be used as a starting point for parameterization: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in µL/min.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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 reaction rate in µL/min/10.

| | |
|---|---|
| Range | **0.01 ... 9999.00 µL/min** |
| Default value | **10.00 (50 µL/min), 20.00 (100 µL/min), 40.00 (500 µL/min) µL/min** |

**Note**

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. 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 control range should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. pH = 3). The nominal value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started with a small deviation from the control point. Within the control range, the dosing rate is determined primarily by the **Min. rate**.

## 5.6.3.8.6.5 STAT pH - Titration parameters

Tab: **Method** ▸ **STAT pH** ▸ **Properties...** ▸ **Titration parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **2 s** |

### Start time

The measured values are not entered in the measuring point list until this time has elapsed since the start of the titration.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Start measured value pH

The measured values are not entered in the measuring point list until this value has been reached.

*Titrando, 855*

| | |
|---|---|
| Range | **-20,000 ... 20,000** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-20.00 ... 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 checked 10 s after the start at the earliest.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Input | **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

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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.000 ... 9999.99 mL** |
| Default value | **100.00 mL** |
| Selection | **off** |

### Stop time

Stops when the preset time has elapsed after the start conditions have been fulfilled.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### since

Specifies when the stop time begins to be counted down (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

Stops when the current dosing rate is less than the defined stop rate. This criterion is checked 10 s after the start at the earliest. The maximum stop rate depends on the cylinder volume of the exchange unit or dosing unit used.

| *Titrando, 855* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **off** |
| Default value | **off** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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.

| Input | **25 characters** |
|---|---|

The following monitoring processes can be switched on and defined on this tab:

**Monitoring Measured value**

**Monitoring Measured value**

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

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

**Lower limit pH**

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20,000 ... 20,000** |
| Default value | **-20,000** |

| *Titrino* | |
|---|---|
| Range | **-20.00 ... 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, then the event **Measured value lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.000 ... 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 exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20,000 ... 20,000** |
| Default value | **20,000** |

| *Titrino* | |
|---|---|
| Range | **-20.00 ... 20.00** |
| Default value | **20.00** |

### Upper hysteresis pH

The 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** will be triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.000 ... 20,000** |
| Default value | **0.020** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

### Monitoring Dosing rate

**Monitoring Dosing rate**

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

If this option is activated, then the dosing rate will be monitored and any exceeded limits will be entered in the list of measuring points. This monitoring is not started until 10 s after the start of the titration.

**Lower limit**

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.00 ... 166.00 mL/min** |
| Default value | **0.00 mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.00 ... 150.00 mL/min** |
| Default value | **0.00 mL/min** |

**Lower hysteresis**

The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit by this hysteresis value, the action **Dosing rate lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.00 ... 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 exceeded** will be triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.00 ... 166.00 mL/min** |
| Default value | **166.00 mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.00 ... 150.00 mL/min** |
| Default value | **150.00 mL/min** |

### Upper hysteresis

Upper hysteresis of the dosing rate. When the dosing rate again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.00 ... 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 exceeded:

| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
|---|---|
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

**Note**

If, when monitoring the dosing rate, the **Lower limit** is exceeded then the actions **Wait for [Continue]** and **Wait for limit ok** are irrelevant as the mean dosing rate becomes ever smaller during this time. The valid range can never be reached again.

### Monitoring Temperature

#### Monitoring Temperature

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

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

#### Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **-20.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **-170.0 °C** |

#### Lower hysteresis

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

#### Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **150.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **500.0 °C** |

### Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

## 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 exceeded.

### [New]

Opens the dialog window **Track call #** in which the parameters for the track call can be entered.

**[Properties]**

Opens the dialog window **Track call #** in which the parameters for the track call can be edited *(see Chapter 5.6.3.8.4, page 810)*.

**[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.

| Input | **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, than a maximum of 9 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 dialog window **Evaluation window #** in which the parameters for a new time slot can be entered *(see Chapter 5.6.3.8.3, page 810)*.

**[Properties]**

Opens the dialog window **Evaluation window #** in which the parameters for the new time slot can be edited *(see Chapter 5.6.3.8.3, page 810)*.

**[Delete]**

Deletes the time slot selected in the table.

**Fix endpoint evaluation**

**Fix 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 **volume**) for the fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.4.3.10, page 671)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.4.3.10, page 671)*.

**[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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.8.6.10 STAT pH - Fix endpoint evaluation

Dialog window: **Method ▸ STAT pH ▸ Properties... ▸ Additional evaluations ▸ Fix endpoint evaluation ▸ [New]/[Properties] ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-20.000 ... 20.000 pH** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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:

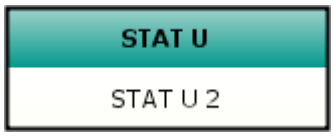
**Titrando:** 835, 836, 842, 857, 902, 906, 907

**Titrino:** 718, 736, 751, 799

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:




### Parameters

The parameters for the command **STAT U** are configured in the following 8 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*
  Definitions of conditions which cause the stop of the titration.
- *Monitoring*
  Definition of measured value, dosing rate, and temperature monitoring.
- *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 in the method run by the command **STAT 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 |
| **.DSC** | Time for processing all start conditions s |

| Identification | Description |
|---|---|
| **.EME** | End measured value (measured value after processing of the command) in the unit of the measured value |
| **.ENP** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in mV |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |
| **.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 |
| **.ITE** | Initial temperature (temperature before start conditions are processed) in °C |
| **.LP.CAx** | Calculated value × (1...3) for the last measuring point on the measuring point list |
| **.LP.DVT** | dV/dt for the last measuring point onthe measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC) |
| **.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 in the unit of the measured value of the measuring point list |
| **.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 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 with maximum measured value in mL |
| **.MI.MEA** | Minimum measured value 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 |
| **.MI.VOL** | Volume for 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 the measuring point list |
| **.RE{x}.DRC** | Correlation coefficient for mean dosing rate in window × (1…9) |
| **.RE{x}.DRS** | Standard deviation for mean dosing rate in window × (1…9) in mL/min |
| **.RE{x}.DRT** | Mean dosing rate in window × (1…9) in mL/min |
| **.RE{x}.RWL** | Lower limit of the evaluation window × (1…9) in s |
| **.RE{x}.RWH** | Upper limit of the evaluation window × (1…9) in s |
| **.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 of 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 |
| **.SVT** | Total start volume (volume that was added in dependence on 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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 | **756 KF Coulometer** \| **831 KC Coulometer** |
| Default value | **831 KC Coulometer** |

## Dosing device

### Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 811)*. This parameter is displayed only for Titrandos and 855.

### Dosing device

Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

*Titrando*

| | |
|---|---|
| Selection | **1** \| **2** \| **3** \| **4** |
| Default value | **2** |

*855*

| | |
|---|---|
| Selection | **1** \| **2** \| **3** |
| Default value | **2** |

### 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 run 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.

*Titrando, 855*

| | |
|---|---|
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

### Filling rate

Speed with 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 then during dosing it will automatically be reduced to the largest possible value (*(see Chapter 5.6.3.8.5, page 811)*).

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

**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*

| | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The start conditions are processed in the listed sequence before the titration is started.

### Initial measured value

**Note**

Is displayed only 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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, 855*

| | |
|---|---|
| Range | **0 ... 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*

| | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **0.00000 mL** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

**Control point**

**Control point at**

Definition of the current value to be controlled.

*Titrando, 855*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Selection | **off** |
| Default value | **off** |

### Titration rate

**Titration rate**

Three predefined rates, for which the parameters for **Control** are not displayed, can selected for the titration rate. The **User** setting must be selected in order to be able to edit these parameters.

| | |
|---|---|
| Selection | **50 µL/min** \| **100 µL/min** \| **500 µL/min** \| **User** |
| Default value | **100 µL/min** |

### Control

**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

**Dynamics**

The control range defines the measured value range before the given control point. It has a decisive influence on the titration rate and thus also on the accuracy. The dosing is also monitored by the **Min. rate** within the control range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing proceeds continuously at the **Max. rate**.

*Titrando, 855*

| | |
|---|---|
| Range | **0.1 ... 2000.0 mV** |
| Default value | **60.0 mV** |
| Selection | **off** |

*Titrino*

| | |
|---|---|
| Range | **1.00 ... 2000 mV** |
| Default value | **60.0 mV** |
| Selection | **off** |

**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. The following rule of thumb should be used as a starting

point for parameterization: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in µL/min.

| *Titrando, 855* | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 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 reaction rate in µL/min/10.

| | |
|---|---|
| Range | **0.01 ... 9999.00 µL/min** |
| Default value | **10.00 (50 µL/min), 20.00 (100 µL/min), 40.00 (500 µL/min) µL/min** |

**Note**

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. The parameters **Max. rate** and **Control range** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The **Control range** should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. U = 180 mV). The nominal value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started with a small deviation from the control point. Within the control range, the dosing rate is determined primarily by the **Min. rate**.

### 5.6.3.8.7.5 STAT U - Titration parameters

Tab: **Method** ▸ **STAT U** ▸ **Properties...** ▸ **Titration parameters**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

Parameters defining 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **2 s** |

### Start time

The measured values are not entered in the measuring point list until this time has elapsed since the start of the titration.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Start measured value

The measured values are not entered in the measuring point list until this value has been reached.

*Titrando, 855*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **-2000 ... 2000 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 checked 10 s after the start at the earliest.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| Input | **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

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*

| Range | **0.00000 ... 9999.99 mL** |
|---|---|
| Default value | **100,000 mL** |
| Selection | **off** |

*Titrino*

| Range | **0.000 ... 9999.99 mL** |
|---|---|
| Default value | **100.00 mL** |
| Selection | **off** |

#### Stop time

Stops when the preset time has elapsed after the start conditions have been fulfilled.

| Range | **0 ... 999999 s** |
|---|---|
| Selection | **off** |
| Default value | **off** |

#### since

Specifies when the stop time begins to be counted down (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 titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **off** |
| Default value | **off** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The following monitoring processes can be switched on and defined on this tab:

## Monitoring Measured value

### Monitoring Measured value

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

If this check box is activated, then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

### Lower limit

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

### Lower hysteresis

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value, then the event **Measured value lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 2000.0 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 exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000** |
| Default value | **2000** |

### Upper hysteresis

The 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** will be triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.0 ... 2000.0 mV** |
| Default value | **0.2 mV** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (Titrando, 855)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (Titrando, 855)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

## Monitoring Dosing rate

### Monitoring Dosing rate

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

If this check box is activated, then the averaged dosing rate will be monitored and any exceeded limits will be entered in the measuring point list. This monitoring is not started until 10 s after the start of the titration.

### Lower limit

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00 ... 166.00 mL/min** |
| Default value | **0.00 mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 150.00 mL/min** |
| Default value | **0.00 mL/min** |

### Lower hysteresis

The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit by this hysteresis value, the action **Dosing rate lower limit ok** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00 ... 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 exceeded** will be triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00 ... 166.00 mL/min** |
| Default value | **166.00 mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.00 ... 150.00 mL/min** |
| Default value | **150.00 mL/min** |

### Upper hysteresis

Upper hysteresis of the dosing rate. When the dosing rate again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit ok** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.00 ... 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 exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (Titrando, 855)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (Titrando, 855)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

## Monitoring Temperature

### Monitoring Temperature

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

If this check box is activated, then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

### Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **-20.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **-170.0 °C** |

### Lower hysteresis

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **150.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **500.0 °C** |

### Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| Selection | **Stop determination** \| **Stop command (Titrando, 855)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
|---|---|
| Default value | **none** |

**Stop determination**
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (Titrando, 855)**
The running **STAT** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **STAT** command is 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 exceeded.

### 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 exceeded.

**[New]**

Opens the dialog window **Track call #** in which the parameters for the track call can be entered *(see Chapter 5.6.3.8.4, page 810)*.

**[Properties]**

Opens the dialog window **Track call #** in which the parameters for the track call can be edited *(see Chapter 5.6.3.8.4, page 810)*.

**[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.

| Input | **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, than a maximum of 9 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 dialog window **Evaluation window #** in which the parameters for a new time slot can be entered *(see Chapter 5.6.3.8.3, page 810)*.

**[Properties]**

Opens the dialog window **Evaluation window #** in which the parameters for the new time slot can be edited *(see Chapter 5.6.3.8.3, page 810)*.

**[Delete]**

Deletes the time slot selected in the table.

### Fix endpoint evaluation

**Fix 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 **volume**) for the fix endpoint from the measuring point list.

**[New]**

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.8.7.10, page 862)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.8.7.10, page 862)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Input | **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]**

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 879)*.

**[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 879)*.

**[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.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.3.8.7.10 STAT U - Fix endpoint evaluation

Dialog window: **Method** ▸ **STAT U** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Properties]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

*Volume*

| | |
|---|---|
| Range | **0.00000 ... 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.

**Devices**

This command can be executed with the following devices.

**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'**:

| 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 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}.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 |
| **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 |

| Identification | Description |
|---|---|
| **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 |
| **MI.TIM** | Time at minimum measured value in s |
| **MI.VOL** | Volume at minimum measured value in mL |
| **NMP** | Number of measuring points in the 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

**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.

### 5.6.3.9.3 TET - Start conditions

Tab: **Method ▸ TET ▸ Properties... ▸ Start conditions**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 .

| | |
|---|---|
| Range | **0.00000 ... 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.

| | |
|---|---|
| Range | **0.100 ... 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.

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **0 s** |

### 5.6.3.9.4 TET - Titration parameters

Tab: **Method ▸ TET ▸ Properties... ▸ Titration parameter**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 carried out. The maximum dosing rate depends on the cylinder volume of the dosing unit used.

| | |
|---|---|
| Range | **0.100 ... 166,000 mL/min** |
| Default value | **2.000 mL/min** |
| Selection | **maximum** |

**Filter**

**Filter 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.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Input | **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**

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.

| | |
|---|---|
| Range | **0.01 ... 50.00 mL** |
| Selection | **off** |
| Default value | **off** |

**Stop measured value**

Stops 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.

| | |
|---|---|
| Range | **0.0 ... 60.0 °C** |
| Selection | **off** |
| Default value | **off** |

**Stop time**

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

### Stop slope

Stops 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.

| | |
|---|---|
| Range | **-999999.999 ... 999999.999 °C/mL** (Increment: **0.001**) |
| Default value | **0.100 °C/mL** |
| Selection | **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.

| | |
|---|---|
| Range | **0.01 ... 50.00 mL** |
| Default value | **0.5 mL** |
| Selection | **off** |

### Filling rate

Rate (volume/time unit) at which the buret is to be refilled 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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

## 5.6.3.9.6 TET - Thermometric evaluation

Tab: **Methode ▸ TET ▸ Properties... ▸ Thermometric evaluation**

### Command name

Name of the command.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0.0 ... 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]**

Opens the dialog window **Endpoint #** in which the parameters for a new endpoint can be entered *(see Chapter 5.6.3.9.9, page 874)*.

**[Properties]**

Opens the dialog window **Endpoint #** in which the parameters for the selected endpoint can be edited *(see Chapter 5.6.3.9.9, page 874)*.

**[Delete]**

Deletes 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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

**Fix endpoint evaluation**

**Fix 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]**

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.3.9.10, page 874)*.

**[Properties]**

Opens the dialog window **Fixed endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.3.9.10, page 874)*.

**[Delete]**

Deletes the selected line.

### Minimum evaluation

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

If this option is enabled, 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.

Can only be edited for **Minimum evaluation** = **on**, otherwise disabled.

| | |
|---|---|
| Range | **0.1 ... 20.0 °C/mL** |
| Default value | **1.0 °C/mL** |

### Maximum evaluation

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

If this option is enabled, 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.

Can only be edited for **Maximum evaluation** = **on**, otherwise disabled.

| | |
|---|---|
| Range | **0.1 ... 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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes 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*

| | |
|---|---|
| Range | **-999999 ... 0** |
| Default value | **-5** |

*for reaction type = endothermic*

| | |
|---|---|
| Range | **0 ... 999999** |
| Default value | **5** |

### 5.6.3.9.10 TET - Fixed endpoint evaluation

Dialog window: **Method ▸ TET ▸ Properties... ▸ Additional evaluations ▸ Fixed endpoint evaluation #**

**Response**

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*

| | |
|---|---|
| Range | **0.0 ... 60.0 °C** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

| *Volume* | |
|---|---|
| Range | **0.00000 ... 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**

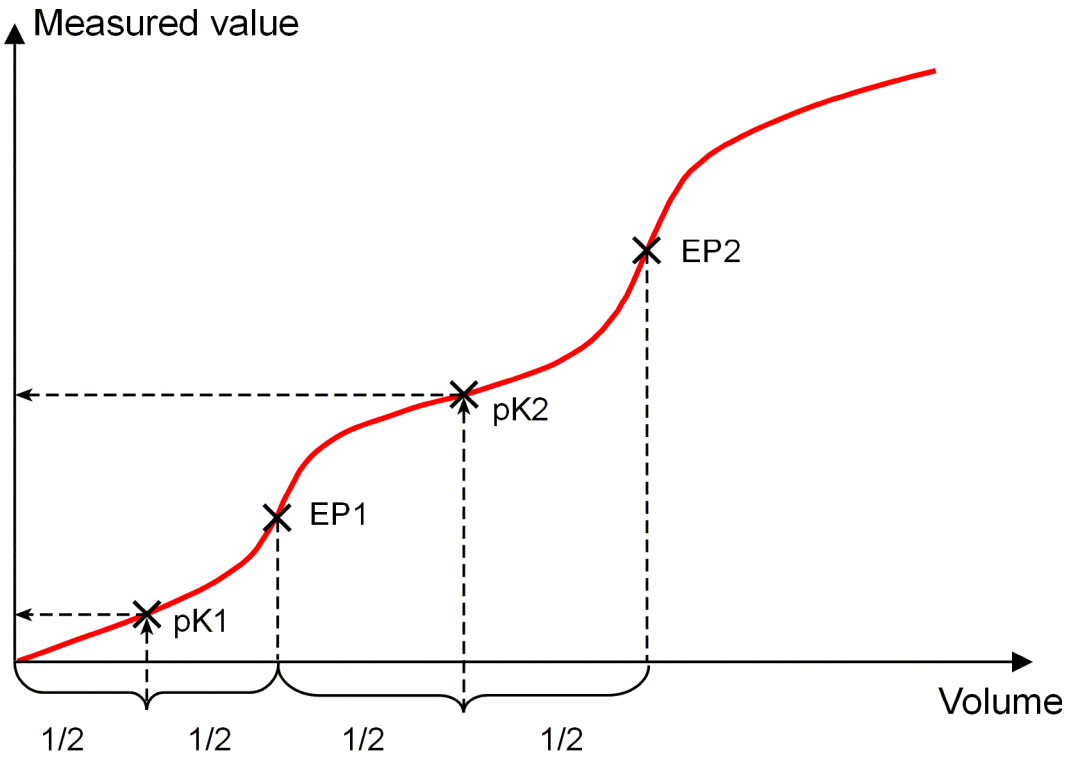
The **pK value** can be determined for pH titrations (DET and MET) and the **half neutralization potential** can be determined for U titrations.

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.



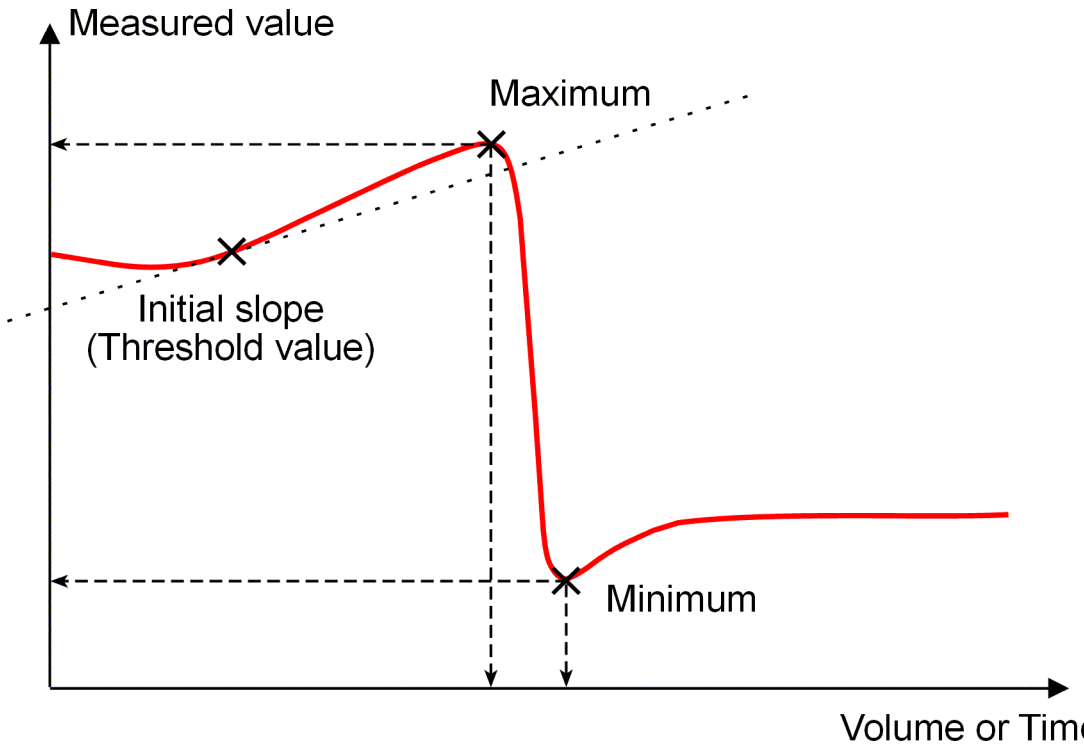

**Note**

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**

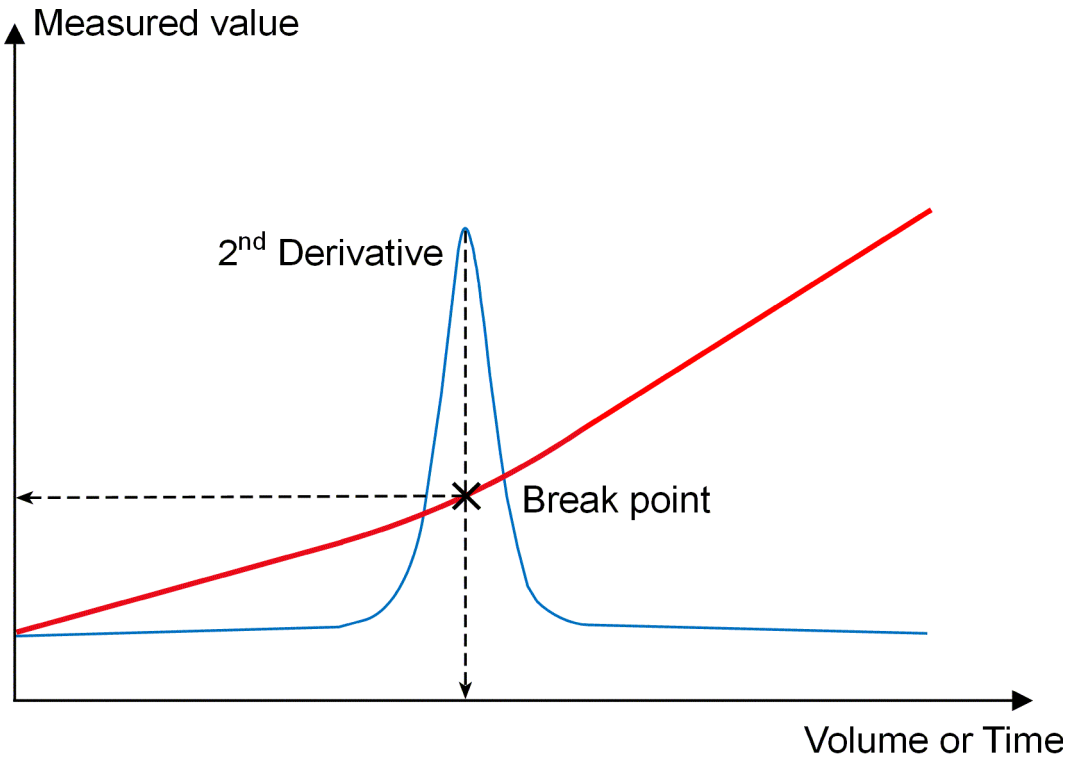
For the minimum or maximum measured value the associated **volume**, **time** and **temperature** are interpolated from the measuring point list. The evaluation begins as soon as the slope of the curve exceeds a particular threshold value.




### 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

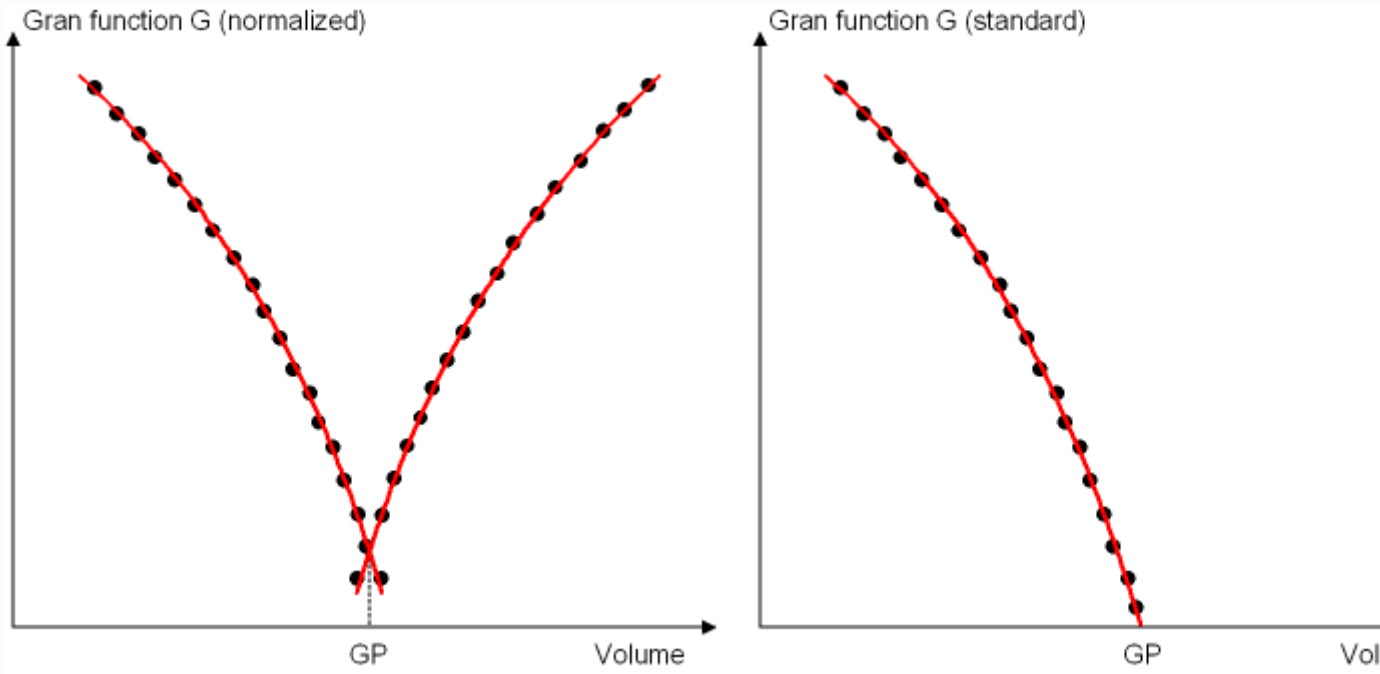
Parameters: **Method** ▸ **DET/MET** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Gran evaluation**

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.

| | |
|---|---|
| Input | **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 .

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0 ... 5** |
| Default value | **2** |

**Comment**

Comment on the calculated measured value.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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 value 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 coefficients of the conductivity.
- *MEAS Ref*
  Measurement of a reference spectrum.
- *MEAS Spec*
  Measurement of the sample spectrum
- *MEAS Opt*
  Adsorption measurement
- *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**

#### Principle

With the standard addition procedure an known amount of the substance to determine is once or more than once added to the sample, whereby the addition can be carried out manually or automatically. In contrast to the normal ion measurement with ion-selective electrodes *(see Chapter 5.6.5.6.1, page 1040)*, with the standard addition procedure it cannot be differentiated between ions searched and interfering ions, because both are present in the sample at the beginning. Only the sum can be determined. Therefore a linear correlation of $U$ and $\log(c_i)$ is generally assumed for standard addition measurements.

$$U_i = E(0) + \frac{U_N}{z} \cdot \log(c_i)$$

This way, the regression line (linear regression) is 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:

$$c = \frac{V_S + V_{Add}}{V_S} \cdot c_A$$

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 the required end result $c_S$ (concentration of the ion searched in the sample solution) out of this, this must be calculated with the aid of a **CALC** command according to the following formula ($\rho$ = 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**

The values for the axis intercept $E(0)$, the slope $s$ and the concentration $c_A$ can only be iteratively recalculated out of voltages $U_i$ measured for the sample and the spiked solutions and the known concentration of the standard which requires a lot of effort because it is about an equation system with 3 unknowns. At least, the concentration $c_S$ is easily recalculable with the values for $E(0)$, $U_S$ and $s$ calculated by tiamo (see following example).

### Example

- **Parameters**
  Concentration of the standard addition solution = 1000 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 |

- **Results**
  $E(0)$ = 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

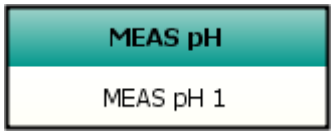
**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

**pH/Ion - Meter:** 867

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:




**Parameters**

The parameters for the command **MEAS pH** are configured on the following 4 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*
  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 pH** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 following processing of the command) 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 on the measuring point list |
| **.LP.EXx** | External value x (1…3) for the last measuring point on 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 of 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 with 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 the 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.

| Input | **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 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** |
| Default value | **pH electrode** |

### 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 manually entered 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 direction in which the stirring is done.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-15 ... 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.

| Input | **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 enabled. The measurement is stopped 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 enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value pH** is met. The corresponding parameters are not visible if this option is disabled.

**Note**

A constant measured value is often only achieved 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 achieved.

#### 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*

| | |
|---|---|
| Range | **0.1 ... 999.0 mV/min** |
| Default value | **10.0 mV/min** |

*Titrino*

| | |
|---|---|
| Range | **0.5 ... 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*

| | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 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* | |
|---|---|
| Range | **-20.000 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **120 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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* | |
|---|---|
| Range | **-20.000 ... 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* | |
|---|---|
| Range | **-20.0 ... 150 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **25 characters** |
|---|---|

The following methods for evaluation of measurement curves can be activated and defined on this tab.

**Fix endpoint evaluation**

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.3.6, page 896)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.3.6, page 896)*.

**[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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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 enabled, 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 modification, even small changes in the

measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

| | |
|---|---|
| Range | **2 ... 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

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-20,000 ... -20,000 pH** |
| Default value | **20,000 pH** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-20,000 ... 20,000 pH** |
| Default value | **20,000 pH** |

| *Window = Time* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 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.

| Input | **25 characters** |
|---|---|

A maximum of 6 additional measured values can be defined here 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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.4.3.6 MEAS pH - Fix endpoint evaluation

Dialog window: **Method ▸ MEAS pH ▸ Properties... ▸ Additional evaluations ▸ Fix 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** |

**Fix value**

Value of the fixed endpoint.

*Measured value*

| | |
|---|---|
| Range | **-20,000 ... 20,000 pH** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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 command **MEAS U** are configured on the following 4 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*
  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 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}.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 slope of the sensor used for the command (in mV for ISE sensors) |

| Identification | Description |
|---|---|
| **.ETE** | End temperature (temperature following processing of the command) 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 on the measuring point list |
| **.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** | Temperature for the last measuring point of 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 with 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 the measuring point list |

| Identification | Description |
|---|---|
| **.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** |

#### 5.6.4.4.2 MEAS U - General/Hardware

Tab: **Method** ▸ **MEAS U** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

**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 manually entered 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 direction in which the stirring is done.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-15 ... 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, 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.

| | |
|---|---|
| Input | **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.

**Note**

A constant measured value is often only achieved 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 achieved.

**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* | |
|---|---|
| Range | **0.1 ... 999.0 mV/min** |
| Default value | **10.0 mV/min** |

| *Titrino* | |
|---|---|
| Range | **0.5 ... 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* | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| *Titrando, 855, 867* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 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* | |
|---|---|
| Range | **-2000.0 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **120 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

#### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.4.6, page 909)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.4.6, page 909)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/s** |
| Default value | **25.0 mV/s** |

### Break-point evaluation

**Break-point evaluation**

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

If this option is enabled, 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 modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

**Smoothing factor**

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

*Window = Time*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **999999 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.

| | |
|---|---|
| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.4.4.6 MEAS U - Fix endpoint evaluation #

Dialog window: **Method** ▸ **MEAS U** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation** ▸ **[New]/[Property]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value (Titrando, 867, 855)*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Measured value (Titrino)*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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, 852, 857, 888, 890, 901, 904, 905, 906, 907

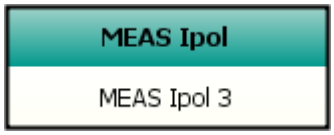
**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

**pH/Ion - Meter:** 867

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:



### Parameters

The parameters for the command **MEAS Ipol** are configured on the following 4 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*
  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 Ipol** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 following processing of the command) 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 |

| 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 on the measuring point list |
| **.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** | Temperature for the last measuring point of 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 with 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 the 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.

| Input | **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, 852, 867*

| | |
|---|---|
| Selection | **1** \| **2** |
| Default value | **1** |

*851, 855*

| | |
|---|---|
| Selection | **1** |
| Default value | **1** |

*852*

| | |
|---|---|
| Selection | **2** |
| Default value | **2** |

#### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 125.0 µA** (Increment: **1**) |
| Default value | **5 µA** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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 manually entered 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 direction in which the stirring is done.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-15 ... 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, 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.

| | |
|---|---|
| Input | **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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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* | |
|---|---|
| Range | **0.1 ... 999.0 mV/min** |
| Default value | **10.0 mV/min** |

| *Titrino* | |
|---|---|
| Range | **0.5 ... 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* | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **52 s** |

**Measuring interval**

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 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*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **120 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 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*

| | |
|---|---|
| Range | **-2000.0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.5.6, page 922)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.5.6, page 922)*.

**[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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 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.

| | |
|---|---|
| Range | **1.0 ... 2000.0 mV/s** |
| Default value | **25.0 mV/s** |

### Break-point evaluation

**Break-point evaluation**

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

If this option is enabled, 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 modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

**Smoothing factor**

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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**

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

**Upper limit**

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

*Window = Time*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **999999 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.

| | |
|---|---|
| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.4.5.6 MEAS Ipol - Fix endpoint evaluation #

Dialog window: **Method** ▸ **MEAS Ipol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix 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** |

**Fix value**

Value of the fixed endpoint.

*Measured value (Titrando, 867, 855)*

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |

*Measured value (Titrino)*

| | |
|---|---|
| Range | **-2000 ... 2000 mV** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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, 852, 857, 888, 890, 901, 904, 905, 906, 907

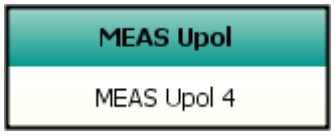
**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

**pH/Ion - Meter:** 867

**Robotic Titrosampler:** 855

**Appearance**

The command has the following appearance:



### Parameters

The parameters for the command **MEAS Upol** are configured on the following 4 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*
  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 Upol** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (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 following processing of the command) 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 × (1…9) in the unit of the measured value |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (1…9) is reached |

| 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 × (1...3) for the last measuring point on 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 in 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 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 with 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 the 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.

| Input | **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** |

*852*

| | |
|---|---|
| Selection | **2** |
| Default value | **2** |

### Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

| | |
|---|---|
| Selection | **Sensor name** \| **Metal electrode** |
| Default value | **Metal electrode** |

### U(pol)

The polarization voltage is the voltage applied to the polarized electrode during an amperometric measurement.

| *Titrando, 855, 867* | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

| *Titrino* | |
|---|---|
| Range | **-1270 ... 1270 mV** (Increment: **10**) |
| Default value | **400 mV** |

### Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition 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 manually entered 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 direction in which the stirring is done.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-15 ... 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, 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.

| | |
|---|---|
| Input | **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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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* | |
|---|---|
| Range | **0.01 ... 99.90 µA/min** |
| Default value | **10.00 µA/min** |

| *Titrino* | |
|---|---|
| Range | **0.05 ... 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* | |
|---|---|
| Range | **0 ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 16200 s** (Increment: **0.08**) |
| Default value | **2.0 s** |

### Stop meas. value

Stops when the preset measured value has been reached since the start of the measurement.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-200.0 ... 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*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

*Titrino*

| | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **120 s** |

**Measuring interval**

Time interval for entering a measuring point in the measuring point list.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

*Titrino*

| | |
|---|---|
| Range | **0.08 ... 16200 s** (Increment: **0.08**) |
| Default value | **2.0 s** |

**Stop meas. value**

Stops when the preset measured value has been reached since the start of the measurement.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-200.0 ... 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*

| | |
|---|---|
| Range | **-20.0 ... 150 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.6.6, page 935)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.6.6, page 935)*.

**[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.

| | |
|---|---|
| Range | **0.5 ... 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.

| | |
|---|---|
| Range | **0.5 ... 10.0 µA/s** |
| Default value | **5.0 µA/s** |

### Break-point evaluation

**Note**

This evaluation method is possible only with Titrando, 855 and 867.

#### Break-point evaluation

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

If this option is enabled, 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 modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

#### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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**

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **-200.0 µA** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

**Upper limit**

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |
| Default value | **200.0 µA** |

*Window = Time*

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **999999 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.

| | |
|---|---|
| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.4.6.6 MEAS Upol - Fix endpoint evaluation #

Dialog window: **Method** ▸ **MEAS Upol** ▸ **Properties...** ▸ **Additional evaluations** ▸ **Fix endpoint evaluation #** ▸ ▸ **[New]/[Property]** ▸ **Fix 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** |

**Fix value**

Value of the fix endpoint.

*Measured value*

| | |
|---|---|
| Range | **-200.0 ... 200.0 µA** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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 command **MEAS T** are configured on the following 4 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*
  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** and can be used in formulas under the designation **'Command name.Variable designation'**:

| Identification | Description |
|---|---|
| **.BP{x}.MEA** | Measured value (temperature) for the break point × (1…9) in the unit of the measured value |
| **.BP{x}.TEM** | Temperature for the break point × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (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 following processing of the command) 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 × (1…9) in the unit of the measured value |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |

| Identification | Description |
|---|---|
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (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 × (1…3) for the last measuring point on the measuring point list |
| **.LP.EXx** | External value × (1…3) for the last measuring point of 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 of 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 with 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 the 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.

| Input | **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 type **Temperature sensor** or **pH Electrode** from the sensors configured in the sensor table.

| | |
|---|---|
| Selection | **Sensor name** \| **Temperature sensor** \| **pH Electrode** |
| Default value | **Temperature sensor** |

**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 direction in which the stirring is done.

*Titrando, 855, 856, 867*

| | |
|---|---|
| Range | **-15 ... 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, 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.

| | |
|---|---|
| Input | **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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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*

| | |
|---|---|
| Range | **0.1 ... 999.0 °C** |
| Default value | **0.5 °C** |

*Titrino*

| | |
|---|---|
| Range | **0.5 ... 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* | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| *Titrando, 855, 867* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **215 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **215 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 16200 s** (Increment: **0.08**) |
| Default value | **2.0 s** |

### Stop meas. value

Stops when the preset measured value has been reached since the start of the measurement.

| *Titrando, 855, 867* | |
|---|---|
| Range | **-20.0 ... 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* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **600 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **600 s** |

#### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 16200 s** (Increment: **0.08**) |
| Default value | **2.0 s** |

#### Stop meas. value

Stops when the preset measured value has been reached since the start of the measurement.

| *Titrando, 855, 867* | |
|---|---|
| Range | **-20.0 ... 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* | |
|---|---|
| Range | **-20.0 ... 150 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

**Fix endpoint evaluation**

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.7.6, page 947)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.7.6, page 947)*.

**[Delete]**

Deletes the selected line.

### 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 20.0 °C/s** |
| Default value | **1.0 °C/s** |

### Break-point evaluation

**Note**

This evaluation method is possible only with Titrando, 855, 856 and 867.

**Break-point evaluation**

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

If this option is enabled, 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 modification, even small changes in the

measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **-20.0 °C** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **150.0 °C** |

| *Window = Time* | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **999999 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.

| Input | **25 characters** |
|---|---|

A maximum of 6 additional measured values can be defined here 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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

#### 5.6.4.7.6 MEAS T - Fix endpoint evaluation

Dialog window: **Method ▸ MEAS pH ▸ Properties... ▸ Additional evaluations ▸ Fix 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** |

**Fix value**

Value of the fix endpoint.

| *Measured value* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 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**.

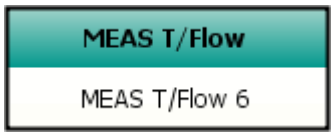
**Devices**

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 |
| **.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 |

| Identification | Description |
|---|---|
| **.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 |
| **.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.

| Input | **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.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

**Measuring time**

Maximum period of time for measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **600 s** |

**Measuring interval**

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **1 ... 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.

| | |
|---|---|
| Range | **50.0 ... 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 command **MEAS Conc** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *General/Hardware*
  Parameters for setting the measurement procedure.
- *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 Conc** 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 not ever been started |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final measured value (measured value after processing of the command) in the unit of the measured value |
| **.ENP** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |
| **.ETE** | End temperature (temperature following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 × (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.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 |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |

| Identification | Description |
|---|---|
| **.NMP** | Number of measuring points in the 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.

| | |
|---|---|
| Input | **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** |

**Sensor**

Selection of an ISE sensor from the ISE sensors available in the sensor table.

| | |
|---|---|
| Selection | **'Sensor name'** \| **ISE electrode** |
| Default value | **ISE electrode** |

**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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

## 5.6.4.9.3 MEAS Conc - Measuring parameters

Tab: **Method** ▸ **MEAS Conc** ▸ **Properties...** ▸ **Measuring parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

#### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

#### Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

| | |
|---|---|
| Range | **0 ... 1E+99** |
| 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.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

#### Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

#### Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

| | |
|---|---|
| Range | **0 ... 1E+99** |
| 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

| | |
|---|---|
| Range | **-20.0 ... 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.

| | |
|---|---|
| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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**.

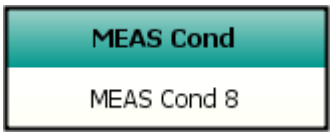
#### Devices

This command can be executed with the following devices:

**Conductometer:** 712, 856

#### Appearance

The command has the following appearance:




#### Parameters

The parameters for the command **MEAS Cond** are configured on the following 4 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*
  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 Cond** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break point × (1…9) in s |

| Identification | Description |
|---|---|
| **.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 |
| **.ETE** | End temperature (temperature following processing of the command) 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 × (1…9) in the unit of the measured value |
| **.FP{x}.TEM** | Temperature for the fixed endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fixed endpoint × (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 × (1...3) for the last measuring point on 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 in 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 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 |

| Identification | Description |
|---|---|
| **.MI.MEA** | Minimum measured value ($U_{ind}$) in mV |
| **.MI.TEM** | Temperature with 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 the measuring point list |
| **.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.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.

| Input | **25 characters** |
|---|---|

The general parameters for the device 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

Display of 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** |
| Default value | **Conductivity sensor** |

### 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 manually entered under **Temperature** on the **Measuring parameters** tab will be used.

## Stirrer

**Note**

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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

## 5.6.4.10.3 MEAS Cond - Measuring parameters

Tab: **Method** ▸ **MEAS Cond** ▸ **Properties...** ▸ **Measuring parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **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 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. 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 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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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*

| | |
|---|---|
| Range | **0.001 ... 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 waiting time is elapsing.

*856*

| | |
|---|---|
| Range | **0 ... 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.

*856*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

**Measuring interval**

Time interval for entering a measuring point in the measuring point list.

*856*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

**Stop meas. value**

Stops when the preset measured value has been reached since the start of the measurement.

*856*

| | |
|---|---|
| Range | **0.0000 ... 2000.00 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:

**Duration of measurement**

Maximum period of time for measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

**Measuring interval**

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

*712*

| | |
|---|---|
| Range | **0.4 ... 999999 s** |
| Default value | **2.0 s** |

*856*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

### Stop meas. value

Stops when the preset measured value has been reached since the start of the measurement.

| | |
|---|---|
| Range | **0.0000 ... 2000.00 mS/cm** |
| Selection | **off** |
| Default value | **off** |

**off**
No stop.

## Temperature

### Measurement temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

*712*

| | |
|---|---|
| Range | **-170.0 ... 500.0°C** |
| Default value | **20.0** |

*856*

| | |
|---|---|
| Range | **-20.0 ... 150.0°C** |
| Default value | **20.0** |

### 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*

| | |
|---|---|
| Range | **-170.0 ... 500.0°C** |
| Default value | **20.0** |

*856*

| | |
|---|---|
| Range | **-20.0 ... 150.0°C** |
| Default value | **20.0** |

| | |
|---|---|
| Selection | **off** |

**off**
The conductivity is displayed for the measurement temperature.

### Temperature compensation

| | |
|---|---|
| Selection | **Temperature coefficient** \| **Sample solution** |
| Default value | **Temperature coefficient** |

**Temperature coefficient**
Manual input of a constant temperature coefficient.

**Sample solution**
Selection of a function for the temperature coefficients from the table **Sample solutions (TC conductivity)**.

**Temperature coefficient**

| | |
|---|---|
| Range | **0.00 ... 9.99 %/°C** |
| Default value | **2.00 %/°C** |

**Sample solution**

Selection of the sample solution from the table **Sample solutions (TC conductivity)**.

| | |
|---|---|
| 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.

| | |
|---|---|
| Input | **25 characters** |

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

**Fix endpoint evaluation**

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint *(see Chapter 5.6.4.10.6, page 973)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table *(see Chapter 5.6.4.10.6, page 973)*.

**[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.

| | |
|---|---|
| Range | **0.001 ... 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 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.

| | |
|---|---|
| Range | **0.001 ... 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 enabled, 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 modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

### Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **0.0000 ... 2000.0 mS/cm** |
| Default value | **0.0000 mS/cm** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **0.0000 ... 2000.0 mS/cm** |
| Default value | **2000.0 mS/cm** |

| *Window = Time* | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **999999 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.

| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[Delete]**

Deletes the external measured value selected in the table.

### 5.6.4.10.6 MEAS Cond - Fix endpoint evaluation

Dialog window: **Method ▸ MEAS Cond ▸ Properties... ▸ Additional evaluations ▸ Fix 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** |

**Fix value**

Value of the fixed endpoint.

*Measured value*

| | |
|---|---|
| Range | **0.0000 ... 2000.00 mS/cm** |

*Time*

| | |
|---|---|
| Range | **0.0 ... 999999.9 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 coefficients 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 command **MEAS TC Cond** are configured on the following two tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *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 Cond** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 × (1…9) in °C |
| **.BP{x}.TIM** | Time for the break-point × (1…9) in s |
| **.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 |
| **.EME** | Final 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 following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended** |

| Identification | Description |
|---|---|
| **.FP{x}.MEA** | Measured value for the fix endpoint × (1…9) in the unit of the measured value |
| **.FP{x}.TEM** | Temperature for the fix endpoint × (1…9) in °C |
| **.FP{x}.TIM** | Time in s until the fix endpoint × (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 × (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.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 ($U_{ind}$) 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 with 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 the 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 |

| Identification | Description |
|---|---|
| **.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 |

### 5.6.4.11.2 MEAS TC Cond - General/Hardware

Tab: **Method** ▸ **MEAS TC Cond** ▸ **Properties...** ▸ **General/Hardware**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| 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** |
| Default value | **Conductivity sensor** |

### 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

## 5.6.4.11.3 MEAS TC Cond - Measuring parameters

Tab: **Method** ▸ **MEAS TC Cond** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **3000 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*712*

| | |
|---|---|
| Range | **0.4 ... 999999 s** |
| Default value | **2.0 s** |

*856*

| | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **2.0 s** |

### Sample solution

Selection of the sample solution from the table **Sample solutions (TC conductivity)**.

| | |
|---|---|
| Selection | **DIN** \| **Table entries** |
| Default value | **DIN** |

### Start temperatur

Temperature at the time of the start of the measurement.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **20.0 °C** |

### Stop temperature

Temperature at the time of the end of the measurement.

*856*

| | |
|---|---|
| Range | **-20.0 ... 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.

| Input | **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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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 a reference spectrum**.

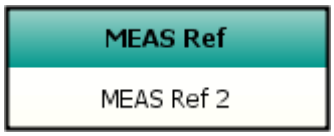
#### Devices

This command can be executed with the following device:

**Spectrometer:** Avantes

#### Appearance

The command has the following appearance:




#### Parameters

The parameters for the command **MEAS Ref** are configured on the following 2 tabs:

- *General/Hardware*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

#### Command variables

The following command variables are generated in the method run by the command **MEAS Ref** 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 |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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.

| | |
|---|---|
| Input | **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 | **Avantes Spectrometer** |
| Default value | **Avantes Spectrometer** |

### 5.6.4.12.3 MEAS Ref - Measuring parameters

Tab: **Method ▸ MEAS Ref ▸ Properties... ▸ Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

**Start wavelength**

Lower limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **400.0 nm** |

**End wavelength**

Upper limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **1000.0 nm** |

**Integration time**

Integration time for spectrum recording.

| | |
|---|---|
| Range | **0.01 ... 600000 ms** |
| Default value | **6 ms** |

**Averaged spectra**

The number of spectra that are recorded and averaged.

| | |
|---|---|
| Range | **1 ... 10000** |
| Default value | **10** |

**Smoothing**

Number of neighboring pixels with which the value for each measurement pixel is determined.

| | |
|---|---|
| Range | **0 ... 100 Pixels** |
| Default value | **0 Pixels** |

## 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 spectrum**.

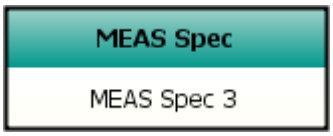
#### Devices

This command can be executed with the following device:

**Spectrometer:** Avantes

#### Appearance

The command has the following appearance:




#### Parameters

The parameters for the command **MEAS Spec** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for device.
- *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 in the method run by the command **MEAS Spec** 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 |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended** |
| **.STY** | Type of stop with which the command was stopped: **1 = normal**;**0 = manual** or **after error** |

| Identification | Description |
|---|---|
| **.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 |
| **.PK{#}.SAT** | Specification as to whether the dectector 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.

| | |
|---|---|
| Input | **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 | **Avantes Spectrometer** |
| Default value | **Avantes Spectrometer** |

### 5.6.4.13.3 MEAS Spec - Measuring parameters

Tab: **Method** ▸ **MEAS Spec** ▸ **Properties...** ▸ **Measuring parameters**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

#### Start wavelength

Lower limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **400.0 nm** |

#### End wavelength

Upper limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **1000.0 nm** |

#### Integration time

Integration time for spectrum recording.

| | |
|---|---|
| Range | **0.01 ... 600000 ms** |
| Default value | **6 ms** |

#### Averaged spectra

The number of spectra that are recorded and averaged.

| | |
|---|---|
| Range | **1 ... 10000** |
| Default value | **10** |

#### Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

| | |
|---|---|
| Range | **0 ... 100 Pixels** |
| Default value | **0 Pixels** |

### 5.6.4.13.4 MEAS Spec - Evaluations

Tab: **Method ▸ MEAS Spec ▸ Properties... ▸ Evaluations**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

**[New]**

Opens the dialog window **Evaluation window #** for entering the start and end wavelengths *(see Chapter 5.6.4.13.5, page 986)*.

**[Properties]**

Opens the dialog window **Evaluation window #** for editing the start and end wavelengths selected in the table *(see Chapter 5.6.4.13.5, page 986)*.

**[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.

| Range | **200.0 ... 1100.0 nm** |
|---|---|
| Default value | **400.0 nm** |

**End wavelength**

Upper limit of the evaluation range.

| Range | **200.0 ... 1100.0 nm** |
|---|---|
| Default value | **1000.0 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 **absorbance measurements**.

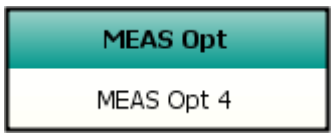
#### Devices

This command can be executed with the following device:

**Spectrometer:** Avantes

### Appearance

The command has the following appearance:




### Parameters

The parameters for the command **MEAS Opt** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Evaluations*
  Definition of evaluation results for absorbance measurements.

### Command variables

The following command variables are generated in the method run by the command **MEAS Opt** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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** | Temperature for the break-point # (1…9) in °C |
| **.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 not ever been started |
| **.DBL** | Total duration for the processing of the command in s |
| **.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** |
| **.FP{#}.[MEA]** | Measured value for the fix endpoint # (1…9) in the unit of the measured value |

| Identification | Description |
|---|---|
| **.FP{#}.CNT** | Intensity for the fix endpoint x (1…9) in counts |
| **.FP{#}.TEM** | Temperature for the fix endpoint # (1…9) in °C |
| **.FP{#}.TIM** | Time for fix endpoint # (1…9) in s |
| **.FP{#}.TRN** | Transmission for the fix endpoint x (1…9) in % |
| **.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.CNT** | Transmission of the last measuring point of the measuring point list in % |
| **.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 in 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 in the measuring point list is reached |
| **.LP.TRN** | Transmission of the last measuring point of 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** | 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** | 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 % |

| Identification | Description |
|---|---|
| **.NMP** | Number of measuring points in the measuring point list |
| **.STY** | Type of stop with which the command was stopped:<br>**1 = normal**;**0 = manual** or **after error** |

### 5.6.4.14.2 MEAS Opt - General/Hardware

Tab: **Method** ▸ **MEAS Opt** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 | **Avantes Spectrometer** |
| Default value | **Avantes Spectrometer** |

### 5.6.4.14.3 MEAS Opt - Measuring parameters

Tab: **Method** ▸ **MEAS Opt** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

### Wavelength

Wavelength at which the measured quantity (absorbance) is recorded

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **400.0 nm** |

### Integration time

Integration time for absorption measurement.

| | |
|---|---|
| Range | **0.01 ... 600000 ms** |
| Default value | **6 ms** |

### Averaged spectra

The number of spectra that are recorded and averaged.

| | |
|---|---|
| Range | **1 ... 10000** |
| Default value | **10** |

### Smoothing

Number of neighboring pixels with which the light intensity is determined for each measurement pixel.

| | |
|---|---|
| Range | **1 ... 100 Pixels** |
| Default value | **1 Pixels** |

## Measurement

### Measuring time

Duration of the absorption measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

### Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

| | |
|---|---|
| Range | **0 ... 4000 mAU** |
| Selection | **off** |
| Default value | **off** |

### 5.6.4.14.4 MEAS Opt - Evaluations

Tab: **Method** ▸ **MEAS Opt** ▸ **Properties...** ▸ **Evaluations**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

#### Fix endpoint evaluation

**Fix 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 fix 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 dialog window **Fix endpoint evaluation #** to enter a new fix endpoint *(see Chapter 5.6.4.14.5, page 993)*.

**[Properties]**

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table *(see Chapter 5.6.4.14.5, page 993)*.

**[Delete]**

Deletes the selected line.

#### 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.

| | |
|---|---|
| Range | **0.1 ... 1000.0 mAU/s** |
| Default value | **20.0 mAU/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.

| | |
|---|---|
| Range | **0.1 ... 1000.0 mAU/s** |
| Default value | **20.0 mAU/s** |

### Break-point evaluation

**Break-point evaluation**

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

If this option is enabled, 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 alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 10.0** |
| Default value | **0.9** |

**Smoothing factor**

The higher the smoothing factor, the fewer endpoints will be found.

| | |
|---|---|
| Range | **2 ... 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

Value for the lower limit of the window.

Time for the lower limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **0 ... 4000 mAU** |
| Default value | **0 mAU** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

### Upper limit

Value for the upper limit of the window.

Time for the upper limit of the window.

*Window = Measured value*

| | |
|---|---|
| Range | **0 ... 4000 mAU** |
| Default value | **4000 mAU** |

*Window = Time*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **999999 s** |

## 5.6.4.14.5 MEAS Opt - Fix endpoint evaluation

Dialog window: **Method ▸ MEAS Opt ▸ Properties... ▸ Evaluations ▸ Fix 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** |

### Fix value

Value of the fix endpoint.

| *Measured value* | |
|---|---|
| Range | **0 ... 4000 mAU** |

| *Time* | |
|---|---|
| Range | **0.0 ... 999999.9 s** |

## 5.6.4.15 STDADD man

### 5.6.4.15.1 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 command **STDADD man** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Standard addition*
  Parameters for standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

#### Standard addition curve

The standard addition curve with its evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations** ▸ **Show calibration curve...** or the symbol .

### 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 not ever been started |
| **.CONC** | Concentration of the solution used for the command |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final 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 following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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** |
| **.VAR** | Variance of the calculated result of the standard addition in the selected unit |
| **.VOL** | Dosed volume |

### 5.6.4.15.2 STDADD man - General/Hardware

Tab: **Method** ▸ **STDADD man** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The general parameters for the control 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 type **ISE electrode** from the sensors configured in the sensor table.

| | |
|---|---|
| Selection | **'Sensor name'** \| **ISE electrode** |
| Default value | **ISE electrode** |

### 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 manually entered 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

### 5.6.4.15.3 STDADD man - Standard addition

Tab: **Method** ▸ **STDADD man** ▸ **Properties...** ▸ **Standard addition**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the standard addition can be defined on this tab

#### Number of additions

Number of times the standard solution is to be added.

| | |
|---|---|
| Range | **1 ... 19** |
| Default value | **3** |

#### Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) which was added to the sample before the first standard addition.

| | |
|---|---|
| Range | **0 ... 9999.999 mL** |
| Default value | **0 mL** |

#### Addition mode

| | |
|---|---|
| Selection | **Fixed volume increments** \| **Variable volume increments** |
| Default value | **Fixed volume increments** |

**Fixed volume increments**
If this option is enabled a fixed volume increment must be added for each standard addition.

**Variable volume increments**
If this option is enabled the defined volume increment must be added for each standard addition.

#### Addition volume

Size of the fixed addition volume (only when **Addition mode** = **fixed volume increments**).

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **100 mL** |

#### Addition volume 1…19

Size of the individual addition volumes (only when **Addition mode** = **variable volume increments**).

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **100 mL** |

### Addition solution

**Concentration**

Concentration of addition solution.

| | |
|---|---|
| Range | **0.001 ... 999999.999** |
| Default value | **1.000** |

**Device**

Concentration unit of 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** |

## 5.6.4.15.4 STDADD man - Measuring parameters

Tab: **Method** ▸ **STDADD man** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

### Measurement with drift control

The measurement is stopped as soon as the **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

**Measured value drift**

The measured value is only accepted if the signal drift defined here has been fallen short of.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

| | |
|---|---|
| Range | **-20.0 ... 150°C** |
| Default value | **25.0** |

## 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 measurement. In this case the following two parameters can be edited:

#### Stir before measurement

Stirring time between end of dosing and measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

#### Pause before measurement

Waiting time before the measurement during which no stirring takes place.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

## 5.6.4.16 STDADD dos

### 5.6.4.16.1 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 command **STDADD dos** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
  Parameters for standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

#### Standard addition curve

The standard addition curve with its associated evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations ▸ Show calibration curve...** or the symbol .

#### Command variables

The following command variables are generated in the method run by the command **STDADD 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 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 |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final 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 following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 |

### 5.6.4.16.2 STDADD dos - General/Hardware

Tab: **Method** ▸ **STDADD** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The general parameters for the control device, 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 (exchange or dosing unit) to be used for dosing the addition solution.

*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.

| | |
|---|---|
| Input | **24 characters** |
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

**Note**

If an existing solution is selected as the solution to be added then the **Concentration** and **Unit** of this solution will be adopted for calculating the standard addition. If **not defined** is selected, then **Concentration** and **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 type **ISE electrode** from the sensors configured in the sensor table.

| | |
|---|---|
| Selection | **'Sensor name'** \| **ISE electrode** |
| Default value | **ISE electrode** |

### 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 manually entered 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

## 5.6.4.16.3 STDADD dos - Standard addition

Tab: **Method** ▸ **STDADD dos** ▸ **Properties...** ▸ **Standard addition**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the standard addition can be defined on this tab

### Number of additions

Number of times the standard solution is added.

| | |
|---|---|
| Range | **1 ... 19** |
| Default value | **3** |

### Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) to be added to the sample before the first standard addition.

| | |
|---|---|
| Range | **0 ... 9999.999 mL** |
| Default value | **0 mL** |

### Addition mode

| | |
|---|---|
| Selection | **Fixed volume increments** \| **Variable volume increments** |
| Default value | **Fixed volume increments** |

**Fixed volume increments**
If this option is enabled a fixed volume increment must be added for each standard addition.

**Variable volume increments**
If this option is enabled the defined volume increment must be added for each standard addition.

### Addition volume

Size of the fixed addition volume (only when **Addition mode** = **fixed volume increments**).

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **100 mL** |

### Addition volume 1…19

Size of the individual addition volumes (only when **Addition mode** = **variable volume increments**).

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **100 mL** |

### Addition solution

**Note**

Displayed only for **Solution** = **not defined**.

**Concentration**

Concentration of addition solution.

| | |
|---|---|
| Range | **0.001 ... 999999.999** |
| Default value | **1.000** |

**Device**

Concentration unit of 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**

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.

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

### 5.6.4.16.4 STDADD dos - Measuring parameters

Tab: **Method** ▸ **STDADD** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

#### Measurement with drift control

The measurement is stopped as soon as the **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

**Measured value drift**

The measured value is only accepted if the signal drift defined here has been fallen short of.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

| | |
|---|---|
| Range | **-20.0 ... 150°C** |
| Default value | **25.0** |

## 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 measurement. In this case the following two parameters can be edited:

#### Stir before measurement

Stirring time between end of dosing and measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

#### Pause before measurement

Waiting time before the measurement during which no stirring takes place.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

## 5.6.4.17 STDADD auto

### 5.6.4.17.1 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 command **STDADD auto** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
  Parameters for standard addition.
- *Measuring parameters*
  Parameters for setting the measurement procedure.

#### Standard addition curve

The standard addition curve with its associated evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations ▸ Show calibration curve...** or the symbol .

#### Command variables

The following command variables are generated in the method run by the command **STDADD auto** 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 |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final 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 following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 |

### 5.6.4.17.2 STDADD auto - General/Hardware

Tab: **Method** ▸ **STDADD auto** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The general parameters for the control device, 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 (exchange or dosing unit) to be used for dosing the addition solution.

*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.

| | |
|---|---|
| Input | **24 characters** |
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

**Note**

If an existing solution is selected as the solution to be added then the **Concentration** and **Unit** of this solution will be adopted for calculating the standard addition. If **not defined** is selected, then **Concentration** and **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 type **ISE electrode** from the sensors configured in the sensor table.

| | |
|---|---|
| Selection | **'Sensor name'** \| **ISE electrode** |
| Default value | **ISE electrode** |

### 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 manually entered 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

## 5.6.4.17.3 STDADD auto - Standard addition

Tab: **Method ▸ STDADD ▸ Properties... ▸ Standard addition**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the standard addition can be defined on this tab

### Number of additions

Number of times the standard solution is added.

| | |
|---|---|
| Range | **1 ... 19** |
| Default value | **3** |

### Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) which was added to the sample before the first standard addition.

| | |
|---|---|
| Range | **0.0000 ... 9999.999 mL** |
| Default value | **0.0000 mL** |

### Stop volume

Volume of auxiliary solution (e.g. buffer) that is to be added to the sample before the first standard addition.

| | |
|---|---|
| Range | **0.0 ... 9999.9 mL** |
| Default value | **100.0 mL** |

## Addition solution

**Note**

Displayed only for **Solution** = **not defined**.

### Concentration

Concentration of addition solution.

| | |
|---|---|
| Range | **0.001 ... 999999.999** |
| Default value | **1.000** |

### Device

Concentration unit of 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

Speed at which the volume increments are added.

| | |
|---|---|
| Selection | **slow** \| **medium** \| **fast** |
| Default value | **fast** |

### Delta U

Potential difference that is to be achieved by a standard addition.

| | |
|---|---|
| Range | **1 ... 999 mV** |
| Default value | **10 mV** |

## 5.6.4.17.4 STDADD auto - Measuring parameters

Tab: **Method ▸ STDADD ▸ Properties... ▸ Measuring parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

### Measurement with drift control

The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

### Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

| | |
|---|---|
| Range | **0.1 ... 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.

| | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999.0 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

| | |
|---|---|
| Range | **-20.0 ... 150°C** |
| Default value | **25.0** |

#### 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 measurement. In this case the following two parameters can be edited:

**Stir before measurement**

Stirring time between end of dosing and measurement.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

**Pause before measurement**

Waiting time before the measurement during which no stirring takes place.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **0 s** |

## 5.6.5 Calibration commands

### 5.6.5.1 Calibration commands - Overview

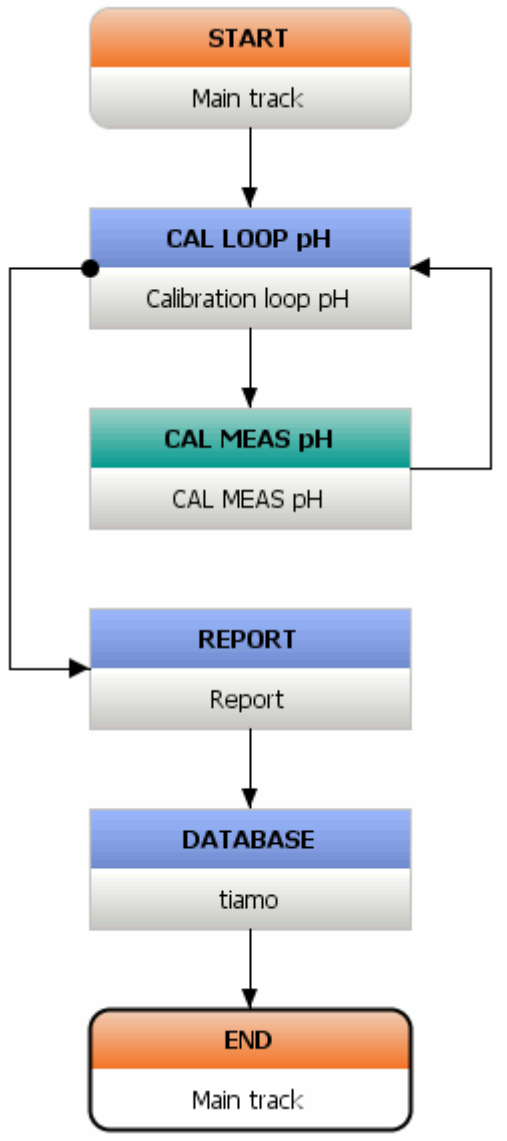
Menu item: **Method ▸ Insert ▸ New command... ▸ Calibrate**

Commands for **calibration** of pH- and ion-selective sensors.

#### General

The commands **CAL LOOP** and **CAL MEAS** are available for calibrating electrodes. The number and type of buffers or standards, respectively, is defined in the loop command **CAL LOOP**, which is to be measured subsequently with the command **CAL MEAS**. After each looping pass, 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 both manual and automatic solution changes with the aid of a Sample Processor.

### Commands

The following commands can be selected for calibration:

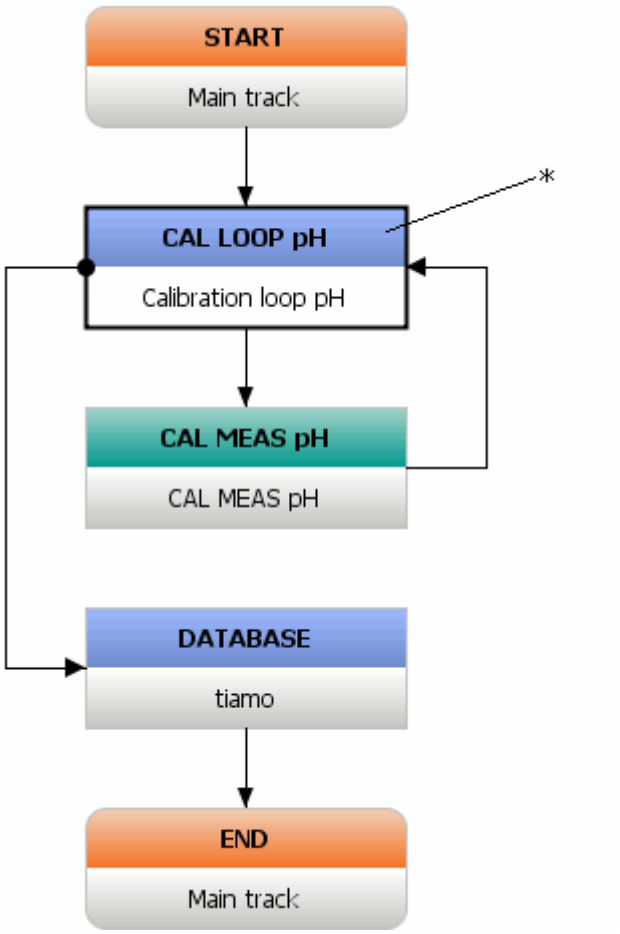
- *CALL LOOP pH*
  Calibration loop for the calibration of pH electrodes.
- *5.6.5.5CAL MEAS pH*
  Measurement of buffers for the calibration of pH electrodes.
- *CAL LOOP Conc*
  Calibration loop for the calibration of ion-selective electrodes (ISE electrodes).

- *CAL MEAS Conc*
  Measurement of standards for the calibration of ion-selective electrodes (ISE electrodes).
- *CAL Cond*
  Measurement of conductivity standards for the determination of the cell constant of conductivity measurement cells.
- *CAL Spec*
  Measuring command for wavelength calibration.

### 5.6.5.2 Calibrating with manual solution changing

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.

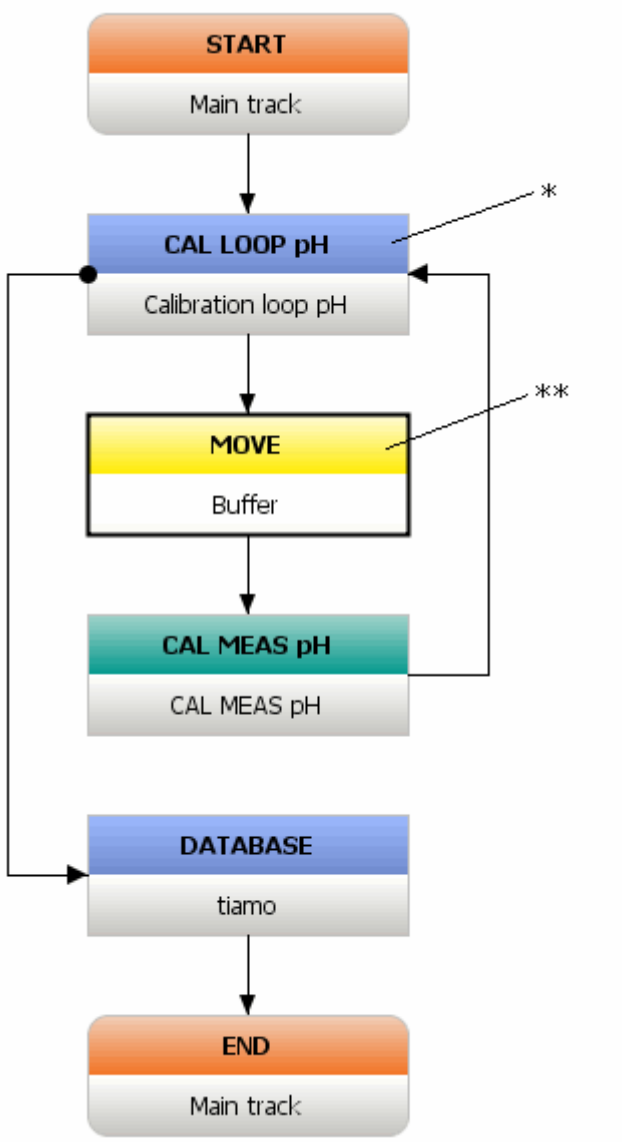
The request for changing the buffer or the standard must be **activated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. During the

method run, a request for specifying the next the buffer or standard is displayed after each measurement.

### 5.6.5.3 Calibrating with manual solution changing

Program part: **Method ▸ Calibration commands**

The basic structure of a calibration method with automatic solution exchange on a Sample Processor 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 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 Processor, 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 a rack position **###** defined for the first calibration solution in the **MOVE** command, the other calibration solutions will be used in sequential order at the subsequent positions. The following settings must be implemented for this purpose in the command **MOVE** under the **Target** parameter:
  **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 a first special beaker **###** for the first calibration solution defined in the command **MOVE**, other calibration solutions will be used in sequential order at the subsequent special beaker positions. The same number of special beakers must be defined for the rack that is set up as the number of calibration buffers used. The following settings must be implemented in the command **MOVE** under the parameter **Target**:
  **Move**: **Special beaker**
  **Number**: **= ### + 'Command name.LCO'** (input via 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 other calibration solutions will be used in sequential order at the subsequent rack positions. The following settings must be implemented for this purpose in the command **MOVE** under the **Target** parameter:
  **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'** 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.

**Note**

The formula editor is opened with a right click in the input field.

### 5.6.5.4 CAL LOOP pH

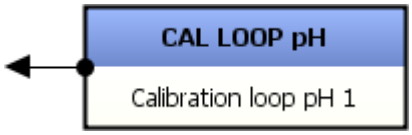
#### 5.6.5.4.1 CAL LOOP pH - Overview

Dialog window: **Method** ▸ **CAL LOOP pH** ▸ **Properties...** ▸ **CAL LOOP pH - 'Command name'**

Loop command for the **calibration of pH electrodes** which is used together with the command **CAL MEAS pH**.

**Appearance**

The command has the following appearance:




**Parameters**

The parameters for the command **CAL LOOP pH** are configured in the following dialog window:

- *CAL LOOP pH - Properties*

**Command variables**

The following command variables are generated in the method run by the command **CAL LOOP pH** 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 |
| **.ENP** | Electrode zero point calculated from the calibration |
| **.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**) |

| Identification | Description |
|---|---|
| **.SLO** | Electrode slope calculated from the calibration |

### 5.6.5.4.2 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 dialog window **CAL LOOP pH - 'Command name'**.

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

#### Buffers

#### Number of buffers

Selecting the number of buffers for the pH calibration.

| | |
|---|---|
| Selection | **1** \| **2** \| **3** \| **4** \| **5** |
| Default value | **2** |

#### Buffer type

Selecting a predefined buffer series for the pH calibration.

If these buffers are used, *tiamo* will recognize the particular buffer automatically.

| | |
|---|---|
| Selection | **Metrohm** \| **NIST** \| **DIN** \| **Fisher** \| **Fluka Basel** \| **Mettler** \| **Merck** \| **Merck CertiPUR 25°C** \| **Beckman** \| **Custom** \| **Special** \| **Radiometer** \| **Baker** \| **Hamilton DURACAL** \| **Precisa** |
| Default value | **Metrohm** |

**Custom**
Uses the custom buffer series defined in the configuration under **Tools ▸ Templates ▸ Custom calibration buffers**.

**Special**
Up to five calibration buffers can be defined directly in the Properties window of the command **CAL LOOP pH**.

**Note**

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 command **CAL LOOP pH**.

**Buffer # pH**

pH value of the special buffers (this parameter is only displayed for **Buffer type** = **Special**).

| | |
|---|---|
| Range | **-20.000 ... 20.000** |

**Note**

Enter the pH values for the measuring 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 Processor.

### 5.6.5.4.3 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 |

| Temp. (°C) | Met4 | Met7 | Met9 |
|---|---|---|---|
| | pH 4.00 | pH 7.00 | pH 9.00 |
| 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 |
| 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 |

| Temp. (°C) | NIST1 | NIST4 | NIST7 | NIST9 | NIST13 |
|---|---|---|---|---|---|
| | pH 1 | pH 4 | pH 7 | pH 9 | pH 13 |
| 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 |
| 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 |

| Temp. (°C) | DIN1 | DIN3 | DIN4 | DIN7 | DIN9 | DIN12 |
|---|---|---|---|---|---|---|
| | pH 1 | pH 3 | pH 4 | pH 7 | pH 9 | pH 12 |
| 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 |
| 70 | - | 4.13 | 7.00 | 9.65 |
| 75 | - | 4.14 | 7.02 | 9.63 |
| 80 | - | 4.16 | 7.03 | 9.62 |

| Temp. (°C) | Fis2 | Fis4 | Fis7 | Fis10 |
|---|---|---|---|---|
| | pH 2 | pH 4 | pH 7 | pH 10 |
| 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 |
| 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 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 |
| 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 |

| Temp. (°C) | Mer2 | Mer4 | Mer7 | Mer9 | Mer12 |
|---|---|---|---|---|---|
| | pH 2 | pH 4 | pH 7 | pH 9 | pH 12 |
| 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 |
| 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 |

| Temp. (°C) | MerC4.01 | MerC7.00 | MerC9.00 | MerC10.00 |
|---|---|---|---|---|
| | pH 4.01 | pH 7.00 | pH 9.00 | pH 10.00 |
| 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 | - | - | - | - |

**Beckmann**

| 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 |
| 55 | 4.08 | 6.98 | - |
| 60 | 4.09 | 6.98 | - |
| 65 | 4.11 | 6.99 | - |

| Temp. (°C) | Bec4 | Bec7 | Bec10 |
|---|---|---|---|
| | pH 4 | pH 7 | pH 10 |
| 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 |
| 80 | 4.159 | 7.004 | 8.885 |
| 85 | 4.183 | 7.018 | 8.867 |
| 90 | 4.210 | 7.034 | 8.850 |

| Temp. (°C) | Rad4.01 | Rad7.00 | Rad9.18 |
|---|---|---|---|
| | pH 4.01 | pH 7 | pH 9.18 |
| 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 | - | - | - | - |

| Temp. (°C) | Ham4.01 | Ham7.00 | Ham9.21 | Ham10.01 |
|---|---|---|---|---|
| | pH 4.01 | pH 7.00 | pH 9.21 | pH10.01 |
| 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 |
| 20 | 3.99 | 7.02 | 9.04 |
| 25 | 4.00 | 7.00 | 9.00 |

| Temp. (°C) | Pre4 | Pre7 | Pre9 |
|---|---|---|---|
| | pH 4.00 | pH 7.00 | pH 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 |

### 5.6.5.5 CAL MEAS pH

#### 5.6.5.5.1 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 command **CAL MEAS pH** are configured on the following 2 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 in the method run by the command **CAL MEAS pH** 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 |
| **.EME** | Final measured value (measured value after processing of the command) in the unit of the measured value |
| **.ETE** | End temperature (temperature following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 |
| **.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 in the measuring point list is reached |

| Identification | Description |
|---|---|
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.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** |

#### 5.6.5.5.2 CAL MEAS pH - General/Hardware

Tab: **Method** ▸ **CAL MEAS pH** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 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** |
| Default value | **pH electrode** |

**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 direction in which the stirring is done.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **-15 ... 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, 855 and 867.

### 5.6.5.5.3 CAL MEAS pH - Measuring parameters

Tab: **Method ▸ CAL MEAS pH ▸ Properties... ▸ Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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.

**Measured value drift**

The measured value is only accepted if the signal drift defined here has been fallen short of.

*Titrando, 855, 867*

| | |
|---|---|
| Range | **0.1 ... 999.0 mV/min** |
| Default value | **2.0 mV/min** |

*Titrino*

| | |
|---|---|
| Range | **0.5 ... 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 waiting time is elapsing.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0 ... 999999 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 equation:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| *Titrando, 855, 867* | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **110 s** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999 s** |
| Default value | **110 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| *Titrando, 855, 867* | |
|---|---|
| Range | **0.1 ... 999999.0 s** (Increment: **0.1**) |
| Default value | **2.0 s** |

| *Titrino* | |
|---|---|
| Range | **0.08 ... 16200 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. The value is used for temperature compensation with the pH measurement.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

## 5.6.5.6 CAL LOOP Conc

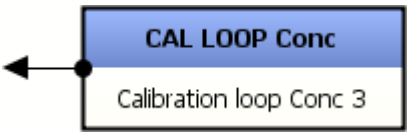
### 5.6.5.6.1 CAL LOOP Conc - Overview

Dialog window: **Method** ▸ **CAL LOOP Conc** ▸ **Properties...** ▸ **CAL LOOP Conc - 'Command name'**

Loop command for the **calibration of ion-selective electrodes**, which is used together with the command **CAL MEAS Conc**.

#### Appearance

The command has the following appearance:



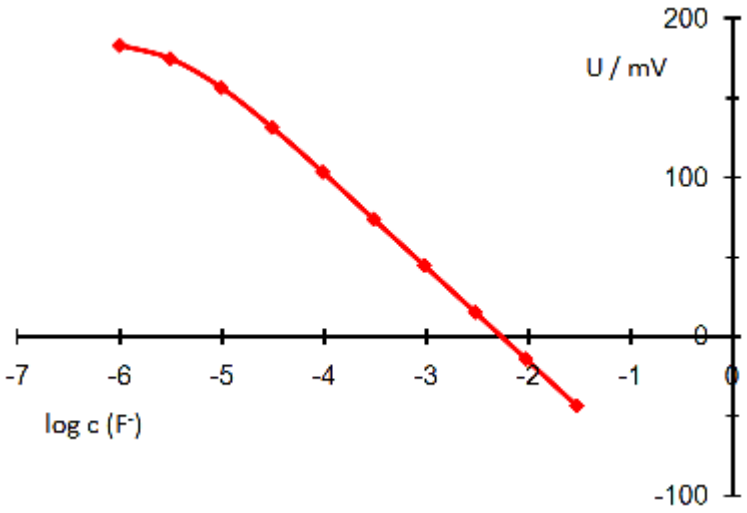

#### Parameters

The parameters for the command **CAL LOOP Conc** 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 Nikolski equation. This is an extended Nernst equation which considers the selectivity of the ISE. 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 detection limit.

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 thus 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 depending on the number of the standard solutions used.

- **1 point calibration**
  - $s$: the existing value is kept if available. Otherwise the theoretical slope $U_N / z$ is used.
  - $E(0) = U_1 + s \cdot \log(c_1)$
  - $c_B$: is set equal to 0.
- **2 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 0.

- **3 and multiple point calibration**
  With at least 3 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 aprox. 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.
  The variance *Var* is calculated and output in any case with at least 4 calibration standards. If $c_B = 0$, the variance is even calculated for 3 standards.

$$Var = \frac{\sum_i (U_i - U_{i,c})^2}{n - F}$$

  $U_i$: measured potential
  $U_{i,c}$ : potential calculated out of 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 in the method run by the command **CAL LOOP Conc** and can be used in formulas under the designation **'Command name.Variable designation'**:

| 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 |
| **.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 quantity 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 |

### 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 dialog window **CAL LOOP Conc - 'Command name'**.

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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** |
| Default value | **2** |

**Unit conc.**

Selection of the concentration unit for the standards.

| | |
|---|---|
| Selection | **mol/L** \| **mmol/L** \| **ppm** \| **%** \| **g/L** \| **mg/L** \| **µg/L** \| **µg/mL** \| **mg/mL** |
| Default value | **ppm** |

**Conc. standard #**

Enter the corresponding concentration for each standard used.

| | |
|---|---|
| Range | **0.001 ... 999999.999** |

**Request for standard exchange**

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

If this option is enabled, a request for manual standard exchange is displayed after each measurement. This option must be disabled for automatic solution exchange when calibrating with a Sample Processor.

## 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 command **CAL LOOP Conc**.

### Devices

This command can be executed with the following devices:

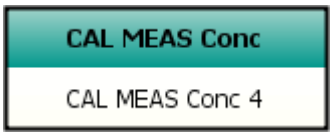
**Titrando:** 808, 809, 835, 836, 857, 904, 905, 906, 907

**pH/Ion - Meter:** 867

**Robotic Titrosampler:** 855

### Appearance

The command has the following appearance:




### Parameters

The parameters for the command **CAL MEAS Conc** are configured on the following 2 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 in the method run by the command **CAL MEAS Conc** 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 |
| **.EME** | Final measured value (measured value after processing of the command) in the unit of the measured value |
| **.ETE** | End temperature (temperature following processing of the command) in °C |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended** |
| **.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.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 of 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 the 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.

| | |
|---|---|
| Input | **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** |
| Default value | **ISE electrode** |

#### 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

| | |
|---|---|
| Input | **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.

**Measured value drift**

The measured value is only accepted if the signal drift defined here has been fallen short of.

| | |
|---|---|
| Range | **0.1 ... 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 waiting time is elapsing.

| | |
|---|---|
| Range | **0 ... 999999 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 equation:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **110 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

| | |
|---|---|
| Range | **0.1 ... 999999 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 on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. The value is used for temperature compensation with the pH measurement.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

## 5.6.5.8 CAL Cond

### 5.6.5.8.1 CAL Cond - Overview

Dialog window: **Method** ▸ **CAL Cond** ▸ **Properties...** ▸ **CAL Cond - 'Command name'**

Command for **Conductivity standards measurements** for the determination of the cell constants 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 command **CAL Cond** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for devices, sensors and stirrers.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Conductivity standard*
  Defining the values or the type of the input for calibration with one standard.

### Command variables

The following command variables are generated in the method run by the command **CAL Cond** 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 |
| **.CLC** | Cell constants determined by calibration for the sensor used in the command with conductivity sensors (only **MEAS Cond** and **CAL Cond**) |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final measured value (measured value after processing of the command) in the unit of the measured value |
| **.ETE** | End temperature (temperature following processing of the command) 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 at the start of the command) in the unit of the measured value for the last measurement |
| **.ITE** | Initial temperature (temperature before processing of the command) 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 |

| Identification | Description |
|---|---|
| **.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 in the measuring point list is reached |
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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 = stopped normally**, **0 = stopped manually with [Quit] or [Stop]**. |
| **.TC** | Temperature coefficient in %/°C |

### 5.6.5.8.2 CAL Cond - General/Hardware

Tab: **Method** ▸ **CAL Cond** ▸ **Properties...** ▸ **General/Hardware**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| 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** |
| Default value | **Conductivity sensor** |

#### 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 manually entered 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 direction in which the stirring is done.

| | |
|---|---|
| Range | **-15 ... 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.

### 5.6.5.8.3 CAL Cond - Measuring parameters

Tab: **Method** ▸ **CAL Cond** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| Input | **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**

Type of measurement selection.

*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 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. 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 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.

**Note**

A constant measured value is often only achieved 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 achieved.

### 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.

*856*

| | |
|---|---|
| Range | **0.001 ... 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 waiting time is elapsing.

*856*

| | |
|---|---|
| Range | **0 ... 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:

$$Wartezeit = 150 / \sqrt{Drift + 0.01} + 5$$

*856*

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **52 s** |

### Measuring interval

Time interval for entering a measuring point in the measuring point list.

*856*

| | |
|---|---|
| Range | **0.1 ... 999999.0 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.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Default value | **120 s** |

#### Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

*712*

| | |
|---|---|
| Range | **0.4 ... 999999 s** |
| Default value | **2.0 s** |

*856*

| | |
|---|---|
| Range | **0.1 ... 999999.0 s** |
| Default value | **2.0 s** |

### Temperature

#### Measurement temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **20.0** |

## 5.6.5.8.4 CAL Cond - Conductivity standard

Tab: **Method ▸ CAL Cond ▸ Properties... ▸ Conductivity standard**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

### Definition of the conductivity standard

Selection of the type as to how the data are to be defined for the conductivity standard.

| | |
|---|---|
| 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 first the current temperature of the solution is measured after the start of the determination. Afterwards, the dialog window **Data Conductivity standard** will appear *(see Chapter 5.6.5.8.5, page 1056)*. The method continues running after the data has been entered.

**Template**
If this option is selected, then a conductivity standard can be selected, and its data will be used to calculate the temperature coefficient for the specified reference temperature.

### Parameters for input

If the option **Input** has been selected, then the following parameters will be displayed:

**Reference temperature**

Input of a temperature for which a calibration point of the conductivity standard is known. It should be as close as possible to the temperature at which measurements are carried out.

| | |
|---|---|
| Range | **-20.0 ... 150.0°C** |
| Default value | **20.0** |

**Conductivity**

Input of the conductivity of the standard at the reference temperature.

| | |
|---|---|
| Range | **0.00000 ... 2000.00 mS/cm** |
| Default value | **11.66 mS/cm** |

**Temperature coefficient**

Temperature coefficient of the standard with the reference temperature.

| | |
|---|---|
| Range | **0.00 ... 9.99 %/°C** |
| Default value | **2.07 %/°C** |

### Parameters for template

If the option **Input** has been selected, then the following parameters will be displayed:

**Name standard**

List box with conductivity standards. The data of one of these standards is used to calculate the temperature coefficient for the specified reference temperature.

| | |
|---|---|
| Selection | **'Conductivity standard'** |

### 5.6.5.8.5 CAL Cond - Data Conductivity standard

Dialog window: **Method ▸ CAL Cond ▸ Data Conductivity standard**

**Current temperature**

Display of the currently measured temperature of the conductivity standard.

**Data transmission from standard**

Input of the data of the conductivity standard, which should be as close as possible to the **Current temperature**. This data is as a rule contained in the Data Sheet/Certificate for the conductivity standard.

**Reference temperature**

Input of a temperature for which a calibration point of the conductivity standard is known. It should be as close as possible to the temperature at which measurements are carried out.

| | |
|---|---|
| Range | **-20.0 ... 150.0°C** |
| Default value | **20.0** |

**Conductivity**

Input of the conductivity of the standard at the reference temperature.

| | |
|---|---|
| Range | **0.00000 ... 2000.00 mS/cm** |
| Default value | **1.0 mS/cm** |

**Temperature coefficient**

Temperature coefficient of the standard with the reference temperature.

| | |
|---|---|
| Range | **0.00 ... 9.99 %/°C** |
| Default value | **1.00 %/°C** |

## 5.6.5.9 CAL Spec

### 5.6.5.9.1 CAL Spec - Overview

Dialog window: **Method ▸ CAL Spec ▸ Properties... ▸ CAL Spec - 'Command name'**

Command for **wavelength calibration**.

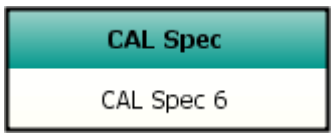
**Devices**

This command can be executed with the following devices:

**Spectrometer:** Avantes

### Appearance

The command has the following appearance:




### Parameters

The parameters for the command **CAL Cond** are configured on the following 3 tabs:

- *General/Hardware*
  Parameters for device.
- *Measuring parameters*
  Parameters for setting the measurement procedure.
- *Calibration wavelengths*
  Input of the reference wavelengths. Definition of the behavior of the calibration.

### Command variables

The following command variables are generated in the method run by the command **CAL Spec** 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 |
| **.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]**. |

| Identification | Description |
|---|---|
| **.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. |

#### 5.6.5.9.2 CAL Spec - General/Hardware

Tab: **Method** ▸ **CAL Spec** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 | **Avantes Spectrometer** |
| Default value | **Avantes Spectrometer** |

### 5.6.5.9.3 CAL Spec - Measuring parameters

Tab: **Method** ▸ **CAL Spec** ▸ **Properties...** ▸ **Measuring parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The parameters for the measuring procedure can be defined on this tab.

**Integration time**

Integration time for spectrum recording.

| | |
|---|---|
| Range | **0.01 ... 600000 ms** |
| Default value | **6 ms** |

**Averaged spectra**

The number of spectra that are recorded and averaged.

| | |
|---|---|
| Range | **1 ... 10000** |
| Default value | **10** |

### 5.6.5.9.4 CAL Spec - Calibration wavelengths

Tab: **Method** ▸ **CAL Spec** ▸ **Properties...** ▸ **Calibration wavelengths**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 calbration 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.

| | |
|---|---|
| Range | **0.1 ... 1100.0 nm** |
| Default value | **0.5 nm** |

**[New]**

Opens the dialog window **Calibration wavelength #** to enter wavelengths and tolerances *(see Chapter 5.6.5.9.5, page 1060)*.

**[Properties]**

Opens the dialog window **Calibration wavelength #** to edit the values selected in the table *(see Chapter 5.6.5.9.5, page 1060)*.

**[Delete]**

Deletes the selected line.

#### 5.6.5.9.5 CAL Spec - Calibration wavelength #

Tab: **Method ▸ CAL Spec ▸ Properties... ▸ Calibration wavelengths ▸ [New]/[Properties] ▸ Calibration wavelength #**

**Wavelength**

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **'empty' nm** |

## 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 and exchange units.

The following dosing commands can be selected:

- *ADD*
  Adding 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 a exchange or dosing unit.
- *EMPTY*
  Emptying a dosing unit.
- *RLS DOS*
  Releasing 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 defined volume** of a solution with 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:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

**Conductometer:** 856

**Dosing Interface:** 846

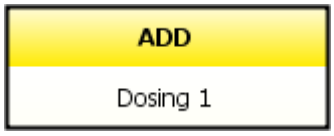
**pH/Ion - Meter:** 867

**Sample 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 **ADD** are configured on the following 2 tabs:

- *General/Hardware*
  Parameters for devices, dosing devices and stirrers.
- *Dosing parameters*
  Parameters for the dosing settings.

#### Command variables

The following command variables are generated in the method run by the command **ADD** 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 |

#### 5.6.6.2.2 ADD - General/Hardware

Tab: **Method** ▸ **ADD** ▸ **Properties...** ▸ **General/Hardware**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

The general parameters for the device, 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 to be used for the dosing. 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.

| | |
|---|---|
| Input | **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. This parameter is displayed only for Titrandos, 846, 856, 867, 814, 815, 855, 864 and 874.

### Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if 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

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.

*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

Speed with 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 dosing to the largest possible value.

*Titrando, 846, 856, 867, 814, 815, 855, 864, 874*

| | |
|---|---|
| Range | **0.01 ... 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 direction in which the stirring is done.

| *Titrando, 846, 856, 867, 814, 815, 855, 864, 874* | |
|---|---|
| Range | **-15 ... 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 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.

| Input | **25 characters** |
|---|---|

The volume to be added and 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* | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **10.0000 mL** |

| *Titrino* | |
|---|---|
| Range | **0.0001 ... 9999.0 mL** |
| Default value | **10.0000 mL** |

*730, 778, 789*

| | |
|---|---|
| Range | **0.001 ... 999.999 mL** |
| Default value | **10.0000 mL** |

*774*

| | |
|---|---|
| Range | **0.01 ... 999.999 mL** |
| Default value | **10.0000 mL** |

### Dosing rate

The rate 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*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*730, 774, 778, 789*

| | |
|---|---|
| Range | **0.01 ... 160.00 mL/min** |
| Default value | **maximum mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

The dosing rate should be reduced for viscous liquids.

### Filling rate

The buret will be filled at this speed 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.

*Titrando, 814, 815, 855, 864, 874*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*730, 774, 778, 789*

| | |
|---|---|
| Range | **0.01 ... 160.00 mL/min** |
| Default value | **maximum mL/min** |

| *Titrino* | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

The filling rate should be reduced for viscous liquids.

**Fill automatically at start**

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

If this option is enabled, the buret is filled automatically before dosing. This parameter is displayed only for Titrandos, 846, 855, 856, 864, 867, 814, 815 and 874.

Using this option ensures that the buret is filled before the execution of the **ADD** command and that it is located at the dosing port of the selected solution.

**Note**

If **Fill automatically at start** is **deactivated**, then the **ADD** command will be begin immediately after the solvent has been added. It must be ensured in the method (e.g. by a preceding **ADD** or **LQH** command) that the buret is situated at the correct dosing port.

**Fill automatically at end**

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

If this option is enabled, the buret is filled automatically after dosing.

Using this option ensures that the buret is filled after the execution of the **ADD** command and that it is located at the dosing port of the selected solution.

### 5.6.6.3 DOS

#### 5.6.6.3.1 DOS - Overview

Menu item: **Method ▸ Paste ▸ New command...**

Command for **controlled dosing** with possibility for monitoring of measured value and temperature.

**Principle**

A predefined volume of a solution is dosed with the **DOS** command with simultaneous monitoring of measured value and temperature. Three differ-

ent 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, a tandem dosing setup can be used, i.e. dosing is carried out with a combination of two dosing devices. The second dosing device is dosing while the first one is being filled and vice-versa.

### Commands

Depending on the measured value, one of the following two **DOS** commands can be selected:

- *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.

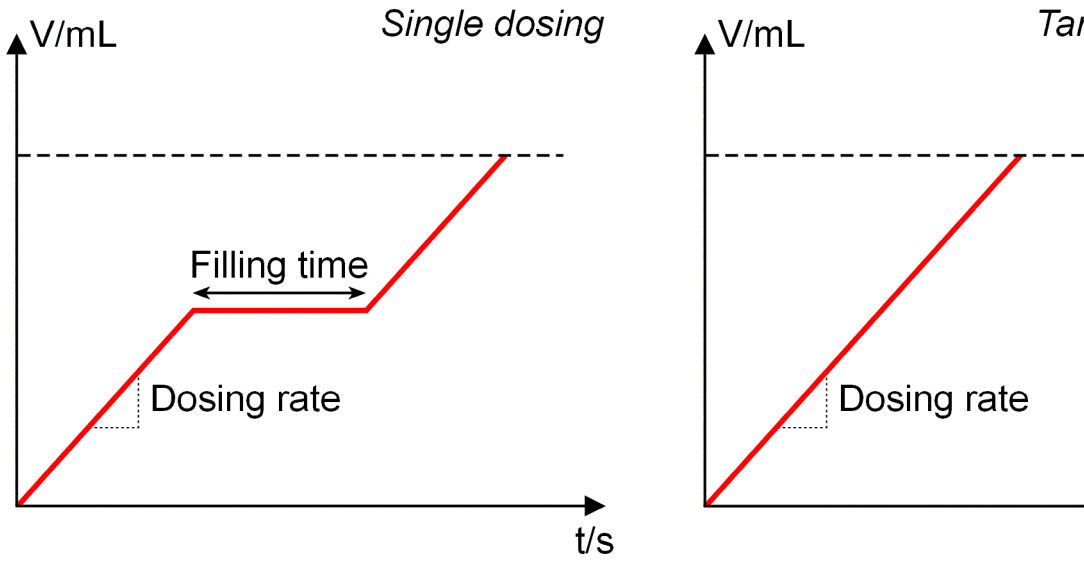
| | |
|---|---|
| Input | **25 characters** |

### Dosing criterion

| | |
|---|---|
| Selection | **Volume/dosing rate** \| **Volume/dosing time** \| **Dosing rate/dosing time** |
| Default value | **Volume/dosing rate** |

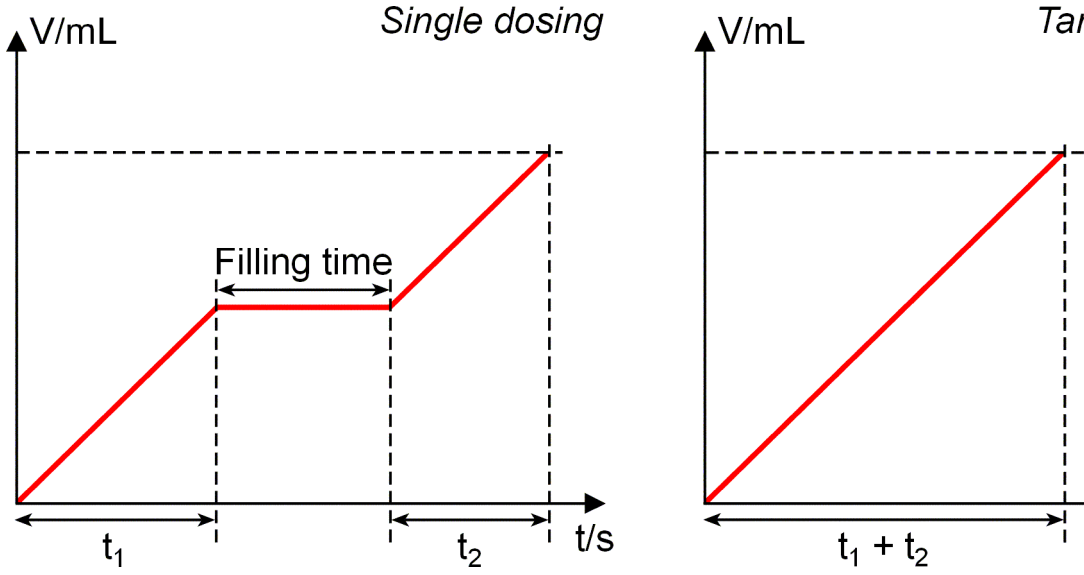
### Specification of volume and dosing rate

You define the volume to be dosed and the desired dosing rate. The filling times prolong the dosing process.




**Specification of volume and dosing time**

You define the volume and the time in which this volume is to be dosed (particularly suitable for synthesis applications). The dosing rate is automatically optimized.




The time defined as Dosing time corresponds to the net dosing time $t_1$+$t_2$, i.e. the filling time of the exchange or dosing unit is included in the total.

If the specifications with the maximum dosing rate cannot be achieved, then dosing is carried out at the maximum rate. The following formula can be used to estimate whether the maximum dosing rate is used or not:

**Dosing rate** = desired flow rate in mL/min • 2.22

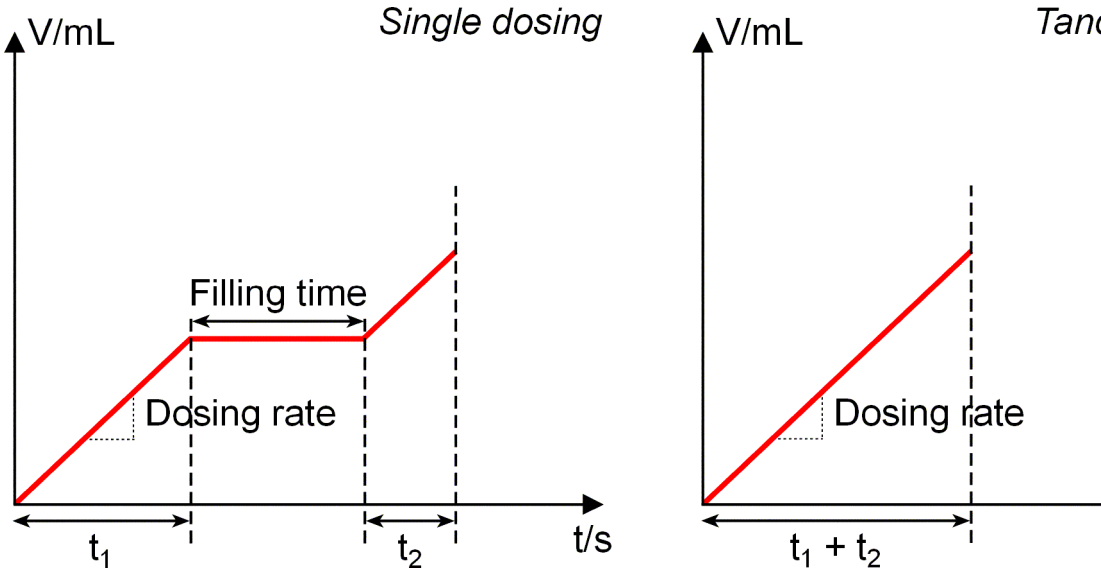
**Note**

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 or dosing unit (or cylinder volume, respectively), then a larger cylinder volume must be selected.

### Specification of dosing rate and dosing time

You define the dosing rate with which dosing is to be carried out during a particular time. As in the previous case, the filling times are not included in the total, and dosing is prolonged accordingly.




### 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 mL10 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 is dependent on the cylinder volume of the exchange/dosing unit that has been put into use. 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 mL10 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. What is the dosing rate?

Total duration = 60 min

Dosing volume = 1000 mL

Filling time = 24 s (at max. filling rate)

Cylinder volume = 50 mL

Number of refillings = dosing volume/cylinder volume = 1000/50 = 20

If the division gives a whole number, the last filling is no longer a refilling and must be deducted. In our example, 19 refills are necessary. There is no dosing during this time, i.e. the net dosing time is

3600 s - 19 × 24 s = 3144 s = 52.4 min

The dosing rate is thus

1000 mL/52.4 min = 19.1 mL/min

Summary in a formula:

Dosing rate in mL/min = dosing volume/(total duration - number of refillings • 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**

Selects the quantity at which a track is to be started when its limit value is exceeded.

| | |
|---|---|
| Selection | **Measured value** \| **Temperature** \| **Any** |
| Default value | **Measured value** |

**Any**
Either one of the two sizes.

**Limit exceeding**

Selects 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 exceeded.

**OK**
The track is started when the monitored quantities are once again within the limit values (including hysteresis).

**Track name**

Selects the track that is to be started automatically.

| | |
|---|---|
| Selection | **Selection of available tracks** |

**Note**

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

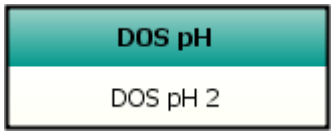
**Titrino:** 718, 736, 751, 799

**pH/Ion Meter:** 867

**Robotic Titrosampler:** 855

### Appearance

The command has the following appearance:




### Parameters

The parameters for the command **DOS pH** are configured in the following 5 tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
  Parameters for the dosing settings.
- *Stop conditions*
  Definition of conditions which cause the stop of the dosing.
- *Monitoring*
  Definition of measured value and temperature monitoring.
- *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 pH** 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 |
| **.DBL** | Total duration for the processing of the command in s |

| Identification | Description |
|---|---|
| **.EME** | Final 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 following processing of the command) in °C |
| **.EVT** | End volume (total dosed volume at the end of the command) in mL |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 × (1…3) for the last measuring point of 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 in the measuring point list in µg/min (KFC) |
| **.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 in the unit of the measured value of the measuring point list |
| **.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 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. |

| Identification | Description |
|---|---|
| **.MTE** | Temperature measurement with sensor; **1 = on**, **0 = off**) |
| **.NMP** | Number of measuring points in the 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** |
| **.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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 to be used for the dosing. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 dosing will proceed continuously with two dosing devices in combination. The second dosing device is dosing while the first one is being filled and vice-versa. This parameter is displayed only for Titrandos and 855.

### Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if 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

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.

*Titrando, 855*

| | |
|---|---|
| Selection | **Solution name** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

### Filling rate

Speed with 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 dosing to the largest possible value.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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 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** |
| Default value | **pH electrode** |

**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*

| | |
|---|---|
| Range | **-15 ... 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 Titrinos.

## 5.6.6.3.4.3 DOS pH - Dosing parameters

Tab: **Method ▸ DOS pH ▸ Properties... ▸ Dosing parameters**

### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The volume to be added, the dosing rate and the dosing time are defined on this tab.

### Dosing criterion

Selects the two parameters that can be preset for dosing. The third parameter is calculated automatically from the formula **Volume = dosing time * dosing rate** and is not shown *(see Chapter 5.6.6.3.2, page 1068)*.

| | |
|---|---|
| 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 is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time.**

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **10.0000 mL** |

### Dosing rate

Rate at which dosing should take place. 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 is only displayed for **Dosing criterion = Volume/Dosing rate** or **Dosing rate/Dosing time**.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

The dosing rate should be reduced for viscous liquids.

### Dosing time

Time during which dosing is to be carried out. This parameter is only displayed for **Dosing criterion = Volume/Dosing time** or **Dosing rate/ Dosing time.**

| | |
|---|---|
| Range | **0 ... 9999999 s** |
| Default value | **100 s** |

### Pause

Waiting period before dosing is started.

| | |
|---|---|
| Range | **0 ... 999999 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 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 during monitoring with pH measurements.

*Titrando, 855*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **5.0 s** |

| *Titrino* | |
|---|---|
| Range | **1 ... 999999 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.

| Input | **25 characters** |
|---|---|

The conditions for stopping the dosing are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the dosing.

**Stop volume**

Stops when the given volume has been added after the start of the dosing. The stop volume should be adapted to suit the sample weight or the titration vessel size.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100.000 mL** |
| Selection | **off** |

**off**
Means that no stop will take place.

| *Titrino* | |
|---|---|
| Range | **0 ... 9999.99 mL** |
| Default value | **100.00 mL** |
| Selection | **off** |

**off**
Means that no stop will take place.

### Stop time

Stops when the preset time has elapsed since the start of the dosing.

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

**off**
Means that no stop will take place.

### Filling rate

Rate at which the dosing cylinder is to be filled 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 dosing to the largest possible value.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

The following monitoring processes can be switched on and defined on this tab:

### Monitoring Measured value

### Monitoring Measured value

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

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

### Lower limit pH

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **-20.000** |

| *Titrino* | |
|---|---|
| Range | **-20.00 ... 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, then the event **Measured value lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0 ... 20.000** |
| Default value | **20** |

### Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Default value | **20.000** |

| *Titrino* | |
|---|---|
| Range | **-20.00 ... 20.00** |
| Default value | **20.00** |

### Upper hysteresis pH

The 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** will be triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0 ... 20.000** |
| Default value | **20** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **DOS** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **DOS** command is 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 exceeded.

### Monitoring Temperature

**Monitoring Temperature**

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

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

**Lower limit**

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **-20.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **-170.0 °C** |

**Lower hysteresis**

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **150.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **500.0 °C** |

### Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **DOS** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

**Wait for limit ok**
Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is once again within the limits (including hysteresis), reagent dosing will be resumed automatically.

**none**
No action will be taken if limits are exceeded.

### Track call on limit exceeding

In this table, which cannot be edited directly, max. 20 entries can be defined for the track that is to be started automatically when a particular limit is exceeded.

**[New]**

Opens the dialog window **Track call** in which the parameters for a new track call can be entered *(see Chapter 5.6.6.3.3, page 1072)*.

**[Properties]**

Opens the dialog window **Track call** in which the parameters for the selected track call can be edited *(see Chapter 5.6.6.3.3, page 1072)*.

**[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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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

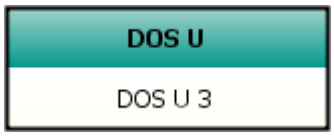
**Titrino:** 718, 736, 751, 799

**pH/Ion Meter:** 867

**Robotic Titrosampler:** 855

#### Appearance

The command has the following appearance:




### Parameters

The parameters for the command **DOS U** are configured in the following 5 tabs:

- *General/Hardware*
  Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
  Parameters for the dosing settings.
- *Stop conditions*
  Definition of conditions which cause the stop of the dosing.
- *Monitoring*
  Definition of measured value and temperature monitoring.
- *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 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 |
| **.DBL** | Total duration for the processing of the command in s |
| **.EME** | Final measured value (measured value after processing of the command) in the unit of the measured value |
| **.ENP** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |
| **.ETE** | End temperature (temperature following processing of the command) in °C |

| Identification | Description |
|---|---|
| **.EVT** | End volume (total dosed volume at the end of the command) in mL |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been 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 × (1...3) for the last measuring point of 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 in the measuring point list in µg/min (KFC) |
| **.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 in 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 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 the measuring point list |
| **.SLO** | Electrode slope of the sensor used for the command (in mV for ISE sensors) |

| Identification | Description |
|---|---|
| **.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.

| | |
|---|---|
| Input | **25 characters** |

The general parameters for the control device, 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 to be used for the dosing. All the dosing device connections which are possible with the selected device type are 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.

| | |
|---|---|
| Input | **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 dosing will proceed continuously with two dosing devices in combination. The second dosing device is dosing while the first one is being filled and vice-versa. This parameter is displayed only for Titrandos and 855.

### Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if 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

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.

*Titrando, 855*

| | |
|---|---|
| Selection | **Solution name** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

### Filling rate

Speed with 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 dosing to the largest possible value.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 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 type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

| | |
|---|---|
| Selection | **Sensor name** \| **pH electrode** \| **Metal electrode** \| **ISE electrode** |
| Default value | **Metal electrode** |

**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*

| | |
|---|---|
| Range | **-15 ... 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 Titrinos.

### 5.6.6.3.5.3 DOS U - Dosing parameters

Tab: **Method** ▸ **DOS U** ▸ **Properties...** ▸ **Dosing parameters**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The volume to be added, the dosing rate and the dosing time are defined on this tab.

**Dosing criterion**

Selects the two parameters that can be preset for dosing. The third parameter is calculated automatically from the formula **Volume = dosing time * dosing rate** and is not shown *(see Chapter 5.6.6.3.2, page 1068)*.

| | |
|---|---|
| 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 is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time.**

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **10.0000 mL** |

### Dosing rate

Rate at which dosing should take place. 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 is only displayed for **Dosing criterion = Volume/Dosing rate** or **Dosing rate/Dosing time**.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

The dosing rate should be reduced for viscous liquids.

### Dosing time

Time during which dosing is to be carried out. This parameter is only displayed for **Dosing criterion = Volume/Dosing time** or **Dosing rate/ Dosing time.**

| | |
|---|---|
| Range | **0 ... 9999999 s** |
| Default value | **100 s** |

### Pause

Waiting period before dosing is started.

| | |
|---|---|
| Range | **0 ... 999999 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 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 during monitoring with pH measurements..

*Titrando, 855*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 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* | |
|---|---|
| Range | **0.1 ... 999999 s** |
| Default value | **5.0 s** |

| *Titrino* | |
|---|---|
| Range | **1 ... 999999 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.

| Input | **25 characters** |
|---|---|

The conditions for stopping the dosing are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the dosing.

**Stop volume**

Stops when the given volume has been added after the start of the dosing. The stop volume should be adapted to suit the measuring vessel size.

| *Titrando, 855* | |
|---|---|
| Range | **0.00000 ... 9999.99 mL** |
| Default value | **100.000 mL** |
| Selection | **off** |

| *Titrino* | |
|---|---|
| Range | **0 ... 9999.99 mL** |
| Default value | **100.00 mL** |
| Selection | **off** |

**Stop time**

| | |
|---|---|
| Range | **0 ... 999999 s** |
| Selection | **off** |
| Default value | **off** |

**off**
Stops when the preset time has elapsed since the start of the dosing.

### Filling rate

Rate at which the dosing cylinder is to be filled 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 dosing to the largest possible value.

*Titrando, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |
| Default value | **maximum mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Default value | **maximum mL/min** |

**Note**

The filling rate should be reduced for viscous liquids.

## 5.6.6.3.5.5 DOS U - Monitoring

Tab: **Methods** ▸ **DOS U** ▸ **Properties...** ▸ **Monitoring**

### Command name

Name of the command.

| | |
|---|---|
| Input | **25 characters** |

The following monitoring processes can be switched on and defined on this tab:

**Monitoring Measured value**

### Monitoring Measured value

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

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

### Lower limit

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **-2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **-2000 mV** |

### Lower hysteresis

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value, then the event **Measured value lower limit ok** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 2000.0 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 exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **2000.0 mV** |

| *Titrino* | |
|---|---|
| Range | **-2000 ... 2000 mV** |
| Default value | **2000 mV** |

### Upper hysteresis

The 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** will be triggered.

| *Titrando, 855* | |
|---|---|
| Range | **0.0 ... 2000.0 mV** |
| Default value | **2.0 mV** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **DOS** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

**Wait for limit ok**
Reagent dosing in the current **DOS** command is 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 exceeded.

### Monitoring Temperature

**Monitoring Temperature**

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

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

**Lower limit**

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

*Titrando,855*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **-20.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **-170.0 °C** |

**Lower hysteresis**

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

*Titrando, 855*

| | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

| *Titrando, 855* | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **150.0 °C** |

| *Titrino* | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **500.0 °C** |

### Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

| *Titrando* | |
|---|---|
| Range | **0.0 ... 150.0 °C** |
| Default value | **0.2 °C** |

### Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

| | |
|---|---|
| Selection | **Stop determination** \| **Stop command (only Titrando)** \| **Wait for [Continue]** \| **Wait for limit ok** \| **none** |
| Default value | **none** |

**Stop determination**
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

**Stop command (only Titrando)**
The running **DOS** command is quit, then the next command is executed.

**Wait for [Continue]**
Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

**Wait for limit ok**
Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is once again within the limits (including hysteresis), reagent dosing will be resumed automatically.

**none**
No action will be taken if limits are exceeded.

### 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 exceeded.

**[New]**

Opens the dialog window **Track call** in which the parameters for a new track call can be entered *(see Chapter 5.6.6.3.3, page 1072)*.

**[Properties]**

Opens the dialog window **Track call** in which the parameters for the selected track call can be edited*(see Chapter 5.6.6.3.3, page 1072)* .

**[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.

| Input | **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]**

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 879)*.

**[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 879)*.

**[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 880)*.

**[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 880)*.

**[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.

| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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

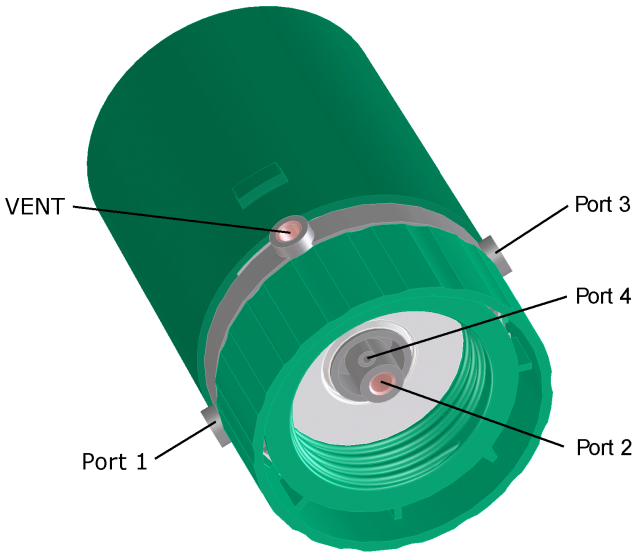
The port where each function is to be carried out needs to be defined for each liquid handling command.

| 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*

| | |
|---|---|
| Range | **0.00000 ... 99999.9 mL** |
| Default value | **10.0000 mL** |

*Aspirate*

| | |
|---|---|
| Range | **0.00000 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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

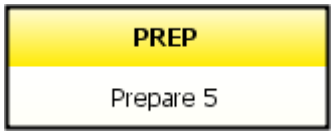
**pH/Ion - Meter:** 867

**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 |
| **.CYL** | Cylinder volume of the exchange or dosing unit used for the command |

| Identification | Description |
|---|---|
| **.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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **24 characters** |
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

## 5.6.6.6 EMPTY

### 5.6.6.6.1 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.

| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **24 characters** |
| Selection | **'Solution name'** \| **not defined** |
| Default value | **not defined** |

**not defined**
No tests will be carried out.

**Note**

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.

**Note**

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** ▸ **Insert** ▸ **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 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **1** |

*Move = Special beaker (for 778, 789, 814, 815, 855, 864, 874)*

| | |
|---|---|
| Range | **1 ... 16** |
| Default value | **1** |

*Move = Special beaker (for 730)*

| | |
|---|---|
| Range | **1 ... 8** |
| Default value | **1** |

*Move = Special beaker (for 774)*

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **-259.90 ... 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.

| | |
|---|---|
| Range | **3 ... 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*

| | |
|---|---|
| Range | **10 ... 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.

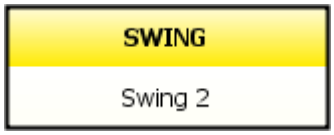
#### Devices

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.

| | |
|---|---|
| Input | **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 7.11.7, page 1411)*.

**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**.

| | |
|---|---|
| Range | **1 ... 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**.

| | |
|---|---|
| Range | **-180.0 ... 180.0 °** |
| Default value | **10.0 °** |

**Parameters**

**Swing rate**

Speed of the robotic arm when swinging to an external position or a particular angle.

| | |
|---|---|
| Range | **10 ... 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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Selection | **Work position** \| **Shift position** \| **Rinse position** \| **Special position** \| **Home position** |
| Default value | **Work position** |

*774*

| | |
|---|---|
| Range | **0 ... 100 mm** |
| Selection | **Work position** \| **Shift position** \| **Rinse position** \| **Special position** \| **Home position** |
| Default value | **Work position** |

*874*

| | |
|---|---|
| Range | **0 ... 110 mm** |
| Selection | **Work position** \| **Shift position** \| **Rinse position** \| **Special position** \| **Home position** |
| Default value | **Work position** |

**Note**

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* | |
|---|---|
| Range | **5 ... 25 mm/s** |
| Default value | **25 mm/s** |

| *730* | |
|---|---|
| Range | **3 ... 25 mm/s** |
| Default value | **25 mm/s** |

| *774* | |
|---|---|
| Range | **3 ... 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.

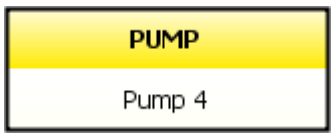
#### Devices

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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0 ... 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, 859, 888, 890, 901, 902, 904, 905, 906, 907

**Titrino:** 751, 758, 784, 785, 795, 798, 799

**Conductometer:** 856

**Coulometer:** 756, 831

**Dosing Interface:** 846

**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.

| Input | **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

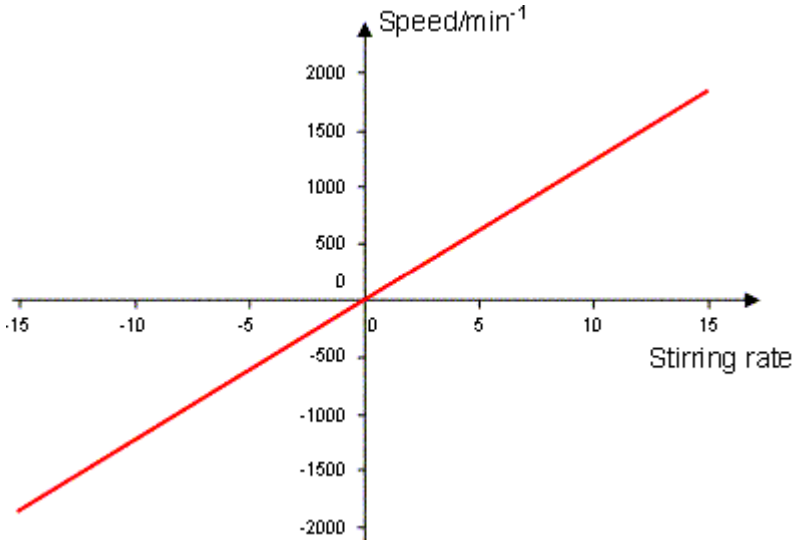
Setting the stirring rate or rotational speed. The algebraic sign of the stirring rate changes the direction in which the stirring is done. The default setting **8** corresponds to a rotational speed of 1000 rpm.

*Titrando, 814, 815, 846, 855, 856, 867, 864, 874*

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

*730, 778, 789*

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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**.

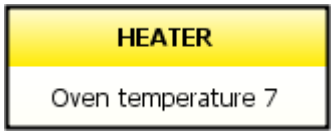
#### Devices

This command can be executed with the following devices:

**Sample Processor:** 774 and 874

#### 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'**:

| 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** |

### 5.6.7.8.2 HEATER - Properties

Dialog window: **Method** ▸ **HEATER** ▸ **Properties...** ▸ **HEATER - 'Command name'**

#### Command name

Name of the command.

| | |
|---|---|
| Input | **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 | **774 Oven Sample Processor** \| **874 Oven Sample Processor** |
| Default value | **874 Oven Sample Processor** |

## Heater

### Target temperature

Temperature to which the oven has to be heated. 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 defined on the device itself and is displayed only in the device configuration.

| | |
|---|---|
| Range | **50 ... 250 °C** |
| Selection | **Initial temp.** |
| Default value | **Initial temp.** |

**Note**

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).

| | |
|---|---|
| Range | **1 ... 999 min** |
| Selection | **off** |
| Default value | **off** |

**Timeout**

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.

| | |
|---|---|
| Range | **1 ... 999 min** |
| Selection | **off** |
| Default value | **off** |

**Action if timeout expires**

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

If this option is enabled, 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** \| **Stop determination** \| **Stop determination and series** |
| Default value | **Display message** |

**Display message**
A message is displayed and you can choose whether you want to continue the run or cancel it.

**Stop 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 and the exit track will be started (if available).

## 5.6.7.9 FLOW

### 5.6.7.9.1 FLOW - Overview

Dialog window: **Method ▸ FLOW ▸ Properties... ▸ FLOW - 'Command name'**

Command for **controlling the gas flow**.

**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 **FLOW** are configured in the following dialog window:

- *FLOW - Properties*

### Command variables

The following command variables are generated in the method run by the command **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 |
| **.FIN** | Command status; **1 = Command has been ended at least once**, **0**, **invalid** (variable not available) **= Command has never been ended** |

## 5.6.7.9.2 FLOW - Properties

Dialog window: **Method** ▸ **FLOW** ▸ **Properties...** ▸ **FLOW -' Command name'**

### Command name

Name of the command.

| | |
|---|---|
| Input | **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 | **774 Oven Sample Processor** \| **874 Oven Sample Processor** |
| Default value | **874 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 only visible for **Gas type** = **other gas**. The values for frequently used carrier gases are listed in the device manuals.

| | |
|---|---|
| Range | **0.001 ... 9.999** |
| Default value | **1.000** |

## Gas flow

### Inlet

Selection of the inlet of the carrier gas

| | |
|---|---|
| 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*

| | |
|---|---|
| Range | **10 ... 150 mL/min** |
| Default value | **50 mL/min** |

**Gas flow**

| | |
|---|---|
| Selection | **Switch on** \| **Switch off** |
| Default value | **Switch on** |

**Switch on**
Switches on the gas flow.

**Switch off**
Switches off the gas flow.

## 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 |

| Identification | Description |
|---|---|
| **.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.

| | |
|---|---|
| Input | **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 ▸ Insert ▸ New command... ▸ Result**

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

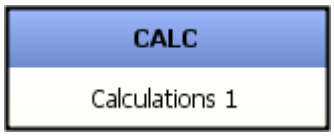
#### 5.6.8.2.1 CALC - Overview

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'**:

| 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** |

**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'**:

| Identification | 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 |
| **.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**) |

### 5.6.8.2.2 CALC - Calculation overview

Dialog window: **Method** ▸ **CALC** ▸ **Properties...** ▸ **CALC 'Command name'**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

Moves the selected result up (changes the sequence).

Moves the selected result down (changes the sequence).

**[New]**

Opens the dialog window **New result** in order to select a new template *(see Chapter 5.6.8.2.3, page 1144)*.

**[Properties]**

Opens 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 1146)*.

**[Delete]**

Deletes the result selected in the table.

**[Templates]**

Opens the dialog window **Manage templates** in order to delete or rename result templates *(see Chapter 5.6.8.2.6.1, page 1152)*.

### 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 **[Next >>]** causes the dialog window **Formula Assistant** to open *(see Chapter 5.6.8.2.4, page 1144)*.

**Empty**
Loads an empty result template. Pressing **[Next >>]** causes the dialog window **Result - 'Result name** to open afterwards *(see Chapter 5.6.8.2.5.1, page 1146)*.

**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 determination templates can be adapted quickly in this dialog window to the required command drawings.

**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.

**Select 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.

### Select 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.

### Select 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.

### Select 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.

### Select 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.

**Enter constant**

All of the constants of the formula template will be listed.

**'Constant'**

Entering the constants.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0E+99 (max. 15 places)** |
| Default value | **'empty'** |

Opens molar mass calculator for entering molar masses *(see Chapter 2.4.5, page 83)*.

### 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**.

| | |
|---|---|
| Input | **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 25)*. The result of the calculation formula defines the result type (**Number**, **Text** or **Date/time**).

| | |
|---|---|
| Input | **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'**.

| | |
|---|---|
| Input | **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** |
| 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**.

| | |
|---|---|
| Range | **0 ... 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** .

**Note**

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.

| | |
|---|---|
| Input | **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 1152)*.

### 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.

| Input | **10 digits** |
|---|---|

**Upper limit**

Upper limit for the result.

| Input | **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 84)*. The formula editor can also be called up inside the text field *(see Chapter 2.4, page 25)*.

| Input | **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 86)*.

**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 1152)*.

### 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 6.8.1, page 1312)*. 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** |
|---|---|

**Note**

As long as no common variable has been defined, the selection box will be empty. The creation of common variables is described in the configuration *(see Chapter 6.8.1, page 1312)*.

**Note**

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 29)*.

#### 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** |
|---|---|

**Note**

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 1265)*.

### 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 6.9, page 1321)*. 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** |
|---|---|

**Note**

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 6.9, page 1321)*.

**Note**

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 1152)*.

### 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.

| | |
|---|---|
| Input | **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**.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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**.

| | |
|---|---|
| Input | **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**.

**Note**

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.

| Input | **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.

**Note**

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*

**Note**

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'**:

| 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** |

### 5.6.8.4.2 REPORT - Properties

Dialog window: **Method** ▶ **REPORT** ▶ **Properties...** ▶ **REPORT - 'Command name'**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

**Report template**

**Report template**

Selecting the predefined Report template which the report should be generated with.

| 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**<br>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...]**

Opens the window **Send E-mail** for defining the E-mail parameters *(see Chapter 2.6.1, page 86)*.

## 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.

| Input | **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 250)*.

| Selection | **'Export template'** |
|---|---|

## 5.6.9 Communications commands

### 5.6.9.1 Communication commands - Overview

Menu item: **Method ▸ Insert ▸ 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, 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 (* devices with only 3 output lines)

**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

### 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.

| | |
|---|---|
| Input | **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.

**Note**

We recommend masking the irrelevant output lines with an asterisk ***** so as not to modify these line conditions.

**Note**

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, 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

**Dosing Interface:** 846

**Coulometer:** 756, 831

**Conductometer:** 856

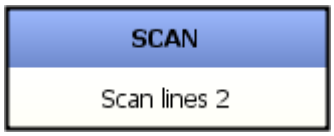
**pH/Ion - Meter:** 867

**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.

| | |
|---|---|
| Input | **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 predefined 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.

**Note**

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.

| | |
|---|---|
| Range | **0.0 ... 9999.9** |
| Default value | **10.0** |

| | |
|---|---|
| Selection | **min** \| **s** |
| Default value | **min** |

**Note**

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.

| Input | **25 characters** |
|---|---|

All the Event messages listed in the table are sent simultaneously. The table cannot be edited directly.

**Note**

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 1166)*.

### [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 1166)*.

### [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**

#### Recipient

Selection of the type of recipient.

| | |
|---|---|
| Selection | **System** \| **Command** |
| Default value | **System** |

#### Selection

Selection of the recipient address. All of the command names already defined in the method are available for **Recipient Command**. This field is empty and cannot be edited for **Recipient 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 recipient:

*System*

| | |
|---|---|
| Selection | **Quit** \| **Hold** \| **Stop** |
| Default value | **Quit** |

*Command*

| | |
|---|---|
| Selection | **Quit** \| **Hold** \| **Continue** \| **Start Titration** |
| Default value | **Quit** |

| Recipient | 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**. |

| Recipient | 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.<br>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.<br>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**). |

**Note**

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

| | |
|---|---|
| Input | **250 characters** |
| 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'**:

| Identifi-cation | 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** |

### 5.6.9.5.2 RECEIVE - Properties

Dialog window: **Method** ▸ **RECEIVE** ▸ **Properties...** ▸ **RECEIVE - 'Command name'**

**Command name**

Name of the command.

| | |
|---|---|
| Input | **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 below are fulfilled.

**Wait until one of the conditions is met**
Waits until **one** of the conditions listed in the table below is fulfilled.

**[New]**

Opens 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 1170)*.

**Note**

A maximum of 10 event messages can be entered.

**[Properties]**

Opens 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 1170)*.

**[Delete]**

Deletes the selected event message.

### Timeout

**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

| | |
|---|---|
| Range | **0 ... 9999.9** |
| Default value | **0** |

#### Unit

| | |
|---|---|
| Selection | **min** \| **s** |
| Default value | **s** |

### 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** |

| Event/ Status | Type | Significance | Com- mands |
|---|---|---|---|
| **Start** | Event | Command has been started. | All |
| **End** | Event | Command has been finished. | All |
| **Dosing** | Event | The dosing of the titration has been started. | **DET**, **MET** |

| Event/ Status | Type | Significance | Com-mands |
|---|---|---|---|
| **Measure** | Event | The measurement of the titration has been started. | **DET**, **MET** |
| **Busy** | Status | System is in status **BUSY**, **HOLD** or **ERROR**. | All |
| **Finished** | Status | Command has been terminated at least once. | 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** |

**Note**

An **event** can only be received as such if the **RECEIVE** command has been activated at the time of the event. A **status**, on the other hand, can be queried at any time.

**Comment**

Comment on the event message

| | |
|---|---|
| Input | **250 characters** |
| 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.

| | |
|---|---|
| Input | **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.

**Note**

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 1174)*.

**[Properties]**

Opens the dialog window **Transfer command** for editing the transfer command selected in the table *(see Chapter 5.6.9.6.3, page 1174)*.

**[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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **250 characters** |

**Note**

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** |
|---|---|

**Note**

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*).

| Input | **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.

**Note**

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.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Input | **S** |

*Mettler*

| | |
|---|---|
| Input | **S** |

*Ohaus*

| | |
|---|---|
| Input | **1S** |

*Precisa*

| | |
|---|---|
| Input | **P1** |

*Sartorius*

| | |
|---|---|
| Input | **\1bP** |

*Shimadzu*

| | |
|---|---|
| Input | **ID08** |

### Max. waiting time

Maximum time during which the balance data is waited for.

#### Value

| | |
|---|---|
| Range | **0.0 ... 9999.9** |
| Default value | **1** |

#### Device

| | |
|---|---|
| Selection | **min** \| **s** |
| Default value | **min** |

## 5.6.10 Miscellaneous commands

### 5.6.10.1 Miscellaneous commands - Overview

Menu item: **Method ▸ Paste ▸ New command...**

These commands can be used independently of the connected devices.

The following five commands can be selected:

- *REQUEST*
  Requesting sample data.
- *CALL*
  Calling tracks (subprograms).
- *LOOP*
  Multiple execution of a command sequence.
- *WAIT*
  Interrupts 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, bar-code 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.

| Input | **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.

**Note**

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**.

**Note**

**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 queried during the method run *(see Chapter 5.6.10.2.3, page 1182)*. 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 84)*.

| Input | **Text (unlimited)** |
|---|---|

**Note**

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**.

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **1** |

#### ID1 ... ID16

Sample identifications.

*Type = Number*

| | |
|---|---|
| Range | **-1.0E-99 ... 1.0E+99** |

*Type = Text*

| | |
|---|---|
| Input | **max. 100 characters** |

*Type = Date/Time*

| | |
|---|---|
| Selection | **'YYYY-MM-DD' or 'YYYY-MM-DD hh:mm:ss'** |

**Note**

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).

| | |
|---|---|
| Input | **1 ... 10 digits.** |
| Default value | **1** |

#### Device

Unit of sample size.

| | |
|---|---|
| Selection | **g** \| **mg** \| **µg** \| **mL** \| **µL** \| **pcs** |
| Default value | **g** |

**Note**

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.

**Note**

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

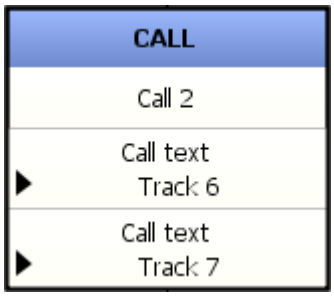
### 5.6.10.3.1 CALL - Overview

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.

| Input | **25 characters** |
|---|---|

### Call table

All the defined calls listed in the table are carried out simultaneously. The table cannot be edited directly.

**Note**

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 5.6.2.3, page 432)*.

### [New]

Opens the dialog window **Call** to enter a new call *(see Chapter 5.6.10.3.3, page 1185)*.

**Note**

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 1185)*.

**[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.

| | |
|---|---|
| Input | **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 25)*.

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).

| | |
|---|---|
| Input | **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'**

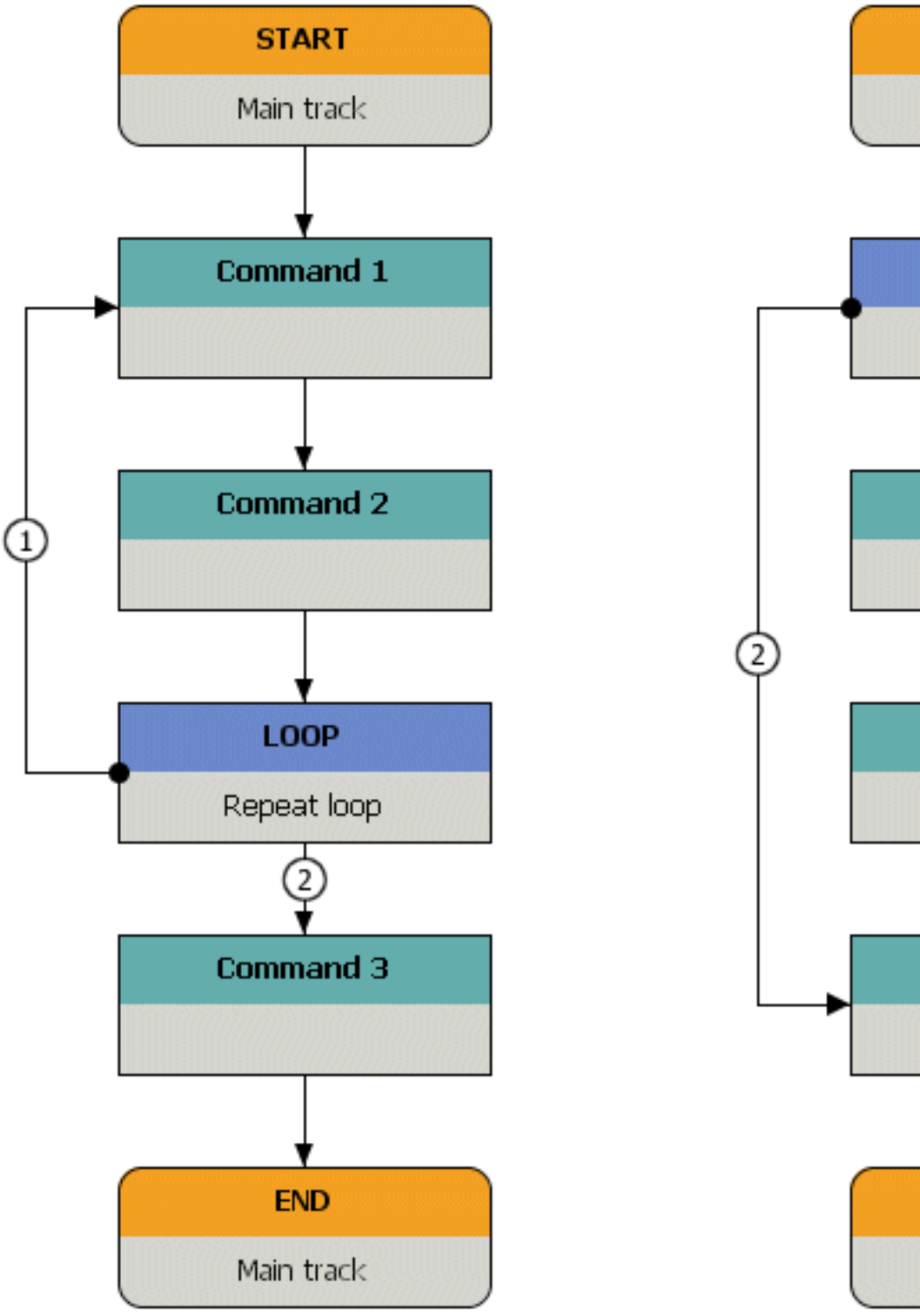
Command for the **repeated execution of a command sequence**. The loop can be terminated after fulfilling various stop criteria.

#### 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**


START
Main track
Command 1
Command 2
LOOP
Repeat loop
Command 3
END
Main track
1
2
1 Stop criterion not fulfilled
2 Stop criterion fulfilled

The LOOP command is at the end of the loop for **Repeat loops**. As soon as one stop criterion is fulfilled (case 2), the command after the LOOP command is carried out. If no stop criterion 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 criterion is fulfilled (case 2), the command after the loop is carried out. If no stop criterion is fulfilled, (case 1), the loop is run through. It is possible with certain stop criteria that the loop is never run through.

**Note**

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.

| | |
|---|---|
| Input | **25 characters** |

#### Stop criteria

Definition of three possible stop criteria. The first stop criterion 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 criterion 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.

| | |
|---|---|
| Range | **0 ... 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 criterion 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.

| | |
|---|---|
| Range | **0 ... 999.9** |
| Selection | **min** \| **s** |
| Default value | **min** |

**Note**

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 criterion 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 25)*. 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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**

| | |
|---|---|
| Range | **0 ... 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 84)*. The formula editor can also be called up inside the text field *(see Chapter 2.4, page 25)*.

| | |
|---|---|
| Input | **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 86)*.

**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

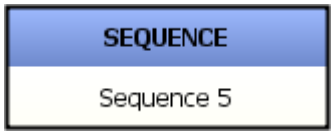
#### 5.6.10.6.1 SEQUENCE - Overview

Dialog window: **Method ▸ SEQUENCE ▸ Properties... ▸ SEQUENCE - 'Command name'**

Command for combining a sequence of commands to a single command. This command is only for clear structuring of methods.

**Appearance**

The command has the following appearance:




**Parameters**

The parameters for the command **SEQUENCE** are configured in the following dialog window:

- *SEQUENCE*

**Command variables**

The following command variables are generated in the method run by the command **SEQUENCE** 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** |

### 5.6.10.6.2 SEQUENCE - Properties

Dialog window: **Method** ▸ **SEQUENCE** ▸ **Properties...** ▸ **SEQUENCE - Sequence #**

**Command name**

Name of the command.

| Input | **25 characters** |
|---|---|

As many commands as one likes can be inserted in a **SEQUENCE** command. They will then be displayed in the command table, which contains information concerning **Command type** and **Command name**. The table itself cannot be edited. The individual lines in 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 dialog window **New command** for selecting the desired command which is to be inserted at the end of the table *(see Chapter 5.2.4.2.1, page 391)*.

**[Properties]**

Opens the dialog window for the selected command *(see Chapter 5.2.4.2.1, page 391)*.

**[Delete]**

Deletes the selected command.

| | |
|---|---|
| **Copy**<br>**Cut** | Use this context-sensitive menu item to delete the commands selected from the table and copy them onto the clip board. |

| | |
|---|---|
| **Paste** | Use this context-sensitive menu item to paste the commands at the end of the table that were copied onto the clip board. |

# 6 Configuration

## 6.1 Configuration - General

### 6.1.1 Configuration - Definition

Program part: **Configuration**

#### Definition

**Configuration** is to be understood as all of the **tiamo** settings for devices, titrants/solutions, sensors, common variables and rack data. Configuration also includes methods, security settings, user administration, program administration, templates, and Audit Trail.

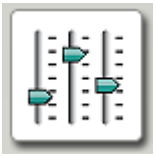
#### Organization

All configuration data is saved in the **configuration 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 client/server systems (**tiamo multi**) the configuration database is stored centrally on the server and saves and contains all the configuration data of all computers (clients) that are connected to this server.

### 6.1.2 Configuration - Desktop

Program part: **Configuration**

#### Configuration symbol



By clicking on on the configuration symbol in the vertical bar at the left-hand margin the program part **Configuration** is opened, 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** includes the following main menu 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...** | Exports configuration data *(see Chapter 6.3.1.1, page 1226)*. |
| **Import...** | Imports configuration data *(see Chapter 6.3.1.2, page 1228)*. |
| **Backup ▸** | |
| **Automatically** | Backup configuration data automatically *(see Chapter 6.3.2.1, page 1231)*. |
| **Manual** | Backup configuration data manually *(see Chapter 6.3.2.2, page 1232)*. |
| **Print (PDF)... ▸** | |
| **User administration** | Outputs user administration data as PDF file *(see Chapter 6.2.1.1, page 1203)*. |
| **Security settings** | Outputs security settings as PDF file *(see Chapter 6.2.2.1, page 1212)*. |
| **Logout...** | Logout user *(see Chapter 2.2.3, page 18)* |
| **Exit** | End program. |

### 6.1.3.3 Configuration - Menu View

Program part: **Configuration**

| | |
|---|---|
| **Change layout...** | Modifies layout of loaded configuration view *(see Chapter 3.1.7.2, page 93)*. |

| | |
|---|---|
| **Load view...** | Loads a saved configuration view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view...** | Saves current configuration view *(see Chapter 3.1.7.4, page 94)*. |
| **Quick access** | Opens a subwindow not contained in the current configuration view. |
| **Toolbar** | Switch toolbar display on/off. |

### 6.1.3.4 Configuration - Menu Tools

Program part: **Configuration**

| | |
|---|---|
| **Manual control** | Manually control the devices connected *(see Chapter 8.1, page 1458)*. |
| **User administration...** | Manages users and groups of users with access rights, signature rights and options *(see Chapter 6.2.1.1, page 1203)*. |
| **Security settings...** | Options for login, password protection, Audit Trail and electronic signature *(see Chapter 6.2.2.1, page 1212)*. |
| **Program administration...** | General settings for local/server and client/server settings *(see Chapter 6.2.3.1, page 1222)*. |
| **Audit Trail...** | Opens Audit Trail *(see Chapter 6.4, page 1244)*. |
| **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 1234)*. |
| **Input lines...** | Generates templates for scanning remote lines *(see Chapter 6.3.3.2.1, page 1235)*. |
| **Output lines...** | Generates templates for setting remote lines *(see Chapter 6.3.3.3.1, page 1236)*. |
| **Options...** | Sets program options *(see Chapter 6.3.4.1, page 1241)*. |

### 6.1.3.5 Help Menu

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

| | |
|---|---|
| **tiamo Help** | Open tiamo Help. |
| **About** | Displays information about the program and the installation. |

## 6.1.4 Configuration - Toolbar

Program part: **Configuration**

| | |
|---|---|
| **Change layout...** | Modifies layout of loaded configuration view *(see Chapter 3.1.7.2, page 93)*. |
| **Load view...** | Loads a saved configuration view *(see Chapter 3.1.7.3, page 94)*. |
| **Save view** | Saves current configuration view *(see Chapter 3.1.7.4, page 94)*. |
| **User administration...** | Manages users and groups of users with access rights, signature rights and options *(see Chapter 6.2.1.1, page 1203)*. |
| **Security settings...** | Options for login, password protection, Audit Trail and electronic signature *(see Chapter 6.2.2.1, page 1212)*. |
| **Audit Trail...** | Opens Audit Trail *(see Chapter 6.4, page 1244)*. |
| **Logout** | Logout user *Log out manually* |
| **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*
  Shows the automatically recognized and manually added devices.
- *Titrants/Solutions*
  Shows the data for the automatically recognized and manually added titrants and auxiliary solutions.
- *Sensoren*
  Shows the data for all defined sensors.
- *Common variables*
  Shows 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*
  Shows 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/Changes*
- *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*
  Defines the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
  Save current view.
- *Load view*
  Load view saved.
- *Rename view*
  Rename view saved.
- *Delete view*
  Delete view saved.

#### Automatic save

If in the programm part Configuration under **Tools ▸ Options** on the **Save** tab, the respective point under **Save on closing** is enabled, then the current view of the program will be saved automatically.

### 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**

With the symbol or the menu item **View ▸ Change Layout...** the dialog window **Change layout** is opened.

### Select layout

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

| Selection | **Selection of the possible combinations** |
|---|---|

### Available subwindows

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

| Selection | **Subwindow selection** |
|---|---|

### Displayed subwindows

Displays the subwindows that are shown in the view.

| Selection | **Subwindow** |
|---|---|

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 Load view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Load view… ▸ Load view**

With the symbol or the menu item **View ▸ Load view...** the dialog window **Load view** is opened.

**Name**

Name of the view that should be loaded.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Load]**

Load the selected view.

### 6.1.7.4 Save view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Save view… ▸ Save view**

With the symbol or the menu item **View ▸ Save view...** the dialog window **Save view** is opened.

**Name**

Name under which the view is to be saved.

**[Rename]**

Rename the selected view.

**[Delete]**

Delete the selected view.

**[Save]**

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

#### 6.1.7.5 Rename view

Dialog window: **Workplace / Database / Configuration ▸ View ▸ Rename view… ▸ Rename view**

To be able to rename a view, either open the dialog window **Load View** or **Save View** and press the **[Rename]** button. The **Rename View** window is opened.

**Rename view to**

Enter a new name for the view.

| Input | **50 characters** |
|---|---|

#### 6.1.7.6 Delete view

Function: **Workplace / Database / Configuration ▸ View ▸ Load/Save view… ▸ [Delete]**

To be able to delete a view, either open the dialog window **Load view** or **Save view** and press the **[Delete]** button. The delete procedure must then be confirmed.

## 6.2 Administration

### 6.2.1 User administration

#### 6.2.1.1 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 for the 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 generated. 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.

The user administration data can be output as PDF file using the menu item **File ▸ Print (PDF) ▸ User administration**.

**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*
  Assigns access rights to the four program parts and their menu bars.
- *Signatures*
  Assigns signature rights for methods and determinations.
- *Options*
  Defines 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**

Shows the name of the user group.

**Description**

Description of the user group.

| Input | **256 characters** |
|---|---|

**[Rename group]**

Renames selected user group.

**[Delete group]**

Deletes selected user group.

**[Copy group]**

Copies selected user group.

**[Add group]**

Adds 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 | **active** \| **inactive** |
|---|---|

**active**
The user can log in as usual.

**inactive**
The user can no longer log in. The Administrator must first assign him/her the status **activated** and provide a new Start password.

**[Add user]**

Adds new user to 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 marked 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) | | |

**Note**

In the **Administrators** group all access rights are switched on as standard 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 marked for a user group, then the rights of this group will be shown in the right-hand part and can be modified there.

**Note**

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 enabled 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 enabled 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 enabled 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 enabled 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 enabled 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 enabled 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 Audit Trail

#### Delete records

If this check box is enabled then users in this user group can confirm the deletion of Audit Trail entries with their signature.

| | |
|---|---|
| Selection | **off** \| **on** |
| Default value | **off** |

**Note**

In the **Administrators** group all signature rights are switched on as standard, but they can also be switched off.

### Executable methods

#### Only methods with Signature Level 2

If this check box is enabled, 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 marked 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 standard 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 standard 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 standard when the user logs in.

| | |
|---|---|
| Selection | **Selection of the defined configuration views** |

**Default method group**

Selection of the method group to be opened as standard for opening and saving methods.

| | |
|---|---|
| Selection | **Selection of the defined method groups** |

#### 6.2.1.2.5 Add user group

Dialog window: **Configuration ▸ Tools ▸ User administration ▸ [Add group] ▸ Add group**

In order to add a new user group with standard settings an existing group must be selected and either the context-sensitive menu item **Add group** then opened or the **[Add group]** button must be pressed. This opens the dialog window **Add group**.

**Group name**

Name of new group.

| | |
|---|---|
| Input | **24 characters** |

With **[OK]** a new group is generated under this name with standard settings; it does not contain any users. The **Description** field and the table of group members are empty.

#### 6.2.1.2.6 Copy 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. This opens the dialog window **Copy group**.

**Group name**

Name of new group.

| Input | **24 characters** |
|---|---|

With **[OK]** a new group is generated 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 Rename 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. This opens the dialog window **Rename group**.

**Group name**

Enter the new group name.

| Input | **24 characters** |
|---|---|

#### 6.2.1.2.8 Delete 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.

**Note**

It is only possible to delete a user group when 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 in the left-hand side of the dialog window **User administration** a user in a user group has been selected, then details of the user will be shown at the right-hand side.

**User**

Shows the short name of the user that must be entered in the field **User**. This name is defined when a new user is entered for the first time and cannot be subsequently modified.

| Input | **24 characters** |
|---|---|

**Full name**

Full name of the user.

| Input | **256 characters** |
|---|---|

**Status**

Shows the current status of the user. Only users of the group **Administrators** can modify the status.

| Selection | **active** \| **inactive** \| **removed** |
|---|---|

**active**
Users with the status **enabled** can log in in the usual way. An exception is the first login after a change in status from **disabled** or **removed** to **enabled**. In this case a **Start password** must be issued with which this user can then log in.

**inactive**
Users with the status **disabled** can no longer log in. They are automatically given this status as soon as the number of login attempts defined in the **Security settings** has been exceeded.

**removed**
Users with the status **removed** can no longer log in. If the status of a user is changed from **activated** or **deactivated** to **removed**, then the user is automatically moved to the group **Removed users**. If a removed user is subsequently again given the status **activated** or **deactivated** then a dialog window appears for selecting the group to which the user is to be assigned.

**Start password**

The invisible start password is shown with 6 ***** characters and must be entered the first time that a new user logs in or after a change in status from **deactivated** or **removed** to **activated**. The Administrator must issue a

new start password when adding a new user or after a change in status to **activated**. If the user has logged in with the start password and then entered a new password, then the start password is deleted again.

| Input | **50 characters** |
|---|---|

**[Set start password]**

Opens the dialog window **Start password**. This button is enabled only for users with the status **activated**. If a user has forgotten his/her password then the Administrator can issue a new start password here.

**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**

Optional entry of additional information for the user (e.g. function, address).

| Input | **1000 characters** |
|---|---|

### 6.2.1.3.2 Add user

Dialog window: **Configuration ▸ Tools ▸ User administration ▸ [Add user] ▸ Add user**

There are two ways of adding a new user:

- Select user group and the context-sensitive menu item **Add user**.
- Select user group and press the **[Add user]** button.

In both cases this opens the dialog window**Add user**.

**User**

Short name of 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.

| Input | **24 characters** |
|---|---|

### 6.2.1.3.3 Set start password

Dialog window: **Configuration ▸ Tools ▸ User administration ▸ [Set start password] ▸ Set start password**

Using the **[Set start password]** button in the dialog window **User administration** a start password can be issued for the selected user. It is enabled only for newly added users or for those who have once again achieved **activated** status. The dialog window **Start password** opens:

**Start password**

Enter a new start password. Password options are not used for the start password.

| | |
|---|---|
| Input | **50 characters** |

**Confirm password**

Confirms the start password.

| | |
|---|---|
| Input | **50 characters** |

## 6.2.2 Security settings

### 6.2.2.1 Security settings

Dialog window: **Configuration ▸ Tools ▸ Security settings**

#### Overview

In the dialog window **Security settings** the parameters for log-in, password protection, Audit Trail and electronic signatures can be configured. These are primarily used to ensure that work is carried out according to the requirements of FDA Guideline 21 CFR 11.

**Note**

The version **tiamo light** cannot be configured to be in conformance with FDA guidelines. With the exception of the parameter **User name required** on the tab **Login/Password protection** all the options are inactive *(see Chapter 6.2.2.2, page 1213)*.

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 put out as PDF file using the menu item **File ▸ Print (PDF) ▸ Security settings**.

#### Tabs

The security settings are configured on the following tabs:

- *Login/Password protection*
  Settings for login and password protection.
- *Audit Trail/Changes*
  Enable/Disable 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 tab **Login/Password protection** is defined whether the user must log in with his/her name or with name and password, and how the password is to be monitored and constructed.

**Settings according to 21 CFR 11**

**[Set]**

Sets the parameters to default settings for FDA-compliant work.

#### Login policies

**Enforce login with user name**

If this check box is **enabled** then every time that the program starts, the login window will appear in which the user must enter his/her user name. If this check box is **disabled** no login is necessary and the user logged in under Windows will be adopted as user name. In this case all subsequent parameters are deactivated.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

**Enforce login with password**

If this check box is **enabled** then every time that the program starts, the login window will appear in which the user has to enter a password as well as his/her user name. If this option is **disabled**, then all subsequent parameters are deactivated.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

**Password monitoring by tiamo**

If this option is **enabled** then the password will be monitored by **tiamo** according to the following parameters.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

### Password monitoring by Windows

If this option is **enabled** then the password will be monitored according to the parameters defined in Windows. In this case the parameters for password protection are deactivated.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **off** |

**Caution**

When using password monitoring through Windows, to avoid an unwanted login by the standard defined user **Guest** in Windows, this must also either be provided with a password or (preferably) be deactivated.

**Caution**

If this option is enabled, the user name in Windows and **tiamo** must correspond with each other otherwise the user in **tiamo** cannot log in any more. In order to ensure this, the dialog window **Test Login** *(see Chapter 6.2.2.3, page 1217)* appears after this option has been selected in which the logged-in user must register with his or her Windows password. If this test login fails, then the **Security settings** dialog window will remain open.

**Note**

With Windows 2000, proceed as follows for password monitoring by Windows:

1. Run/Execute "secpol.msc".
2. Under "Local Policies/User Rights Assignment", switch on the guideline "Act as part of the operating system" for all desired user groups.
3. Restart computer.

### Maximum number of login attempts

If this check box is **activated** then a user will be given the status **deactivated** as soon as the number of login attempts defined here has been exceeded. A user with the status **deactivated** can no longer start the program. The counter for login attempts is reset to zero for all users at each new start.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **off** |

| | |
|---|---|
| Range | **2 ... 5** |
| Default value | **3**<br>FDA default: **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**<br>FDA default: **off** |

**[E-mail]**

This button opens the dialog window **Send E-mail***(see Chapter 6.2.2.7, page 1220)* for defining the E-mail parameters.

### Logout policies

**New login only for same user**

If this check box is **activated** then for manual logout a renewed login is only possible for the same user. Users with administrator rights can always log in. If this option is enabled then the subsequent option is automatically enabled and deactivated.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **off** |

**Note**

If the automatic logout is enabled (see below) only the same user or a user with administrator rights can log in again independent of these option settings.

**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 on the workplaces still open with running determinations can neither edit data or trigger actions. Such workplaces will only be available again when all determinations are finished. For running determinations the old user name always applies (Audit Trail entries, Save, Export, etc.). Exceptions are the stop of a determination with **[Stop]** and the emer-

gency stop, which are always possible for all running determinations and series.

If this check box is **deactivated** then the newly logged-in user will have all the rights for the opened workplaces that his/her group assignment authorizes him/her to. For running determinations the new user name applies immediately (Audit Trail entries, Save, Export, etc.).

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |
| | FDA default: **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 member of the same user group as the one to which the previously logged-off user belongs or a user with administrator rights can log in again.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |
| | FDA default: **off** |

| | |
|---|---|
| Range | **1 ... 60 min** |
| Default value | **10 min** |
| | FDA default: **10 min** |

**Note**

The immediate termination of all determinations on all activated workplaces with the **emergency stop button** still remains possible after an automatic logout.

## Password policies

### Enforce unique password

If this check box is **activated** then this ensures that a user can use a given password only once.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |
| | FDA default: **on** |

### Enforce use of special characters

If this check box is **activated** then this ensures that the password must contain at least one special character (@, #, ~ etc.).

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **off** |

**Minimum password length**

If this check box is **activated** then this ensures that the password must contain the indicated number of characters.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

| | |
|---|---|
| Range | **1 ... 10 Characters** |
| Default value | **6 Characters**<br>FDA default: **6 characters** |

**Validity**

If this check box is **activated** then this 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 changes the password.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

| | |
|---|---|
| Range | **1 ... 999 days** |
| Default value | **365 days**<br>FDA default: **365 days** |

### 6.2.2.3 Test login for password monitoring by Windows

Tab: **Configuration ▸ Tools ▸ Security settings ▸ Login/Password protection ▸ Test login**

The user's Windows password must be entered in this dialog window when enabling the option **Password monitoring by Windows***(see Chapter 6.2.2.2, page 1213)*. The test login will be used to check whether the user name matches the Windows user name.

**User**

Shows the current user name.

**Windows password**

Entry of the Windows password.

It is only if when the test login is successful that the **Password monitoring by Windows** can be used.

### 6.2.2.4 Audit Trail/Modifications

Tab: **Configuration ▸ Tools ▸ Security settings ▸ Audit Trail/Modifications**

Audit Trail recording is enabled and disabled on the **Audit Trail/Modifications** tab. When a method, determination or sample data is modified, you can also define whether or not a reason must be given for the modification together with comments.

**Settings according to 21 CFR 11**

**[Set]**

Sets the parameters to default settings for FDA-compliant work.

#### Audit Trail

**Enable Audit Trail**

If this check box is **activated** then all program actions will be automatically recorded; these are defined as Audit Trail actions.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

#### 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**<br>FDA default: **on** |

**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 subwindow **Information** on the tab **Determination**. The reason and comments are also recorded in the Audit Trail.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off**<br>FDA default: **on** |

**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 subwindow **Information** on the tab **Sample**. The reason and comments are also recorded in the Audit Trail.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |
| | FDA default: **on** |

### 6.2.2.5 Signatures

Tab: **Configuration** ▸ **Tools** ▸ **Security settings** ▸ **Signatures**

On the tab **Signatures** the parameters for the electronic signatures can be configured.

**Settings according to 21 CFR 11**

**[Set]**

Sets the parameters to default settings for FDA-compliant work.

**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** |
| | FDA default: **on** |

| | |
|---|---|
| Range | **1 … 60 min** |
| Default value | **10 min** |
| | FDA default: **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** |

**Sign each determination separately**

If this check box is **activated** then each determination contained in the determination overview must be signed individually.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |
| | FDA default: **on** |

### 6.2.2.6 Default reasons

Tab: **Configuration ▸ Tools ▸ Security settings ▸ Default reasons**

On the tab **Default reasons** the reasons are defined that have to be entered when methods and determinations have to be signed for, or when methods, determinations and sample data are modified.

**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 determination** \| **Modification Sample Data** |
| Default value | **Signature Level 1** |

**Reasons**

Shows the reasons defined for the selected category.

| | |
|---|---|
| Input | **50 characters** |

Moves text upward (modifies sequence).

Moves text downward (modifies sequence).

**[New]**

Adds a new reason.

**[Edit]**

Edits 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**

**E-mail address**

E-mail address of the recipient.

| | |
|---|---|
| Input | **200 characters** |

**Subject**

Title for describing the message.

| | |
|---|---|
| Input | **200 characters** |

### Message

The message defined here will be transmitted as an E-mail if the maximum permitted number of login attempts is exceeded.

The Text editor for entering or changing the message is opened with or by double-clicking into the text field.

| | |
|---|---|
| Selection | **Text (unlimited)** |

### Sender

**E-mail address**

E-Mail address of the sender.

| | |
|---|---|
| Input | **200 characters** |

**SMTP server**

Address of SMTP mail server.

| | |
|---|---|
| Input | **200 characters** |

**Port**

Port number of the SMTP mail server.

| | |
|---|---|
| Range | **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 POP mail server.

| | |
|---|---|
| Input | **200 characters** |

**Port**

Port number of the POP mail server.

| | |
|---|---|
| Range | **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.

| Input | **200 characters** |
|---|---|

**Password**

Password for the access to the mail server. This password does not necessarily have to be identical to the Windows password.

| Input | **200 characters** |
|---|---|

## 6.2.3 Program administration

### 6.2.3.1 Program administration

Dialog window: **Configuration** ▸ **Tools** ▸ **Program administration**

#### Overview

In the dialog window **Program administration** backup directories and licenses can be managed.

#### 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 generated during installation.

**Note**

The following buttons are activated only when **tiamo** is running on the server; they are deactivated for the individual clients.

**[New]**

Adds a new backup directory *(see Chapter 6.2.3.2.2, page 1223)*.

**[Edit]**

Edits the selected backup directory *(see Chapter 6.2.3.2.3, page 1224)*.

**[Delete]**

Deletes the selected backup directory.

**Note**

The **Default backup directory** cannot be deleted.

### 6.2.3.2.2 Create new backup directory

Dialog window: **Configuration** ▸ **Tools** ▸ **Program administration** ▸ **Backup directories** ▸ **[New]** ▸ **New backup directory**

**Name**

Name for the backup directory.

| | |
|---|---|
| Input | **50 characters** |

**Directory**

Entry or selection (with ...) of the path for the backup directory.

| | |
|---|---|
| Input | **1000 characters** |

**Note**

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.

**Note**

Make sure that you have read and write access rights on the selected directory.

### 6.2.3.2.3 Edit backup directory

Dialog window: **Configuration ▸ Tools ▸ Program administration ▸ Backup directories ▸ [Edit] ▸ Edit backup directory**

#### Name

Name for the backup directory.

| Input | **50 characters** |
|---|---|

**Note**

The **Default backup directory** generated during installation cannot be renamed.

#### Directory

Entry or selection (with ...) of the path for the backup directory.

| Input | **1000 characters** |
|---|---|

**Note**

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.

**Note**

Make sure that you have read and write access rights 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

Shows the ID for the client that has been entered for the client/server installation.

**Computer name**

Shows the name of the computer on which the client has been installed.

**Status**

Shows whether **tiamo** has been started (**active**) or not (**inactive**).

**Note**

The contents of the tab **Clients** can be displayed, even if **tiamo** is not running, by using the shortcut Clients in the directory **..\\Metrohm\ \tiamo\\bin** (only available on the server).

### 6.2.3.4 Add licenses

Dialog window: **Configuration ▸ Tools ▸ Program administration ▸ 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.

### 6.2.3.5 Licenses

Tab: **Configuration ▸ Tools ▸ Program administration ▸ Licenses**

Table with the licenses that are installed on the server (for **tiamo multi**) or local server (for **tiamo light** and **tiamo full**). 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.

**Note**

In client/server systems this tab is only visible on the server and only for members of the **Administrators** user group.

**License code**

Shows the entered license code.

**Number of licenses**

Shows the number of clients to have been enabled with the license code.

**[Add licenses]**

Adds new, additional licenses. The dialog window **Add licenses** opens.

**License code**

Entry of the license code.

# 6.3 Configuration data

## 6.3.1 Export/Import

### 6.3.1.1 Export configuration data

Dialog window: **Configuration ▸ File ▸ Export… ▸ Export configuration data**

With **File ▸ Export...** the dialog window **Export configuration data** opens, in which the following parts of the configuration database can be selected for export:

**Devices**

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

Exports configuration data for devices *(see Chapter 6.5.1, page 1259)*.

**Titrants/Solutions**

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

Exports configuration data for titrants and solutions *(see Chapter 6.6.2.1, page 1266)*.

**Sensors**

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

Exports configuration data for sensors *(see Chapter 6.7.2.1, page 1289)*.

**Common variables**

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

Exports configuration data for common variables *(see Chapter 6.8.1, page 1312)*.

**Global variables**

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

Exports configuration data for global variables *(see Chapter 6.9, page 1321)*.

**Rack data**

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

Exports configuration data for sample changer racks *(see Chapter 6.11.1, page 1337)*.

**Sample solutions (TC conductivity)**

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

Exports the configuration data for calculating the temperature coefficients of sample solutions *(see Chapter 6.10.2, page 1330)*.

**Configuration views**

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

Exports saved configuration views *(see Chapter 3.1.7, page 92)*.

**Workplace views**

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

Exports saved workplace views *(see Chapter 3.1.7.1, page 92)*.

**Database views**

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

Exports saved database views *(see Chapter 3.1.7, page 92)*.

**Result templates**

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

Exports saved result templates *(see Chapter 5.6.8.2.6.1, page 1152)*.

**Control chart templates**

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

Exports saved control card templates *(see Chapter 4.4.2.1, page 240)*.

**Curve overlay templates**

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

Exports saved curve overlay templates *(see Chapter 4.4.3.1, page 244)*.

**Buffer data**

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

Exports configuration data for custom buffers *(see "Buffer table", page 1234)*.

**Conductivity standards**

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

Exports configuration data for conductivity standards *(see Chapter 6.3.3.4.1, page 1238)*.

**E-mail templates**

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

Exports saved E-mail templates *(see Chapter 6.3.3.5, page 1239)*.

**Text templates**

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

Exports saved text templates *(see Chapter 3.5, page 120)*.

**Sample assignment table**

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

Exports the saved sample assignment table *(see Chapter 3.4, page 118)*.

**Security settings**

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

Exports saved security settings *(see Chapter 6.2.2.1, page 1212)*.

**User administration**

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

Exports saved user administration *(see Chapter 6.2.1.1, page 1203)*.

**[OK]**

The dialog window **Save** for saving data opens, in which the name and directory for the export file must be entered. The selected configuration data is then saved in a file with the extension **.mcfg**.

### 6.3.1.2 Import configuration data

Dialog window: **Configuration ▸ File ▸ Import… ▸ Import configuration data**

With **File ▸ Import…** and after selection of the file ***.mcfg** to be imported, the dialog window **Import configuration data** opens, in which the parts of the configuration database present in the export file can be selected for import:

**Note**

Data that is not present in the export file cannot be selected.

**Devices**

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

Imports configuration data for devices *(see Chapter 6.5.1, page 1259)*.

**Titrants/Solutions**

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

Imports configuration data for titrants and solutions *(see Chapter 6.6.2.1, page 1266)*.

**Sensors**

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

Imports configuration data for sensors *(see Chapter 6.7.2.1, page 1289)*.

**Common variables**

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

Imports configuration data for common variables *(see Chapter 6.8.1, page 1312)*.

**Global variables**

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

Imports configuration data for global variables *(see Chapter 6.9, page 1321)*.

**Rack data**

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

Imports configuration data for sample changer racks *(see Chapter 6.11.1, page 1337)*.

**Sample solutions (TC conductivity)**

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

Imports the configuration data for calculating the temperature coefficients of sample solutions *(see Chapter 6.10.2, page 1330)*.

**Configuration views**

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

Imports saved configuration views *(see Chapter 3.1.7, page 92)*.

**Workplace views**

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

Imports saved workplace views *(see Chapter 3.1.7.1, page 92)*.

**Database views**

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

Imports saved database views *(see Chapter 3.1.7, page 92)*.

**Result templates**

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

Imports saved result templates *(see Chapter 5.6.8.2.6.1, page 1152)*.

**Control chart templates**

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

Imports saved control card templates *(see Chapter 4.4.2.1, page 240)*.

**Curve overlay templates**

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

Imports saved curve overlay templates *(see Chapter 4.4.3.1, page 244)*.

**Buffer data**

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

Imports configuration data for custom buffers *(see "Buffer table", page 1234)*.

**Conductivity standards**

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

Imports configuration data for conductivity standards *(see Chapter 6.3.3.4.1, page 1238)*.

**E-mail templates**

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

Imports saved E-mail templates *(see Chapter 6.3.3.5, page 1239)*.

**Text templates**

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

Imports saved text templates *(see Chapter 3.5, page 120)*.

**Sample assignment table**

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

Imports the saved sample assignment table *(see Chapter 3.4, page 118)*.

**Security settings**

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

Imports security settings *(see Chapter 6.2.2.1, page 1212)*.

**User administration**

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

Imports user administration *(see Chapter 6.2.1.1, page 1203)*.

**[OK]**

The selected data is imported.

## 6.3.2 Backup/Restore

### 6.3.2.1 Backup configuration data automatically

Dialog window: **Configuration ▸ File ▸ Save ▸ Automatically ▸ Backup configuration data automatically**

**Automatic backup**

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

If this check box is **activated** then the configuration database will be backed up automatically in the defined backup directory at the required time interval. The whole configuration database (including method groups and methods) is backed up.

If this check box is **deactivated** then the following parameters cannot be edited.

**Last backup**

Shows the date and time of the last configuration data backup.

**Next backup**

Date and time at which the next backup is to be carried out. The … opens the window **Next backup** to select the date *(see Chapter 2.5.1, page 83)*.

| Default value | **Last backup+ 1 month** |
|---|---|

### Interval

Entry of the time interval after which an automatic backup will take place. After each automatic or manual backup the interval entered here will be added to the date of the **Last backup** and shown in the field **Next backup**.

| | |
|---|---|
| Range | **1 ... 999** |
| Default value | **1** |
| Selection | **Day(s)** \| **Week(s)** \| **Month(s)** \| **Year(s)** |
| Default value | **Month(s)** |

### Backup directory

Selection of a pre-defined backup directory *(see Chapter 6.2.3.2.1, page 1222)*.

**Note**

Make sure that you have read and write access rights on the selected directory.

## 6.3.2.2 Backup configuration data manually

Dialog window: **Configuration ▸ File ▸ Save ▸ Manually ▸ Backup configuration file manually**

### Backup target

### Backup directory

Selection of a pre-defined backup directory *(see Chapter 6.2.3.2.1, page 1222)*.

**Note**

Make sure that you have read and write access rights on the selected directory.

### Backup name

Selection of an existing name for the backup file or entry of a new name. If an existing backup file is selected it will be overwritten.

| | |
|---|---|
| Input | **50 characters** |
| Selection | **Backup names** |

**Note**

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.

**[Start]**

Start manual backup of complete configuration database (including method groups and methods).

### 6.3.2.3 Restore 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. If the backup file is located on a network drive, this information is not available.

**Database name**

Shows the name of the configuration database. If the backup file is located on a network drive, this information is not available.

**Size**

Shows the size of the configuration database in KB.

**Save as**

Name under which the configuration database will be restored.

**[Start]**

Starts the recovery of the configuration database. After the start, a progress bar appears in the window. When the backup has been completed the dialog window closes automatically.

## 6.3.3 Templates

### 6.3.3.1 Template - Custom calibration buffer

Dialog window: **Configuration ▸ Tools ▸ Templates ▸ Custom calibration buffer**

You can define 5 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**. The dialog window consists of 5 identical tabs for the 5 buffers.

#### 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 (see below).

**[Delete All]**

All the pH values of the selected buffer will be set to **off**.

#### Dialog window "Change pH values"

In the dialog window **Change pH values** you can edit the pH values for the buffer selected in the buffer table.

**Temperature**

Selects the temperature for which the pH value is to be edited.

| | |
|---|---|
| Range | **0 ... 95 °C** |

**pH value**

pH value of the buffer for the selected temperature.

| | |
|---|---|
| Range | **-20.000 ... 20.000** |
| Selection | **off** |
| Default value | **off** |

**Note**

For your own calibration buffers you should enter the pH values for the particular temperature range in which your pH calibration and measurements will later be carried out. If you do not know the pH values for individual temperatures these will be automatically calculated by linear interpolation.

### 6.3.3.2 Templates for input lines

#### 6.3.3.2.1 Managing the 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]**

Generates a new template *(see Chapter 6.3.3.2.2, page 1235)*.

**[Edit]**

Edits the selected template *(see Chapter 6.3.3.2.2, page 1235)*.

**[Delete]**

Deletes the selected template.

#### 6.3.3.2.2 Editing the 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.

| | |
|---|---|
| Input | **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.

**Note**

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 for 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 according to the selected column in increasing or decreasing sequence by clicking on the column title

**[New]**

Generates a new template *(see Chapter 6.3.3.3.2, page 1236)*.

**[Edit]**

Edits the selected template *(see Chapter 6.3.3.3.2, page 1236)*.

**[Delete]**

Deletes 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.

| Input | **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.

**Note**

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.

| | |
|---|---|
| Range | **100 ... 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 1238)*.

**[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 1238)*.

**[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.

| | |
|---|---|
| Input | **25 characters** |

**Comment**

Comment on the conductivity standard.

| | |
|---|---|
| Input | **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 1239)*.

**[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 1239)*.

**[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.

| | |
|---|---|
| Range | **-20 ... 150 °C** |

**Conductivity**

Conductivity for the specified temperature (6 significant places).

| | |
|---|---|
| Range | **0.00000 ... 2000.00 mS/cm** |

### 6.3.3.5 E-mail templates

#### 6.3.3.5.1 Manage E-mail templates

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ E-mail templates... ▶ E-mail templates**

The stored 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 sequence.

**[New]**

Generates a new template. The window **Edit E-mail template** opens, in which a new template can be defined *(see Chapter 6.3.3.5.2, page 1240)*.

**[Edit]**

Edits the selected template. The window **Edit E-Mail template** opens, in which the template can be edited *(see Chapter 6.3.3.5.2, page 1240)*.

**[Delete]**

Deletes the selected template.

**[Copy]**

Copies the selected template and saves it under the name **Copy of....**.

### 6.3.3.5.2 Edit 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 **E-mail templates** dialog window, 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.

| | |
|---|---|
| Input | **1 ... 16 characters** |

#### Receiver

**E-mail address**

E-mail address of the receiver.

| | |
|---|---|
| Input | **1 ... 200 characters** |

#### Sender

**E-mail address**

E-mail address of the sender.

| | |
|---|---|
| Input | **1 ... 200 characters** |

**SMTP server**

Address of SMTP mail server.

| | |
|---|---|
| Input | **1 ... 200 characters** |

**Port**

Port number of the SMTP mail server.

| | |
|---|---|
| Range | **1 ... 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 selecting the authentication method.

| | |
|---|---|
| Selection | **SMTP** \| **SMTP after POP** |
| Default value | **SMTP** |

**POP server**

Address of POP mail server.

| | |
|---|---|
| Input | **3 … 200 characters** |

**Port**

Port number of the POP mail server.

| | |
|---|---|
| Range | **1 … 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.

| | |
|---|---|
| Input | **2 … 50 characters** |

**Password**

Password for access to the mail server. This password does not necessarily have to be identical to the Windows password.

| | |
|---|---|
| Input | **0 … 50 characters** |

## 6.3.4 Options

### 6.3.4.1 Options - Overview

Dialog window: **Configuration** ▸ **Tools** ▸ **Options** ▸ **Options**

Under **Tools** ▸ **Options**, general program properties can be set on the following tabs:

- *General*
  Selection of the dialog language and switches the emergency stop button on/off.
- *Save*
  Saves settings 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** |

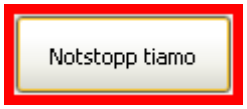
**Note**

For the altered setting to become effective the program must be restarted.

### Emergency stop button

If this option is enabled then the emergency stop button will be shown in all program parts.

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |




This button can be moved to any position with the left-hand mouse button pressed down and is always shown right up at the top on 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 activated workplaces. When this happens, all devices are stopped (including pumps; any device commands that may have been started will be carried out to their ends, 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 running actions 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 exiting

Here you can define the settings 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 at the next program start the original, manually saved view will be loaded.

### Configuration settings

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

Switches Save configuration view on/off when exiting the program.

**Workplace settings**

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

Switches Save workplace view on/off when exiting the program.

**Database settings**

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

Switches Save database view on/off when exiting the program.

### 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 option is **switched off** none of the PDF file contents can be copied or extracted.

**Printing allowed**

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

If this option is **switched off** the PDF file cannot be printed out.

**Adding or changing comments allowed**

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

If this option is **switched off** comments and form fields can neither be added nor altered.

**Modifying the document allowed**

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

If this option is **switched off** no changes can be made to the PDF file.

# 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 logging of all user actions with which in **tiamo** data is generated, altered 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.

#### Organization

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 1218)*.

### 6.4.1.2 Audit Trail - Desktop

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

#### Elements

The desktop of the **Audit Trail** program window contains 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 **Audit Trail** program window contains the following main menu items:

- *File*
  Prints, exports, archives, deletes Audit Trail
- *View*
  Updates table, defines column display.
- *Filter*
  Defines and uses special filters and quick filters.
- *Tools*
  Monitors Audit Trail
- *Help*
  Opens program help, display program information.

#### 6.4.1.3.2 Audit Trail - Menu File

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **Print (PDF)...** | Prints Audit Trail data sets as PDF file *(see Chapter 6.4.2.8, page 1258)*. |
| **Export...** | Exports Audit Trail data sets *(see Chapter 6.4.2.5, page 1255)*. |
| **Archive...** | Archives Audit Trail data sets *(see Chapter 6.4.2.6, page 1256)*. |
| **Delete** | Deletes archived Audit Trail data sets *(see Chapter 6.4.2.7, page 1257)*. |
| **Exit** | Exits the Audit Trail window. |

#### 6.4.1.3.3 Audit Trail - Menu View

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **Update** | Updates Audit Trail table *(see Chapter 6.4.2.4, page 1255)*. |
| **Column display** | Defines the columns for the Audit Trail table *(see Chapter 6.4.2.2, page 1250)*. |

#### 6.4.1.3.4 Audit Trail - Menu Filter

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **Last filter** | Uses the last quick or special filter again *(see Chapter 6.4.2.3.2, page 1251)*. |
| **Quick filter** | Uses the quick filter *(see Chapter 6.4.2.3.3, page 1251)*. |

| | |
|---|---|
| **Special filter...** | Defines and uses special filter *(see Chapter 6.4.2.3.4.1, page 1251)*. |
| **Remove filter** | Removes current filter *(see Chapter 6.4.2.3.5, page 1255)*. |

### 6.4.1.3.5 Audit Trail - Menu Tools

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **Monitoring** | Defines Audit Trail table monitoring *(see Chapter 6.4.2.9, page 1258)*. |
| **Installation log** | Opens log file for installation. |
| **Verify export/archive** | Checks the checksum of an exported or stored Audit Trail file *(see Chapter 6.4.2.10, page 1259)*. |

### 6.4.1.3.6 Audit Trail - Menu Help

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **tiamo Help** | Opens tiamo Help. |
| **Info** | Displays information about the program and the installation. |

## 6.4.1.4 Audit Trail - Toolbar

Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**

| | |
|---|---|
| **Print (PDF)...** | Prints Audit Trail data sets as PDF file *(see Chapter 6.4.1.3.2, page 1245)*. |
| **Last filter** | Uses the last quick or special filter again *(see Chapter 6.4.2.3.2, page 1251)*. |
| **Quick filter** | Uses the quick filter *(see Chapter 6.4.2.3.3, page 1251)*. |
| **Special filter...** | Defines and uses special filter *(see Chapter 6.4.2.3.4.1, page 1251)*. |
| **Remove filter** | Removes current filter *(see Chapter 6.4.2.3.5, page 1255)*. |
| **Update** | Updates Audit Trail table *(see Chapter 6.4.2.4, page 1255)*. |
| **tiamo Help** | Opens tiamo 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.

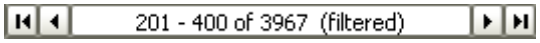
**Quick filter**
The table is filtered according to the last defined Quick filter *(see Chapter 6.4.2.3.3, page 1251)*.

**Temporary filter**
The table is filtered according to the last defined, not saved Special filter *(see Chapter 6.4.2.3.4.1, page 1251)*.

**Filter name**
The table is filtered according to the selected and saved Special filter *(see Chapter 6.4.2.3.4.1, page 1251)*.

### 6.4.1.6 Audit Trail - Navigation bar

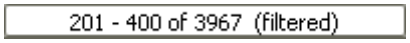
Program window: **Configuration** ▸ **Tools** ▸ **Audit Trail...** ▸ **Audit Trail**




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 tools:

Jumps to first set of entries in the Audit Trail table.

Returns to previous set of entries in the Audit Trail table.




Shows 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 the symbol in the program part **Configuration**.

**Note**

The table can only be opened if the option **Audit Trail activated** is switched on in the Security settings *(see Chapter 6.2.2.4, page 1218)*.

**Contents**

The Audit Trail table shows the following information about user actions as standard:

**Type**

Symbol for characterizing the action:

Information about the action, which is neither relevant to the security nor has altered any data.

Information about the action, which is either relevant to the security or has altered 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).

With the menu item **View ▸ Column display...** unwanted columns can be removed.

### 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**

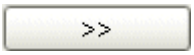
**View** ▸ **Column display…** opens the dialog window **Column display**. Here you can define the columns that are to be shown in the Audit Trail table.

#### Columns available

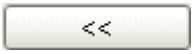
Shows all the fields that can be displayed as columns in the Audit Trail table.

#### Columns displayed

Shows all the fields that are displayed as columns in the Audit Trail table. All available columns are shown as the default.




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.

### 6.4.2.3 Filter 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

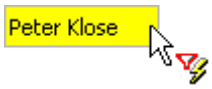
Menu item: **Audit Trail** ▸ **Filter** ▸ **Last filter**

With the menu item **Filter** ▸ **Last filter** or the symbol in the **Audit Trail** program window, the previously used filter is reactivated.

#### 6.4.2.3.3 Audit Trail - Quick filter

Menu item: **Audit Trail** ▸ **Filter** ▸ **Quick filter**

A quick filter can be applied for the contents of the selected table field with the menu item **Filter** ▸ **Quick filter** or the symbol 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 in the Audit Trail table. At the same time the following special filter symbol appears:




By double clicking on it with the left-hand mouse button, the contents of the field selected in the table will be set as the filter criterion and this filter will be applied directly to the table.

**Note**

The quick filter can be used 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'**

With the menu item **Filter** ▸ **Special filter** or the symbol in the **Audit Trail** program window, the dialog window **Special filter - Database 'ConfigDB'** opens for defining user-specific filters.

**Filter**

Selects the filter to be loaded for processing. An empty table with the name **New filter** is loaded as standard.

| | |
|---|---|
| Selection | **Filter name** \| **New filter** |
| Default value | **New filter** |

**[Save filter]**

Opens the dialog window **Save filter** 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 1254)*.

**[Delete filter]**

Deletes the special filter that is currently loaded.

### 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-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

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.

For the meaning of the columns, see *Edit filter criterion*.

### Functions

The menu **[Edit]** beneath the filter table contains the following menu items:

| | |
|---|---|
| **Edit line** | Opens the dialog window **Edit filter criterion** in which the filter condition of the line selected in the table can be edited *(see Chapter 6.4.2.3.4.2, page 1253)*. |
| **Insert a new line** | Inserts a new empty line above the line selected in the table. The dialog window **Edit filter criterion** opens automatically *(see Chapter 6.4.2.3.4.2, page 1253)*. |
| **Cut lines** | Transfers selected lines to clipboard. |
| **Copy lines** | Copies selected lines to the clipboard. |
| **Paste lines** | Inserts lines from the clipboard above the selected line. |
| **Delete lines** | Deletes the selected lines. |

**[Apply filter]**

Applies filter conditions to Audit Trail table.

### 6.4.2.3.4.2 Special filter - Editing filter criterion

Dialog window: **Audit Trail ▸ Filter ▸ Special filter... ▸ Special filter - Database 'ConfigDB' ▸ [Edit] ▸ Edit line ▸ Edit filter criterion #**

With **[Edit] ▸ Edit line** the dialog window **Edit filter criterion #** opens in which the filter criterion selected in the filter table can be edited.

#### Link

Selection of the type of link (logic operator) with the previous 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** |

**[Other...]**

Opens the dialog window **Filter - Field selection**, in which all fields that can be used for filtering are listed in a tree structure. A field can be added to the filter condition by marking it and closing the dialog window with **[OK]**.

#### Condition

**Type**

Selection of the type of format for columns in which several types are possible. For columns with a fixed type only this type will be shown.

| | |
|---|---|
| Selection | **Text** \| **Number** \| **Date** |
| Default value | **Text** |

**Operator**

Selection of the comparison operator for the filter criterion.

*for fields of type 'Text'*

| | |
|---|---|
| Selection | **=** \| **<>** \| **empty** \| **not empty** |
| Default value | **=** |

*for fields of type 'Number'*

| | |
|---|---|
| Selection | **=** \| **<>** \| **<** \| **>** \| **<=** \| **>=** \| **invalid** \| **out of limits** |
| Default value | **=** |

*for fields of type 'Date'*

| | |
|---|---|
| Selection | **=** \| **<>** \| **<** \| **>** \| **<=** \| **>=** \| **Today** |
| Default value | **=** |

**Note**

If for the column **Date**, the **Operator Today** is selected then filtering will be carried out for the actual date. In the field **Comparative value**, a range in days (**-9999 ... 9999**) can also be defined for filtering based on the current date.

**Comparative value**

Selection or entry of the comparative value for the filter criterion.

*for fields of type 'Text'*

| | |
|---|---|
| Input | **250 characters**<br>**^*** can be used as a wildcard for any strings. |

*for fields of type 'Number'*

| | |
|---|---|
| Input | **Numerical value** |

*for fields of type 'Date'*

The [...] opens the window **Select date** to select the date *(see Chapter 2.5.1, page 83)*.

*for fields of type 'Date' and 'Operator = Today'*

| | |
|---|---|
| Range | **-9999 ... 9999** |
| Default value | **0** |

**Match case**

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

If this option is switched on 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 switched on, the asterisk ***** can be used as a wildcard for any character strings for filtering fields with **Type** = **Text**.

### 6.4.2.3.4.3 Special filter - Saving filter

Dialog window: **Audit Trail ▸ Filter ▸ Special filter... ▸ Special filter - Database 'ConfigDB' ▸ [Save filter] ▸ Save filter**

With the **[Save filter]** button the dialog window **Save filter** opens for saving a Special filter.

**Filter name**

Name under which the special filter is to be saved.

| Input | **50 characters** |
|---|---|

**[Save]**

Saves filter under given name.

> **Note**
>
> The filters are saved globally in the configuration database and are therefore available for all clients.

### 6.4.2.3.5 Audit Trail - Removing filter

Menu item: **Audit Trail** ▸ **Filter** ▸ **Remove filter**

With the menu item **Filter** ▸ **Remove filter** or the symbol in the **Audit Trail** program window, the previously used filter is removed and all the entries are shown.

### 6.4.2.4 Update Audit Trail

Menu item: **Audit Trail** ▸ **View** ▸ **Update**

The Audit Trail table is updated with the menu item **View** ▸ **Update** or the symbol .

> **Note**
>
> The Audit Trail table is automatically updated when it is opened, but not again afterwards.

### 6.4.2.5 Export 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 file name for saving the export file.

| Input | **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.

**Note**

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 allows to verify whether the file has been modified later on.

## 6.4.2.6 Archive Audit Trail

Dialog window: **Audit Trail** ▸ **File** ▸ **Archive...** ▸ **Archive Audit Trail**

With 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.

| | |
|---|---|
| Input | **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.

**Note**

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 **Archive** 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 Delete 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 generated up to the entered date will be deleted from the Audit Trail table.

#### User 1

**User**

Short name of the first user to have the right to delete Audit Trail entries.

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password of the first user to have the right to delete Audit Trail entries.

| | |
|---|---|
| Input | **24 characters** |

#### User 2

**User**

Short name of the second user to have the right to delete Audit Trail entries.

| | |
|---|---|
| Input | **24 characters** |

**Password**

Password of the second user to have the right to delete Audit Trail entries.

| | |
|---|---|
| Input | **24 characters** |

### 6.4.2.8 Print Audit Trail

Dialog window: **Audit Trail ▸ File ▸ Print (PDF)... ▸ Print Audit Trail (PDF)**

The menu item **File ▸ Print (PDF)...** or the symbol PDF in the **Audit Trail** program window is used to open the dialog window **Print Audit Trail (PDF)**.

#### 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**
Prints the Audit Trail table in portrait format.

**Landscape**
Prints 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.

**Note**

The audit Trail table is automatically updated when it is opened, but not afterwards.

### 6.4.2.9 Monitor 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 **switched on**, 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.

| | |
|---|---|
| Range | **10 ... 500000** |
| Default value | **100000** |

### 6.4.2.10 Verify Audit Trail

Dialog window: **Audit Trail ▸ Tools ▸ Verify export/archive ▸ Verify Audit Trail export/archive**

With the menu item **Extras ▸ Verify export/archive**, the dialog window **Verify Audit Trail export/archive** opens, in which the checksum of a file exported or archived from the Audit Trail can be checked.

**Selecting file**

Entering or selecting (with ) the file that is to be verified

**[Verify export/archive]**

Triggers the checking of the selected file.

**Result**

The result of the checking of the checksum is displayed.

## 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 as standard:

**Instrument name**

Designation of the device.

**Device type**

Type of device.

**Device serial number**

Serial number of the instrument.

**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.

**Note**

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.

**Start-up**

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.

**Note**

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 terminated. 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 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.

### Functions

The menu **[Edit]** beneath the device table contains the following menu items:

| | |
|---|---|
| **New...** | Adds manually a new device connected to the PC via an RS-232 interface*(see Chapter 6.5.2.2, page 1262)*. |
| **Delete** | Deletes the selected device. Only devices that are not connected can be deleted*(see Chapter 6.5.2.3, page 1262)*. |
| **Properties...** | Edits the selected device *(see Chapter 6.5.3, page 1264)*. |
| **Column display...** | Defines columns for the device table*(see Chapter 6.5.2.4, page 1263)*. |
| **Print (PDF)...** | Outputs the device table as a PDF file *(see Chapter 6.5.2.6, page 1264)*. |
| **Ignored devices...** | Opens the list of ignored devices *(see Chapter 6.5.2.5, page 1263)*. |
| **Initialize** | Initializes the selected device (only possible for USB devices). |

## 6.5.2.2 Adding 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.

When 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 device

Menu item: **Configuration ▸ Devices ▸ [Edit] ▸ Delete**

With **[Edit] ▸ Delete**, the device selected in the device table is deleted.

**Note**

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**

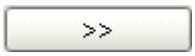
With**[Edit] ▸ Column display…**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the device table.

#### Available columns

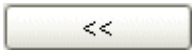
Shows all the fields that can be shown as columns in the device table.

#### Displayed columns

Shows all the fields that will be shown as columns in the device table. The default position is that the columns **Device name**, **Device type**, **Device serial number**, **Status**, **Set to work**, **Next GLP test** and **Remarks** will be shown. The columns **Device name** and **Device type** 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.

### 6.5.2.5 Editing ignored devices

Dialog window: **Configuration ▸ Devices ▸ [Edit] ▸ Ignored devices… ▸ Ignored devices**

The dialog window **Ignored devices** is opened with **[Edit] ▸ Ignored devices…**. 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 instrument.

**[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 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)** opens.

### Orientation

| | |
|---|---|
| Selection | **Portrait** \| **Landscape** |
| Default value | **Portrait** |

**Portrait**
Prints the device table in portrait format.

**Landscape**
Prints 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 subwindow **Titrants/Solutions** contains the solution table with all automatically recognized and manually added titrants and auxiliary solutions. 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.

### Titrant

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 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.

### Non-intelligent exchange units (EU) and dosing units (DU)

Non-intelligent exchange 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.

**Note**

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 1267)*. |
| **Delete** | Deletes selected solution *(see Chapter 6.6.2.3, page 1268)*. |
| **Properties…** | Edits selected solution *(see Chapter 6.6.3.1, page 1269)*. |
| **Column display…** | Defines the columns for the solution table *(see Chapter 6.6.2.4, page 1268)*. |
| **Print (PDF)** | Shows the solution table as a PDF file *(see Chapter 6.6.2.5, page 1269)*. |

## 6.6.2.2 Add new solution

**Menu item:Configuration ▸ Titrants/Solutions ▸ [Edit] ▸ New…**

Solutions in non-intelligent 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...**

**Note**

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**

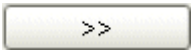
With**[Edit] ▸ Column display…**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the solution table..

**Columns available**

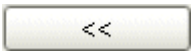
Shows all the fields that can be shown as columns in the solution table.

**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 in the following tabs:

- *Solution*
  Properties of the solution and solution monitoring.
- *Titer*
  Information about the titer value and titer determination.
- *Titer history*
  Displays 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**

**Solution name**

Name of the solution (can be entered or selected).

| | |
|---|---|
| Input | **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 as a variable **''Command name.CONC'** for calculations.

| | |
|---|---|
| Range | **0.0 ... 1E+13** |
| Default value | **1.000** |

**Concentration (unit)**

Concentration unit of solution.

| | |
|---|---|
| Input | **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.)

| | |
|---|---|
| Input | **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** |

**Solution monitoring**

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

If this option is switched on 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.

| | |
|---|---|
| Range | **0 ... 999 Days** |
| Default value | **999 Days** |

**Expiry date**

Expiry date of the solution. The date can be selected by pressing ... in the dialog window **Select date**. When 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**)

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 86)*.

**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 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 at Start test:

| | |
|---|---|
| Selection | **Record message** \| **Display message** \| **Stop 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 choose 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 in the determination.

**Stop determination**
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

### 6.6.3.3 Properties - Titer

Tab: **Configuration** ▶ **Titrants/solutions** ▶ **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'**'Command name.

| | |
|---|---|
| Range | **1E-12 ... 1E+12 (max. 10 digits)** |
| Default value | **1.000** |

**Titer (unit)**

Titer unit of the solution.

| | |
|---|---|
| Input | **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.**

Display of the date and time of last titer determination, which is 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 work is not carried out using log in, then the user logged in under Windows will be entered automatically.

#### Statistics

Statistical 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 units of the titer.

**Rel. standard dev. (s rel)**

Relative standard deviation for the titer determination in %.

### Monitoring titer validity

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

If this option is switched on then the validity of the titer will be monitored.

**Validity**

Validity of the titer in days. If a value is entered here then the date for the **Next titer determination** will be automatically adapted.

| | |
|---|---|
| Range | **0 ... 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 pressing ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the **Validity** field will be adapted automatically.

| | |
|---|---|
| Set 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**)

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 86)*.

**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 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 at Start test.

| | |
|---|---|
| Selection | **Record message** \| **Display message** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

### 6.6.3.4 Properties - Titer history

Tab: **Configuration** ▸ **Titrants/solutions** ▸ **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 exceeded then the line number will also be shown with an orange and 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.

**Note**

This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are 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 work is not carried out using login then the user logged in under Windows will be entered automatically.

**Note**

This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are 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**.

**Note**

The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

**[Limits]**

Opens the dialog window Limits for titer, in which the warning and intervention limits can be defined for the titer *(see Chapter 6.6.3.5, page 1276)*. These limits apply only to the graph, no monitoring is carried out during the titer determination.

**[Delete history]**

Deletes titer history.

### 6.6.3.5 Titer history Limit values

Dialog window: **Configuration ▸ Titrants/solutions ▸ Properties ▸ Titer history ▸ [Limit values] ▸ Limit values titer**

Warning and intervention limits can be defined for the titer in the dialog window **Limits for titer**. If you have defined 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 **switched on**, then the titer value will be shown in **orange** if this limit is exceeded.

**Lower limit**

Lower warning limit.

| | |
|---|---|
| Input | **10 digits** |
| Default value | **0.9750** |

**Upper limit**

Upper warning limit.

| | |
|---|---|
| Input | **10 digits** |
| Default value | **1.0250** |

#### Intervention limits for titer

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

If this option is **switched on** then the titer value will be shown in **red** if this limit is exceeded.

**Lower limit**

Lower intervention limit.

| | |
|---|---|
| Input | **10 digits** |
| Default value | **0.9500** |

**Upper limit**

Upper intervention limit.

| | |
|---|---|
| Input | **10 digits** |
| Default value | **1.0500** |

### 6.6.3.6 Properties - Exchange unit

Tab: **Configuration** ▸ **Titrants/solutions** ▸ **Properties** ▸ **Exchange unit**

#### Hardware

**Name**

Freely definable designation for exchange unit.

| | |
|---|---|
| Input | **24 characters** |
| Default value | **'empty'** |

**Type**

Shows the type of exchange unit:

| | |
|---|---|
| Selection | **EU** \| **IEU** |

**EU**
Non-intelligent 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 off automatically and cannot be edited.

| | |
|---|---|
| Input | **24 characters** |
| Default value | **'empty'** |

**Serial number**

Serial number of exchange unit. With intelligent exchange units the serial number is read off automatically and cannot be edited.

| | |
|---|---|
| Input | **10 characters** |
| Default value | **'empty'** |

**Cylinder volume**

Cylinder volume of exchange unit. With intelligent exchange 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 | **1 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 exchange units it is read off automatically. It can be altered at any time, e.g. if the cylinder has to be replaced.

*IEU*

| | |
|---|---|
| Input | **8 characters** |
| Default value | **'empty'** |

*EU*

| | |
|---|---|
| Input | **10 characters** |
| Default value | **'empty'** |

### Parameters for preparation

Configures the parameters to be used in the command **PREP**.

#### Volume

Volume to be dosed in during preparation.

| | |
|---|---|
| Range | **0.00000 ... 99999.99999 mL** |
| Selection | **Cylinder volume** |
| Default value | **Cylinder volume** |

**Cylinder volume**
The whole contents of the cylinder will be dosed in.

#### Cycles

Number of rinsing cycles during preparation.

| | |
|---|---|
| Range | **1 ... 9** |
| Default value | **2** |

#### Dosing rate

Speed 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 speed will automatically be reduced to the largest possible value.

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

#### Filling rate

Speed 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 speed will automatically be reduced to the largest possible value.

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |
| Selection | **maximum** |
| Default value | **maximum** |

**Maximum Dosing/Filling rate for exchange unit as a function of 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 |

**Note**

Enter lower rates for high-viscosity liquids.

### Tubing parameters

Defines the length and diameter of the tubing connected to the exchange unit.

**Note**

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 tubing see **Products/Accessories and columns** under *http://products.metrohm.com*.

## Dosing tip

### Length

Length of the tubing connecting the cock to the dosing tip.

| | |
|---|---|
| Range | **0.0 … 999.9 cm** |
| Default value | **40.0 cm** |

### Diameter

Diameter of the tubing connecting the cock to the dosing tip.

| | |
|---|---|
| Range | **0.0 … 9.9 mm** |
| Default value | **2.0 mm** |

## Cylinder

### Length

Length of the tubing connecting the cock to the cylinder.

| | |
|---|---|
| Range | **0.0 ... 999.9 cm** |
| Default value | **13.0 cm** |

### Diameter

Diameter of the tubing connecting the cock to the cylinder.

| | |
|---|---|
| Range | **0.0 ... 9.9 mm** |
| Default value | **2.0 mm** |

## Reagent bottle

### Length

Length of the tubing connecting the cock to the reagent bottle.

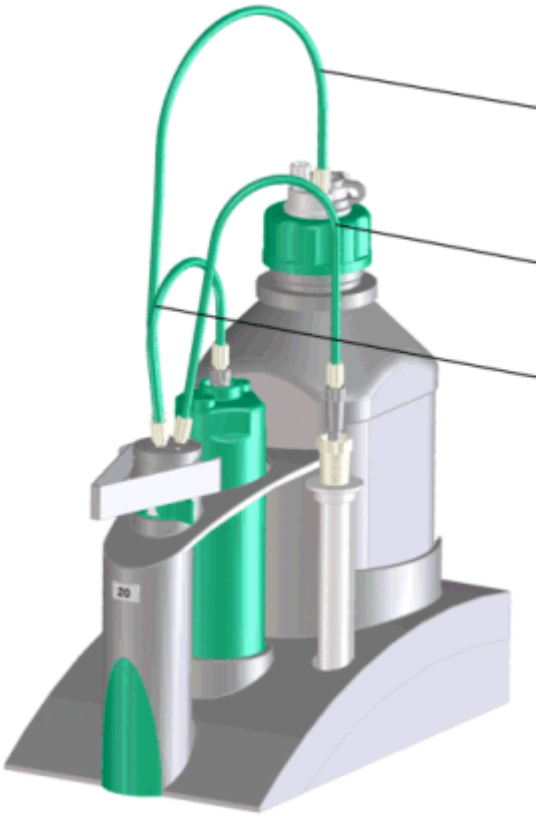
| | |
|---|---|
| Range | **0.0 ... 999.9 cm** |
| Default value | **25.0 cm** |

### Diameter

Diameter of the tubing connecting the cock to the reagent bottle.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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.

| | |
|---|---|
| Range | **0.01 ... 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 |

**Note**

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.

**Note**

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 **Products/Accessories and columns** under*http://products.metrohm.com*.

## 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.

| | |
|---|---|
| Range | **0.0 ... 999.9 cm** |
| Default value | **40.0 cm** |

### Diameter

Diameter of tubing attached to Dosing port 1.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 999.9 cm** |
| Default value | **0.0 cm** |

#### Diameter

Diameter of tubing attached to Dosing port 2.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 999.9** |
| Default value | **25.0** |

#### Diameter

Diameter of tubing attached to Fill port.

| | |
|---|---|
| Range | **0.0 ... 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.

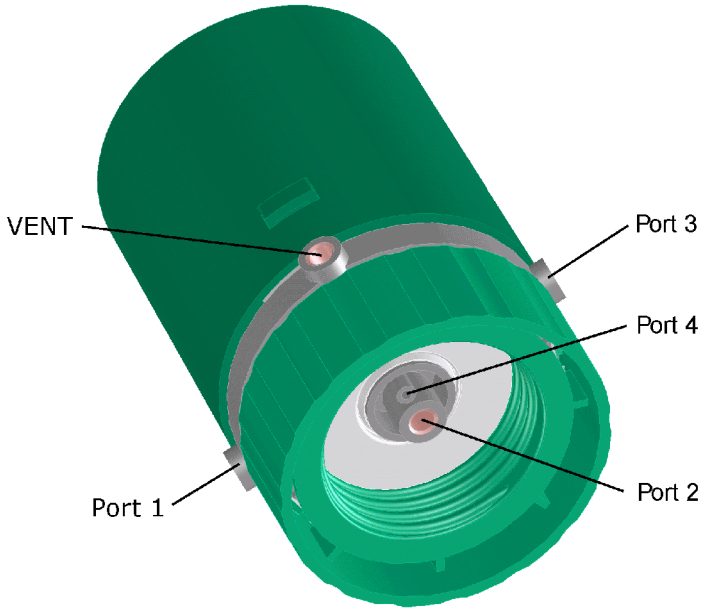
| | |
|---|---|
| Range | **0.0 ... 999.9 cm** |
| Default value | **0.0 cm** |

#### Diameter

Diameter of tubing attached to special port.

| | |
|---|---|
| Range | **0.0 ... 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** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol … in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 6.7 Subwindow Sensors

## 6.7.1 Sensors - General

Subwindow: **Configuration ▸ Sensors**

### Subwindow Sensors

The subwindow **Sensors** contains the Sensor table with automatically recognized and manually added sensors. 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.

### 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.

### Non-intelligent sensors

Non-intelligent sensors must be added manually to the sensor table.

### Standard sensors

The sensor table contains the following sensors as standard; 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 to which sensor is connected.

**Measuring input**

Device and measuring input to which the sensor is connected. 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 shown with the menu item **Edit ▸ Column display**.

**Note**

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 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 sensor table contains the following menu items:

| | |
|---|---|
| **New…** | Adds new sensor manually *(see Chapter 6.7.2.3, page 1291)*. |
| **Delete** | Deletes the selected sensor *(see Chapter 6.7.2.4, page 1292)*. |
| **Properties…** | Edits the selected sensor *(see Chapter 6.7.3.1, page 1293)*. |
| **Column display…** | Defines columns for the sensor table*(see Chapter 6.7.2.2, page 1291)* |
| **Print (PDF)…** | Outputs the sensor table as a PDF file*(see Chapter 6.7.2.5, page 1292)* |

### 6.7.2.2 Sensors - Column display

Dialog window: **Configuration ▸ Sensors ▸ Edit ▸ Column display… ▸ Column display**

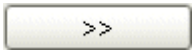
In the dialog window **[Column display]**, you can define the columns to be shown in the sensor table.

#### Columns available

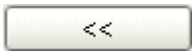
Shows all the fields that can be shown as columns in the Sensor table.

#### Columns displayed

Shows 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.




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 and down.

### 6.7.2.3 Add new sensor

Menu item: **Configuration ▸ Sensors ▸ Edit ▸ New**

In order to add a new non-intelligent 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 1293)*. 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 defines another ion with **Custom**. The valency 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**.

| | |
|---|---|
| Input | **6 characters** |
| Default value | **'empty'** |

**Valency**

Selection of the valency 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 Delete sensor

Menu item: **Configuration ▸ Sensors ▸ Edit ▸ Delete**

With **Edit ▸ Delete**, the sensor selected in the sensor table is deleted.

### 6.7.2.5 Print list of sensors

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** \| **Landscape** |
| Default value | **Portrait** |

**Portrait**
Prints the sensor table in portrait format.

**Landscape**
Prints the sensor table in landscape format.

**[OK]**

The sensor table is produced 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 Edit sensor properties

Dialog window: **Configuration ▸ Sensors ▸ Edit ▸ Sensor**

With the menu item **Edit ▸ Properties…** in the subwindow **Sensors**, the properties window for the sensor selected in the sensor table opens in which the parameters of the sensor can be edited. It consists of the following tabs:

- *Sensor*
  General information about the sensor, such as sensor name, sensor type, set to work, etc.
- *Calibration data*
  Information about calibration of the sensor.
- *Limits*
  Definition of limits monitoring for slope and electrode zero point.
- *History*
  Shows the last 10 calibration values.

### 6.7.3.2 Properties - Sensor

Tab: **Configuration ▸ Sensors ▸ Edit ▸ Sensor ▸ Sensor**

**Sensor name**

Name of the sensor.

| Input | **24 characters** |
|---|---|

**Note**

The sensor name for the 5 non-deletable default 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 marked in addition with **IS**.

**Ion**

Shows the ion to be measured and its valency. This parameter only appears for **ISE electrodes**.

### Order number

Order number of the sensor (read-only for intelligent sensors and the Thermoprobe).

| | |
|---|---|
| Input | **24 characters** |
| Default value | **'empty'** |

### Sensor serial number

Serial number of the sensor (read-only for intelligent sensors and the Thermoprobe).

| | |
|---|---|
| Input | **10 characters** |
| Default value | **'empty'** |

### Device

For non-intelligent sensors it is possible to select the device to which the sensor is connected. All the devices in the device table which 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 | **Selecting device** \| **'empty'** |
| Default value | **'empty'** |

### Measuring input

For non-intelligent sensors it is possible to select here 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 chosen. 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

It is possible to enter remarks about the sensor.

| | |
|---|---|
| Input | **24 characters** |
| Default value | **'empty'** |

### Start-up

The current date is automatically entered here for a newly added sensor.

When editing an existing sensor, the date can be selected by pressing … in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*.

### Sensor monitoring

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

If this option is enabled 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 adapted.

| | |
|---|---|
| Range | **0 ... 999 days** |
| Default value | **999 days** |

**Expiry date**

Expiry date of the sensor. The date can be selected by pressing ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. When a date has been entered the **Working life** will be automatically adapted.

*Can only be edited if monitoring is switched on.*

| | |
|---|---|
| Set 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**)

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 86)*.

**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 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 at Start test:

| | |
|---|---|
| Selection | **Document message** \| **Display message** \| **Cancel determination** |
| Default value | **Display message** |

**Document message**
The message that the working life of the sensor 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 working life of the sensor 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]**.

### 6.7.3.3 Properties - Calibration data

Tab: **Configuration** ▸ **Sensors** ▸ **Edit** ▸ **Sensor** ▸ **Calibration data**

**Note**

This tab is displayed only 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**.

| | |
|---|---|
| Range | **-999.9 ... 999.9 %** |
| Default value | **100.0 %** |

**pH(0)**

After the slope, the **pH(0)** is the second characteristic indicator 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 as a variable **'Command name.ENP'** for calculations.

| | |
|---|---|
| Range | **-20.000 ... 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**.

| | |
|---|---|
| Range | **-999.9 ... 999.9 mV** |
| Default value | **59.2/Valency mV** |

**E(0)**

**E(0)** is the second characteristic quantity of the calibration function **U = f(log c)**. **E(0)** is the y-axis intercept of the calibration curve and corresponds to the potential at log c = 0. The electrode zero point **E(0)** of an ISE electrode is available as a variable **'Command name.ENP'** for calculations.

| | |
|---|---|
| Range | **-2000.0 ... 2000.0 mV** |
| Default value | **0.0 mV** |

**c (blank)**

**c (blank)** is the third characteristic quantity 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 parameter **c (blank)** is available as a variable **'Command name.BLV'** for calculations.

*Value*

| | |
|---|---|
| Range | **0.00 ... 999999999** |
| Default value | **0.00** |

*Unit*

| | |
|---|---|
| Input | **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 as a variable **'Command name.BLV'** for calculations.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **1 /cm** |

### Specific calibration data for the Thermoprobe

**a ... e**

Display of the calibration coefficient **a** ... **e** .

### Shared calibration data

**Calibration temp.**

Temperature during the calibration. The display also shows whether the temperature was measured with a Pt1000 or an NTC temperature sensor or entered manually (is not being displayed for the Thermoprobe).

| | |
|---|---|
| Range | **-20.0 ... 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 being displayed for the Thermoprobe).

**Calibration method**

Name of the method with which the last calibration was carried out (is not being displayed for the Thermoprobe). If the calibration data was entered manually then **manual** will appear here.

**User**

Short name of the user logged in during the calibration or when the calibration data was entered manually (is not being displayed for the Thermoprobe). If work is not carried out using log in, then the user logged in under Windows will be entered automatically.

**Measuring input**

Display of the type and the serial number of the measuring input at which the sensor was connected during the calibration (only for Titrando, is not being displayed for the Thermoprobe).

**[Initial data]**

Opens the dialog window **Initial data sensor** *(see Chapter 6.7.3.6, page 1305)*, 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 enabled then the validity of the calibration will be monitored (is not being displayed for the Thermoprobe).

**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.

**Note**

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.

*Can only be edited if monitoring is switched on.*

| | |
|---|---|
| Range | **0 ... 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** *(see Chapter 2.5.1, page 83)*. When a date has been entered, the value for the **Calibration interval** will be adapted automatically.

*Can only be edited if monitoring is switched on.*

| | |
|---|---|
| Set value | **Calibration 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**)

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 window **Send E-mail** *(see Chapter 2.6.1, page 86)*.

**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 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 at Start test:

| | |
|---|---|
| Selection | **Document message** \| **Display message** \| **Cancel determination** |
| Default value | **Display message** |

**Document 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 running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

### 6.7.3.4 Properties - Limits

Tab: **Configuration** ▸ **Sensors** ▸ **Edit** ▸ **Sensor** ▸ **Limits**

**Note**

This tab is displayed only 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 enabled then a check will be made to see whether the **Slope** determined during calibration is within the defined limits. 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* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **96.0 %** |

| *for ISE (+1)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **55.0 mV** |

| *for ISE (-1)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-61.0 mV** |

*for ISE (+2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **25.0 mV** |

*for ISE (-2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-31.0 mV** |

*for ISE (+3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **16.0 mV** |

*for ISE (-3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-23.0 mV** |

*for ISE (+4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **12.0 mV** |

*for ISE (-4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-17.0 mV** |

### Upper limit

Upper limit value for the slope.

*for pH electrode*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **101.0 %** |

*for ISE (+1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **61.0 mV** |

*for ISE (-1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-55.0 mV** |

*for ISE (+2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **31.0 mV** |

*for ISE (-2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-25.0 mV** |

*for ISE (+3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **23.0 mV** |

*for ISE (-3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-16.0 mV** |

*for ISE (+4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **17.0 mV** |

*for ISE (-4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-12.0 mV** |

### pH(0) monitoring (for pH electrodes only)

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

If this option is enabled 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 limits. 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 for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **6,750** |

### Upper limit

Upper limit for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **7,250** |

### E(0) monitoring (for ISE electrodes only)

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

If this option is enabled 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 limits. 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 for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-2000.0 mV** |

### Upper limit

Upper limit for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **2000.0 mV** |

### Cell constant monitoring (only for conductivity sensors)

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

If this option is enabled, 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 limits. 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 for cell constant.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **0.001 /cm** |

### Upper limit

Upper limit for cell constant.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **0.001 /cm** |

## 6.7.3.5 Properties - History

Tab: **Configuration** ▸ **Sensors** ▸ **Edit** ▸ **Sensor** ▸ **History**

**Note**

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 arranged chronologically according to date so that the most recent determination appears last. For pH electrodes, the **Slope** and the **pH(0)** are displayed, for ISE electrodes the

**Slope**, **E(0)** and **c(blank value)**, 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**, when the values were determined 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.

### 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 was entered manually then **manual** will appear here.

**Note**

This parameter is not saved on the data chip of intelligent sensors, i.e. this parameter will be empty if the data are written into the sensor table from the sensor.

### 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.

**Note**

This parameter is not saved on the data chip of intelligent sensors, i.e. this parameter will be empty if the data are written into the sensor table from the sensor.

### 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**, when the values were determined automatically by a method.
- **Black**, when the values have been entered manually.

If limits have been defined then the warning limits will be shown in **orange** and the intervention limits in **red**.

**Note**

The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

**[Limits]**

Opens the dialog window **Limits for sensor** 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. For monitoring during calibration, the limits set on the **Limits** tab apply.

**[Delete history]**

Deletes the sensor history.

### 6.7.3.6 Initial sensor data

Dialog window: **Configuration ▸ Sensors ▸ Edit ▸ Sensor ▸ Calibration data ▸ Initial data sensor**

The initial calibration data for the intelligent sensor is displayed in the dialog window **Initial sensor data**.

**Slope**

Display of the slope in % for the first calibration.

**Uas**

Display of the asymmetry potential $U_{as}$ in mV during the first calibration.

**Calibration temp.**

Temperature display in °C during the calibration.

### 6.7.3.7 Sensor history - Limits

Dialog window: **Configuration ▸ Sensors ▸ Edit ▸ Sensor ▸ History ▸ [Limit values] ▸ Limits Sensor**

In the dialog window **Limits for sensor** you can define warning and intervention limits for the slope and pH(0) or E(0). 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 **Limits** tab apply.

**Warning limits for slope (only for pH and ISE electrodes)**

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

If this option is **enabled**, 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*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **97.5 %** |

*for ISE (+1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **57.2 mV** |

*for ISE (-1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-61.2 mV** |

*for ISE (+2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **27.7 mV** |

*for ISE (-2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-31.7 mV** |

*for ISE (+3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **17.7 mV** |

*for ISE (-3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-21.7 mV** |

*for ISE (+4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **12.8 mV** |

*for ISE (-4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-16.8 mV** |

### Upper limit

Upper warning limit for the slope.

| *for pH electrode* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **102.5 %** |

| *for ISE (+1)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **61.2 mV** |

| *for ISE (-1)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-57.2 mV** |

| *for ISE (+2)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **31.7 mV** |

| *for ISE (-2)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-27.7 mV** |

| *for ISE (+3)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **21.7 mV** |

| *for ISE (-3)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-17.7 mV** |

| *for ISE (+4)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **16.8 mV** |

| *for ISE (-4)* | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-12.8 mV** |

### Intervention limits for slope (only for pH and ISE electrodes)

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

If this option is **enabled**, 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*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **95 %** |

*for ISE (+1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **55 mV** |

*for ISE (-1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-62.4 mV** |

*for ISE (+2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **26.7 mV** |

*for ISE (-2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-32.7 mV** |

*for ISE (+3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **16.7 mV** |

*for ISE (-3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-22.7 mV** |

*for ISE (+4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **11.8 mV** |

*for ISE (-4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-17.8 mV** |

### Upper limit

Upper intervention limit for the slope.

*for pH electrode*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 %** |
| Default value | **105.0 %** |

*for ISE (+1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **62.4 mV** |

*for ISE (-1)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-55.0 mV** |

*for ISE (+2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **32.7 mV** |

*for ISE (-2)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-26.7 mV** |

*for ISE (+3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **22.7 mV** |

*for ISE (-3)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-16.7 mV** |

*for ISE (+4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **17.8 mV** |

*for ISE (-4)*

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-11.8 mV** |

### Warning limits for pH(0) (only for pH electrodes)

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

If this option is **enabled**, then the values for pH(0) will be shown in **orange** if the limits are exceeded.

### Lower limit

Lower warning limit for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **6,500** |

### Upper limit

Upper warning limit for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **7,500** |

### Intervention limits for pH(0) (only for pH electrodes)

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

If this option is **enabled**, then the values for pH(0) will be shown in **red** if the limits are exceeded.

**Lower limit**

Lower intervention limit for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **6.000** |

**Upper limit**

Upper intervention limit for pH(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9** |
| Default value | **8.000** |

### Warning limits for E(0) (only for ISE electrodes)

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

If this option is **enabled**, then the values for E(0) will be shown in **orange** if the limits are exceeded.

**Lower limit**

Lower warning limit for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-15 mV** |

**Upper limit**

Upper warning limit for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **15 mV** |

### Intervention limits for E(0) (only for ISE electrodes)

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

If this option is **enabled**, then the values for E(0) will be shown in **red** if the limits are exceeded.

**Lower limit**

Lower intervention limit for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **-30 mV** |

**Upper limit**

Upper intervention limit for E(0).

| | |
|---|---|
| Range | **-2.147E+9 ... 2.147E+9 mV** |
| Default value | **30 mV** |

### Warning limits for cell constant (only for conductivity sensors)

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

If this option is **enabled** 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.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **2.0 /cm** |

**Upper limit**

Upper warning limit for the cell constant.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **400 /cm** |

### Intervention limits for cell constant (only for conductivity sensors)

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

If this option is **enabled** 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.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **0.001 /cm** |

**Upper limit**

Upper intervention limit for the cell constant.

| | |
|---|---|
| Range | **0.001 ... 500 /cm** |
| Default value | **500 /cm** |

# 6.8 Subwindow Common variables

## 6.8.1 Configuration - Common variables

Subwindow: **Configuration** ▸ **Common Variables**

### Common variables subwindow

The subwindow **Common variables** contains the table with the configured common 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 common variables

Common variables are method-embracing 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.

**Note**

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 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.

## 6.8.2 Table of common variables

### 6.8.2.1 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**.

**Note**

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 6.8.2.2, page 1314)*. |
| **Delete** | Deletes the selected common variable *(see Chapter 6.8.2.3, page 1314)*. |
| **Properties…** | Edits the selected common variable *(see Chapter 6.8.3.1, page 1315)*. |
| **Column display…** | Defines the columns of the table of Common variables *(see Chapter 6.8.2.4, page 1314)*. |
| **Print (PDF)…** | Outputs the table of common variables as a PDF file *(see Chapter 6.8.2.5, page 1315)*. |

### 6.8.2.2 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…**

### 6.8.2.3 Delete common variable

Menu item: **Configuration ▸ Common variables ▸ [Edit] ▸ Delete**

With **[Edit] ▸ Delete** the common variable selected in the table is deleted.

### 6.8.2.4 Common variables - Column display

Dialog window: **Configuration ▸ Common variables ▸ [Edit] ▸ Column display… ▸ Column display**

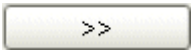
With **[Edit] ▸ Column display…** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the Common variables table.

#### 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.

#### 6.8.2.5 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.

### 6.8.3 Common variables properties

#### 6.8.3.1 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*
  Displays last 10 values.

### 6.8.3.2 Properties - Common variable

Tab: **Configuration** ▸ **Common variables** ▸ **[Edit]** ▸ **Properties...** ▸ **Common variable - 'Name'** ▸ **Common variable**

#### Name

Name of common variable.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **-1E+99 ... 1E+99 (max. 15 places)** |

*Type = Text*

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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 common variable.

| | |
|---|---|
| Input | **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.

**Note**

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.

### Common variable monitoring

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

If this option is switched on 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.

| | |
|---|---|
| Range | **0 ... 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 83)*. 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 enabled, an acoustic signal will be emitted additionally 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 Start test:

| | |
|---|---|
| Selection | **Record message** \| **Display message** \| **Stop determination** |
| Default value | **Display message** |

**Record message**
The message that the validity period of the common variable has expired will be automatically saved with the determination.

**Display message**
A message is displayed and you can choose 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.

**Stop determination**
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

## 6.8.3.3 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**, 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 common 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**.

**Note**

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.

### 6.8.3.4 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 **switched on** 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.

| | |
|---|---|
| Range | **-1.0E+99 ... 1.0E+99 (max. 10 digits)** |

**Upper limit**

Upper warning limit for common variable.

| | |
|---|---|
| Range | **-1.0E+99 ... 1.0E+99 (max. 10 digits)** |

#### Intervention limits for common variable

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

If this option is **switched on** 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.

| | |
|---|---|
| Range | **-1.0E+99 ... 1.0E+99 (max. 10 digits)** |

**Upper limit**

Upper warning limit for common variable.

| | |
|---|---|
| Range | **-1.0E+99 ... 1.0E+99 (max. 10 digits)** |

# 6.9 Subwindow Global variables

## 6.9.1 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.

**Note**

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.

## 6.9.2 Table of global variables

### 6.9.2.1 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 name**

Name of the client (computer name) 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.

**Note**

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 6.9.2.2, page 1323)*. |
| **Delete** | Deletes the selected global variable *(see Chapter 6.9.2.3, page 1323)*. |
| **Properties…** | Edits the selected global variable *(see Chapter 6.9.3, page 1324)*. |
| **Column display…** | Defines the columns of the table of global variables *(see Chapter 6.9.2.4, page 1323)*. |
| **Print (PDF)…** | Outputs the table of global variables as a PDF file *(see Chapter 6.9.2.5, page 1324)*. |

## 6.9.2.2 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…**.

## 6.9.2.3 Delete global variable

Menu item: **Configuration ▸ Global variables ▸ [Edit] ▸ Delete**

With **[Edit] ▸ Delete** the global variable selected in the table is deleted.

## 6.9.2.4 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.

#### 6.9.2.5 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.

### 6.9.3 Properties Global variables

#### 6.9.3.1 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.

### 6.9.3.2 Properties - Global variable

Tab: **Configuration** ▸ **Global variables** ▸ **[Edit]** ▸ **Properties...** ▸ **Global variable - 'Name'** ▸ **Global variable**

#### Name

Name of global variable.

| | |
|---|---|
| Input | **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*

| | |
|---|---|
| Range | **-1E+99 ... 1E+99 (max. 15 places)** |

*Type = Text*

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Input | **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.

**Note**

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.

### 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.

| | |
|---|---|
| Range | **0 ... 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 83)*. 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]**.

## 6.9.3.3 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**.

**Note**

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.

### 6.9.3.4 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.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0E+99 (max. 10 digits)** |

**Upper limit**

Upper warning limit for global variable.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0E+99 (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.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0E+99 (max. 10 digits)** |

**Upper limit**

Upper warning limit for global variable.

| | |
|---|---|
| Range | **-1.0 E+99 ... 1.0E+99 (max. 10 digits)** |

# 6.10 Subwindow Sample solutions (TC conductivity)

## 6.10.1 Sample solutions (TC conductivity) - General

Subwindow: **Configuration ▸ Sample solutions (TC conductivity)**

### Sample solutions (TC conductivity) subwindow

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.

## 6.10.2 Sample solutions (TC conductivity) table

### 6.10.2.1 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 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**

Point in time 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**

Unique identification for the determination of the data.

**Comment**

Comment which can be entered by the user.

With menu item **[Edit]** ▸ **Column display...** further columns from the solution properties can be shown.

**Note**

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…** | Adds a new column manually *(see Chapter 6.10.2.2, page 1332)* . |
| **Delete** | Deletes the selected line *(see Chapter 6.10.2.3, page 1332)*. |
| **Properties…** | Edits the selected line *(see Chapter 6.6.3.1, page 1269)*. |
| **Column display…** | Defines the columns for the table *(see Chapter 6.10.2.4, page 1332)*. |
| **Print (PDF)** | Outputs the table as a PDF file *(see Chapter 6.10.2.5, page 1333)*. |

## 6.10.2.2 Insert 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 altered at any time with **[Edit] ▸ Properties…**

## 6.10.2.3 Delete line

Menu item: **Configuration ▸ Sample solutions (TC conductivity) ▸ [Edit] ▸ Delete**

With**[Edit] ▸ Delete**, the selected line in the table is deleted.

## 6.10.2.4 Sample solutions (TC conductivity) - Column display

Dialog window: **Configuration ▸ Sample solutions (TC conductivity) ▸ [Edit] ▸ Column display… ▸ Column display**

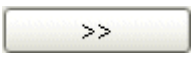
With**[Edit] ▸ Column display…**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the table.

### Columns available

Shows all the fields that can be displayed as columns in the table.

### Columns displayed

Shows 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.




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 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 sample solutions (TC conductivity) (PDF)**.

**Orientation**

| | |
|---|---|
| Selection | **Portrait** \| **Landscape** |
| Default value | **Portrait** |

**Portrait**
Prints the table in portrait format.

**Landscape**
Prints 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.

### 6.10.3 Sample solutions (TC conductivity) properties

#### 6.10.3.1 Edit 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.

### 6.10.3.2 Properties - General

Tab: **Configuration ▸ Sample solutions (TC conductivity) ▸ [Edit] ▸ Properties... ▸ Sample solution (TC conductivity) ▸ General**

#### Name

Name of the measurement solution for which the temperature coefficient was determined for conductivity.

| | |
|---|---|
| Input | **50 characters** |
| Default value | **'empty'** |

#### Comment

Comments on the solution to be measured.

| | |
|---|---|
| Input | **500 characters** |
| Default value | **'empty'** |

### 6.10.3.3 Properties - TC data

Tab: **Configuration ▸ Sample solutions (TC conductivity) ▸ [Edit] ▸ Properties... ▸ Sample solution (TC conductivity) ▸ TC data**

#### Start temperature

Temperature at the time of the start of the measurement.

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **20.0 °C** |

#### Stop temperature

Temperature at the end of the measurement.

| | |
|---|---|
| Range | **-20.0 ... 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**.

| | |
|---|---|
| Range | **1E-08 ... 1E+08** |
| 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**.

| | |
|---|---|
| Range | **1E-08 ... 1E+08** |
| Default value | **1.0** |

**c0 ... c4**

Coefficients of the Chebyshev polynomial for the calculation of the function.

| | |
|---|---|
| Range | **1E-08 ... 1E+08** |
| Default value | **0.0** |

**Assignment date**

Display of the point in time 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 log in, then the user logged in under Windows will be entered automatically.

**Measuring input**

Type and serial number of the measuring input at which the conductivity sensor was connected.

**Determination ID**

Unambiguous identification for the determination with which the determination of the TC data was carried out.

### Monitoring TC data

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

If this option is switched on, then the period of validity of the data will be monitored.

**Validity**

Period that the data is valid in days. If a value is entered here, then the date in the field **Next assignment** will be adapted automatically.

| | |
|---|---|
| Range | **0 ... 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 83)*. 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]**

Pressing **[E-mail]** opens the **Send E-mail** *(see Chapter 2.6.1, page 86)* 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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

# 6.11 Subwindow Rack data

## 6.11.1 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.

## 6.11.2 Rack table

### 6.11.2.1 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 6.11.2.2, page 1338)*. |
| **Delete** | Deletes the selected rack *(see Chapter 6.11.2.3, page 1339)*. |
| **Properties…** | Edits the selected rack *(see Chapter 6.11.3.1, page 1339)*. |
| **Print (PDF)…** | Outputs the rack table as a PDF file *.(see Chapter 6.11.2.4, page 1339)* |

## 6.11.2.2 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.

| | |
|---|---|
| Input | **25 characters** |

**Rack code**

Code of the new rack. The selected rack code must not already exist.

| | |
|---|---|
| Input | **6-figure binary pattern made up of 0 and 1** |

### 6.11.2.3 Deleting rack

Menu item: **Configuration ▸ Rack data ▸ [Edit] ▸ Delete**

With **[Edit] ▸ Delete** the rack selected in the rack list will be deleted.

### 6.11.2.4 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.

## 6.11.3 Rack properties

### 6.11.3.1 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.

### 6.11.3.2 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 7.10.3, page 1397)* 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.

| | |
|---|---|
| Range | **1.0 ... 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.

| | |
|---|---|
| Range | **-5.00 ... 5.00 °** |

### 6.11.3.3 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.

| | |
|---|---|
| Range | **0 ... 235 mm** |

**Rinse position**

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| | |
|---|---|
| Range | **0 ... 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.

| Range | **0 ... 235 mm** |
|---|---|

### Rinse position

Rinse position for Lift 2. This lift position is used for rinsing the electrodes.

| Range | **0 ... 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.

| Range | **0 ... 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.

| Range | **0 ... 235 mm** |
|---|---|

## 6.11.3.4 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.

**Note**

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 6.11.3.5, page 1343)* for editing the data of the selected special beaker.

### 6.11.3.5 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.

| Range | **0 ... n (n is rack-dependent)** |
|---|---|

**Note**

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.

| Range | **0 ... 235 mm** |
|---|---|

**Work position Tower 2**

Work position of the selected special beaker at Tower 2.

| Range | **0 ... 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 7.10.3, page 1397)* 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.

| | |
|---|---|
| Range | **1.0 ... 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** |

### 6.11.3.6 Editing rack properties (774)

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.

### 6.11.3.7 Properties - Lift positions (774)

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 6.11.3.8, page 1345)*.

**Work position**

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

| Range | **0 ... 100 mm** |
|---|---|

**Rinse position**

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

| Range | **0 ... 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.

| Range | **0 ... 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.

| Range | **0 ... 100 mm** |
|---|---|

### 6.11.3.8 Properties - Special beaker (774)

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 Titrando

### 7.1.1 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 Titrando** 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.

**Note**

2.xxx.0010 Titrando models only have one measuring input.

**Note**

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.

### 7.1.2 Properties - General

Tab: **Configuration** ▸ **Devices** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.1.3 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.*

| | |
|---|---|
| Range | **1000 ... 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.*

| | |
|---|---|
| Range | **1000 ... 9999** |
| Default value | **4100** |

## 7.1.4 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.1.5 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[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 83)*.

### Comment GLP test

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

### Monitoring of GLP validity

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

## 7.1.6 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.

**Note**

Make sure that the device is not manipulated or switched off during the loading process and follow the instructions shown.

# 7.2 Titrino

## 7.2.1 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)

**Note**

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 |

### 7.2.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.2.3 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.

**Note**

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 1108)* 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.

| | |
|---|---|
| Range | **0.1 ... 999.9 h** |
| Default value | **12 h** |

## 7.2.4 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 1108)* 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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.2.5 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.

**Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

## 7.2.6 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

### Comment GLP test

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

#### Monitoring of GLP validity

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.3 756/831 Coulometer

## 7.3.1 756/831 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.

## 7.3.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.3.3 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.

**Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

## 7.3.4 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

### Comment GLP test

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

#### Monitoring of GLP validity

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.4 712 Conductometer

## 7.4.1 712 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.

## 7.4.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.4.3 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.

**Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

## 7.4.4 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

### Comment GLP test

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

### Monitoring of GLP validity

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.5 856 Conductivity Module

## 7.5.1 856 Conductivity Module - Device

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.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.5.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **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.*

| | |
|---|---|
| Range | **1000 ... 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.*

| | |
|---|---|
| Range | **1000 ... 9999** |
| Default value | **4100** |

## 7.5.4 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.5.5 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.6 867 pH Module

## 7.6.1 867 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.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.6.2 Properties - General

Tab: **Configuration** ▸ **Devices** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **General**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

### Start-up

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

### Remarks

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.6.3 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.*

| | |
|---|---|
| Range | **1000 ... 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.*

| | |
|---|---|
| Range | **1000 ... 9999** |
| Default value | **4100** |

## 7.6.4 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.6.5 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

**Monitoring of GLP validity**

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter*

*2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.7 846 Dosing Interface

## 7.7.1 846 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 7.1.4, page 1348)*
  Properties of the MSB connector and the peripheral devices connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.7.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.7.3 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.7.4 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.8 730 Sample Changer

## 7.8.1 730 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. 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.

## 7.8.2 Properties - General

Tab: **Configuration** ▸ **Devices** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.8.3 Properties - Tower

Tab: **Configuration** ▸ **Devices** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **Towers**

**Note**

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.

**Note**

A swing head can only be mounted on Tower 1.

## 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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 - 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.

**Note**

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.

## 7.8.6 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.

**Note**

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** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol … in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. 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**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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.

**Note**

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.*

| | |
|---|---|
| Range | **50 ... 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.*

| | |
|---|---|
| Range | **50 ... 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.*

| | |
|---|---|
| Range | **-10 ... +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.

**Note**

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.

**Note**

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** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

**Monitoring of GLP validity**

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.10 778/789 Sample Processor

## 7.10.1 778/789 Sample Processor - Overview

Dialog window: **Configuration ▸ Devices ▸ [Edit] ▸ Properties ▸ Properties - 'Device type' - 'Device name'**

The parameters for the devices **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 connectors 1...3 and the peripheral devices connected to. 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 the device 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**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.10.3 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.

| | |
|---|---|
| Range | **0 ... 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 6.11.2.1, page 1337)* for general **Sample posi-**

**tions***(see Chapter 6.11.3.2, page 1340)* and **Special beakers***(see Chapter 6.11.3.4, page 1342)* 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.

| | |
|---|---|
| Range | **3 … 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.

| | |
|---|---|
| Range | **100.0 … 300.0 mm** |

*814 USB Sample Processor XL*

| | |
|---|---|
| Selection | **166.0 mm** |
| Default value | **166.0 mm** |

*815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 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.

| | |
|---|---|
| Range | **0 … 235 mm** |
| Default value | **0 mm** |

**Rinse position**

Rinse position valid for all 4 external positions.

| | |
|---|---|
| Range | **0 … 235 mm** |
| Default value | **0 mm** |

**[Configuration]**

Opens the dialog window **Configuration** *(see Chapter 7.11.7, page 1411)* 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 7.11.8, page 1412)* in which the parameters for the external position selected from the table can be edited.

## 7.10.4 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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.

## 7.10.5 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.10.6 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.

**Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

## 7.10.7 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

### Comment GLP test

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

### Monitoring of GLP validity

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.11 814/815 USB Sample Processor

## 7.11.1 814/815 USB Sample Processor - Overview

Dialog window: **Configuration ▸ Devices ▸ [Edit] ▸ Properties ▸ Properties - 'Device type' - 'Device name'**

The parameters for the devices **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.
- *MSB #*
  Properties of the MSB connector 1...3 and the peripheral devices 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**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.11.3 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.

| | |
|---|---|
| Range | **0 ... 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 6.11.2.1, page 1337)* for general **Sample positions***(see Chapter 6.11.3.2, page 1340)* and **Special beakers***(see Chapter 6.11.3.4, page 1342)* 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.

| | |
|---|---|
| Range | **3 … 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.

| | |
|---|---|
| Range | **100.0 … 300.0 mm** |

*814 USB Sample Processor XL*

| | |
|---|---|
| Selection | **166.0 mm** |
| Default value | **166.0 mm** |

*815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 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.

| | |
|---|---|
| Range | **0 … 235 mm** |
| Default value | **0 mm** |

**Rinse position**

Rinse position valid for all 4 external positions.

| | |
|---|---|
| Range | **0 … 235 mm** |
| Default value | **0 mm** |

**[Configuration]**

Opens the dialog window **Configuration** *(see Chapter 7.11.7, page 1411)* 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 7.11.8, page 1412)* in which the parameters for the external position selected from the table can be edited.

## 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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 - 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.11.6 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| Input | **1000 characters** |
|---|---|

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol … in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

## 7.11.7 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.

| | |
|---|---|
| Range | **-270.0 ... 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.

| | |
|---|---|
| Range | **0.0 ... 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.

| | |
|---|---|
| Range | **30.0 ... 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.

| | |
|---|---|
| Range | **-270.0 ... 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.

## 7.11.8 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 7.11.7, page 1411)*. The maximum swing range is also defined under Robotic arm properties.

| | |
|---|---|
| Range | **(Offset) ... (Offset + max. swing range) °** |
| Default value | **60.0 °** |

### Work position

Definition of the work position for the selected external position.

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Default value | **0 mm** |

# 7.12 855 Robotic Titrosampler

## 7.12.1 855 Robotic Titrosampler - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **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.
- *Tower*
  Properties of Tower 1.
- *Rack*
  Information on the rack attached.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.12.2 Properties - General

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.12.3 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.*

| | |
|---|---|
| Range | **1000 ... 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.*

| | |
|---|---|
| Range | **1000 ... 9999** |
| Default value | **4100** |

## 7.12.4 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.

| | |
|---|---|
| Range | **0 ... 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 6.11.2.1, page 1337)* for general **Sample positions***(see Chapter 6.11.3.2, page 1340)* and **Special beakers***(see Chapter 6.11.3.4, page 1342)* 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.

| | |
|---|---|
| Range | **3 ... 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.

| | |
|---|---|
| Range | **100.0 ... 300.0 mm** |

*814 USB Sample Processor XL*

| | |
|---|---|
| Selection | **166.0 mm** |
| Default value | **166.0 mm** |

*815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 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.

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Default value | **0 mm** |

**Rinse position**

Rinse position valid for all 4 external positions.

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Default value | **0 mm** |

**[Configuration]**

Opens the dialog window **Configuration** *(see Chapter 7.11.7, page 1411)* 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 7.11.8, page 1412)* in which the parameters for the external position selected from the table can be edited.

## 7.12.5 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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.

## 7.12.6 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

### 7.12.7 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| Input | **1000 characters** |
|---|---|

#### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.13 864 Balance Sample Processor

## 7.13.1 864 Balance Sample Processor - Overview

Dialog window: **Configuration ▸ Devices ▸ [Edit] ▸ Properties ▸ Properties - 'Device type' - 'Device name'**

The parameters for the device **864 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 Tower 1 and Tower 2 (if present).
- *Rack*
  Information on the rack attached.
- *MSB #*
  Properties of the MSB connector 1...3 and the peripheral devices connected to.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.13.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.13.3 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.

| | |
|---|---|
| Range | **0 ... 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 6.11.2.1, page 1337)* for general **Sample positions***(see Chapter 6.11.3.2, page 1340)* and **Special beakers***(see Chapter 6.11.3.4, page 1342)* 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.

| | |
|---|---|
| Range | **3 … 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.

| | |
|---|---|
| Range | **100.0 … 300.0 mm** |

*814 USB Sample Processor XL*

| | |
|---|---|
| Selection | **166.0 mm** |
| Default value | **166.0 mm** |

*815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 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.

| | |
|---|---|
| Range | **0 … 235 mm** |
| Default value | **0 mm** |

**Rinse position**

Rinse position valid for all 4 external positions.

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Default value | **0 mm** |

**[Configuration]**

Opens the dialog window **Configuration** *(see Chapter 7.11.7, page 1411)* 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 7.11.8, page 1412)* in which the parameters for the external position selected from the table can be edited.

## 7.13.4 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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.

## 7.13.5 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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 ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.14 874 Oven Sample Processor

## 7.14.1 874 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.
- *Oven*
  Information on the oven.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.14.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.14.3 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.

| | |
|---|---|
| Range | **0 ... 110 mm** |
| Default value | **110 mm** |

### Lift rate

Entry of the lift rate for manual control of the tower.

| | |
|---|---|
| Range | **3 ... 25 mm/s** |
| Default value | **25 mm/s** |

## 7.14.4 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.

| | |
|---|---|
| Range | **3 ... 20 °/s** |
| Default value | **20 °/s** |

**[Rack Data]**

Opens the dialog window **Rack data** *(see Chapter 6.11.3.1, page 1339)* or **Rack data (774)** *(see Chapter 6.11.3.6, page 1344)* 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.

## 7.14.5 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 1108)* (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.

| | |
|---|---|
| Range | **0.1 ... 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.

## 7.14.6 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.*

| | |
|---|---|
| Range | **50 ... 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.*

| | |
|---|---|
| Range | **50 ... 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.*

| | |
|---|---|
| Range | **-10 ... +10 °C** |
| Default value | **0 °C** |

## 7.14.7 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 7.15 Avantes Spectrometer

## 7.15.1 Avantes Spectrometer - Overview

Dialog window: **Configuration ▸ Devices ▸ [Edit] ▸ Properties ▸ Properties - 'Device type' - 'Device name'**

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.
- *Kalibrierung*
  Information on wavelength calibration.
- *Dark spectrum*
  Information on dark spectrum.
- *Reference spectrum*
  Information on reference spectrum.
- *GLP*
  Information on GLP tests and GLP monitoring.

## 7.15.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.15.3 Properties - Settings

Tab: **Configuration** ▸ **Device** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **Settings**

### Light source

**Type**

Type of light source used.

| | |
|---|---|
| Selection | **continuous** \| **pulsed** |
| Default value | **continuous** |

**Pulses per integration time**

Frequency the light flashes with. This parameter can only be edited for the **Type** = **pulsed**.

| | |
|---|---|
| Range | **0 ... 1000** |
| Default value | **10** |

**Analog output**

**Analog output**

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

If this option is enabled, the measured signal on the analog output of the spectrometer is put out. If the connected spectrometer has no analog output, this option is ignored.

**Sensitivity**

*Only editable when the analog output is switched on.*

| | |
|---|---|
| Range | **1 ... 214783647 mAU/mV** |
| Default value | **100 mAU/mV** |

## 7.15.4 Properties - Detector

Tab: **Configuration** ▸ **Devices** ▸ **[Edit]** ▸ **Properties...** ▸ **Properties - 'Device type' - 'Device name'** ▸ **Detector**

On the tab **Detector** information on the detector built in the spectrometer is displayed.

**Detector type**

Display of the detector type.

**Minimum wavelength.**

Display of the minimum wavelength of the measurable range in mm.

**Maximum wavelength**

Display of the maximum wavelength of the measurable range in mm.

**Number of pixels**

Display of the resolution the spectrum is recorded with.

## 7.15.5 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.

### 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**.

## 7.15.6 Properties - Dark spectrum

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ Dark spectrum**

On the tab **Dark spectrum** information on the dark spectrum stored in the device is displayed.

If no dark spectrum has been recorded yet or the calibration has been reset to factory settings, **--** is displayed in the fields.

**Date**

Display of date and time the dark spectrum has been recorded.

**User**

Display of the user logged in during recording of the dark spectrum.

**Method**

Display of the method the dark spectrum has been recorded with.

**Determination ID**

ID of the determination the dark spectrum has been recorded in.

**Integration time**

Display of the integration time at recording the dark spectrum.

**Averaged spectra**

Number of spectra recorded and averaged.

**Smoothing**

Display of the number of neighbor pixels the light intensity of each pixel has been averaged with.

**Spectrum**

Display of the dark spectrum. The graph can be zoomed with the mouse. By double-clicking the whole spectrum is displayed again.

**x axis**

Display of the wavelength. Unit mm.

**y axis**

Display of the intensity. Unit Counts.

## 7.15.7 Properties - Reference spectrum

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ Reference spectrum**

On this tab information on the reference spectrum stored in the device is displayed.

If no reference spectrum has been recorded yet or the calibration has been reset to factory settings, **--** is displayed in the fields.

**Date**

Display of date and time the reference spectrum has been recorded.

**User**

Display of the user logged in during recording of the reference spectrum.

**Method**

Display of the method the reference spectrum has been recorded with.

**Determination ID**

ID of the determination the reference spectrum has been recorded in.

**Integration time**

Display of the integration time at recording the dark spectrum.

**Averaged spectra**

Number of spectra recorded and averaged.

**Smoothing**

Display of the number of neighbor pixels the light intensity of each pixel has been determined with.

**Spectrum**

Display of the reference spectrum. The graph can be zoomed with the mouse. By double-clicking the whole spectrum is displayed again.

**x axis**

Display of the wavelength in mm.

**y axis**

Display of the intensity in Counts.

## 7.15.8 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| Input | **1000 characters** |
|---|---|

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

# 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**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **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** |

### Max. waiting time

Maximum waiting time for receiving characters. If this time is exceeded, receiving will be stopped.

| | |
|---|---|
| Range | **1000 … 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**<br>(**\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**<br>(**\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.*

| | |
|---|---|
| Range | **0 ... 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 1447)*.

**[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** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. 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 Balances

## 7.17.1 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.

## 7.17.2 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

### Device name

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.17.3 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** |

**[Connect]**

Establishes the connection to the balance. The dialog window **Establish connection** appears *(see Chapter 7.17.5, page 1452)*.

**[Disconnect]**

Disconnects the connection to the balance (only then the device can be deleted out of the configuration).

## 7.17.4 Properties - GLP

Tab: **Configuration ▸ Device ▸ [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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol ... in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

## 7.17.5 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.

# 7.18 Barcode reader

## 7.18.1 Barcode reader - General

A barcode reader is used to enter sample and other data in **tiamo**.

**Note**

A barcode reader only needs to be configured as a **device** in **tiamo** if 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 device

**Note**

If the functions of a barcode reader for automatic data import into sample tables are to be used, then it must be added to **tiamo** as a device and configured in such a way that during each data transfer the following preamble and postamble check 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 for instructions regarding its configuration.

### Barcode reader as HID

**Note**

If a barcode reader is to be used as HID it must be configured in such a way that it does not transmit any preamble check characters.

Refer to the barcode reader manual for instructions regarding its configuration.

## 7.18.2 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.

## 7.18.3 Properties - General

Tab: **Configuration ▸ Devices ▸ [Edit] ▸ Properties... ▸ Properties - 'Device type' - 'Device name' ▸ General**

General properties of the device are displayed on the **General** tab.

**Device name**

Designation of the device (can be freely defined by user).

| | |
|---|---|
| Input | **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 7.1.6, page 1351)*.

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.

**Start-up**

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 calibratable data memory.

*Only visible and editable with Sartorius balances.*

| | |
|---|---|
| Selection | **on** \| **off** |
| Default value | **off** |

**Remarks**

Remarks about the device.

| | |
|---|---|
| Input | **1000 characters** |
| Default value | **empty** |

## 7.18.4 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 7.18.6, page 1457)* appears.

**[Disconnect]**

Disconnects the connection to the barcode reader (only then the device can be deleted out of the configuration).

## 7.18.5 Properties - GLP

Tab: **Configuration** ▸ **Device** ▸ **[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 83)*.

**Comment GLP test**

Comment on GLP test.

| | |
|---|---|
| Input | **1000 characters** |

### Monitoring of GLP validity

**Monitoring of GLP validity**

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

If this option is switched on 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 adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| Range | **1 ... 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 clicking on the symbol … in the dialog window **Select date** *(see Chapter 2.5.1, page 83)*. After the date has been entered, the field **GLP test interval** will be adapted automatically.

*Only editable when the monitoring is activated.*

| | |
|---|---|
| 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**)

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 86)*.

**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 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** \| **Stop 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 choose 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.

**Stop determination**
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

## 7.18.6 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.

# 8 Manual Control

## 8.1 Manual Control - General

Program part: **Manual Control**

### Definition

In **tiamo**, **Manual Control** refers to the program part in which the connected devices can be directly actuated, i.e. without a predefined execution specification. The precondition for this is that the devices are switched on and detected by **tiamo**. The Manual control is also possible live when running a method.

### Close

The dialog window **Manual Control** can be closed with **[Close]** or the Windows buttons for closing.

**Note**

The Manual Control can only be closed when no more manually triggered actions are running (except: Stirrer is 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 can be selected, on which the functions are to be triggered manually. Therefore they are displayed in tree-form. Displayed are all devices configured in the device table with status "**ok**", device name and (in brackets) the device type number. The currently selected device is shown with a blue background. Devices, which are still running manually triggered actions, are shown with red lettering.

# 8.4 Manual Control - Functions

Program part: **Manual Control**

In the subwindow Functions/Parameters, the functions for the manual control of the selected device and the accompanying parameters can be selected. In addition, here the measured values for running actions and messages are displayed.

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*
- *Prepare*
- *Fill*
- *Empty*
- *Fixed volume*
- *Dosing*

#### Devices

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, 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

**pH/Ion - Meter:** 867

**Sample changer:** 730, 774, 778, 789, 814, 815, 864, 874

**Robitic Titrosampler:** 855

### 8.4.1.2 Dosing - General

Program part: **Manual Control**

Here information on the selected dosing device, the attached exchange/ dosing unit and the containing solution is displayed. 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**
Select the titrants and solutions for non-intelligent exchange/dosing units listed in the **Solution table**. For intelligent exchange/dosing units the name is only displayed.

**Titer**

Display of the titer of the solution put on. 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 - Prepare

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.

**Note**

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 - Fill

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.

**Note**

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 - Empty

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.

**Note**

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 - Add fix 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 to be dosed.

| | |
|---|---|
| Range | **100 ... 99999.9 ml** |
| Default value | **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.

**Note**

For viscous liquids the dosing rate should be reduced.

| | |
|---|---|
| Selection | **maximum** |
| Default value | **maximum** |

*Titrando, 814, 815, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |

*730, 774, 778, 789*

| | |
|---|---|
| Range | **0.01 ... 160.00 mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 150.00 mL/min** |

### Filling rate

The buret is filled at this rate after the dosing. 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 dosing to the largest possible value.

**Note**

For viscous liquids the filling rate should be reduced.

| | |
|---|---|
| Selection | **maximum** |
| Default value | **maximum** |

*Titrando, 814, 815, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |

*730, 774, 778, 789*

| | |
|---|---|
| Range | **0.01 ... 160.00 mL/min** |

*Titrino*

| | |
|---|---|
| Range | **0.01 ... 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 enabled, the buret is filled automatically after dosing. During the filling procedure the volume display is reset to **0.0000 mL**. If this option is disabled, the added volume is displayed cumulatively.

### [Start]

Start fixed volume dosing for the selected dosing device. The dosed volume is displayed live.

**Note**

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 disabled. 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.

**Note**

For viscous liquids the dosing rate should be reduced.

| | |
|---|---|
| Selection | **maximum** |
| Default value | **maximum** |

*Titrando, 814, 815, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |

*778, 789*

| | |
|---|---|
| Range | **0.01 ... 160.00 mL/min** |

**Filling rate**

The buret is filled at this rate after the dosing. 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 dosing to the largest possible value.

**Note**

For viscous liquids the filling rate should be reduced.

| | |
|---|---|
| Selection | **maximum** |
| Default value | **maximum** |

*Titrando, 814, 815, 855*

| | |
|---|---|
| Range | **0.01 ... 166.00 mL/min** |

*778, 789*

| | |
|---|---|
| Range | **0.01 ... 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.

**Note**

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 1459)*, 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*

#### Devices

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

**Robitic Titrosampler:** 855

### 8.4.2.2 Stirring - Switch on/off

Program part: **Manual Control**

Here stirrers can be switched on and off. This tab appears when selecting a single stirrer as well as with all stirrers.

**Stirring rate**

Select the stirring rate. This parameter can also be modified live.

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

**[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**

Select the stirring rate. This parameter can also be modified live.

| | |
|---|---|
| Range | **-15 ... 15** |
| Default value | **8** |

**Stirring time**

Enter the time during which should be stirred. If this parameter is modified after the start of the stirrer, it is not valid until the next stirring procedure.

| | |
|---|---|
| Range | **1 ... 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.

**Note**

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.

**Note**

We recommend masking the irrelevant output lines with an asterisk ***** so as not to modify these line conditions.

**Note**

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 Control**

If in the subwindow for the device selection, a tower of a sample changer is selected, then the functions and parameters belonging to this sample changer are displayed in the subwindow Functions/Parameters.

#### Sample changer functions

The sample changer functions are displayed on the following tabs:

- *General*
- *Move*
- *Assign position*
- *Pump*
- *Heater/Gas*

#### Devices

The sample 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 Control**

Here information on the rack attached is displayed. In addition, shift and lift rate for manual sample changer control can be set.

**Rack name**

Shows the name of the rack attached. If no rack is attached, **--------** is displayed.

### Rack code

Shows the number of positions on the rack attached. If no rack is attached, -------- is displayed.

### Number of positions

Shows the number of positions on the rack attached. If no rack is attached, -------- is displayed.

### Shift rate

Shift rate for manual control of the sample changer.

| | |
|---|---|
| Range | **5 ... 20 °/s** |
| Default value | **20 °/s** |

### Lift rate

Lift rate for manual control on the selected tower.

*730, 778, 789, 814, 815, 855, 864*

| | |
|---|---|
| Range | **5 ... 25 mm/s** |
| Default value | **25 mm/s** |

*774, 874*

| | |
|---|---|
| Range | **3 ... 12 mm/s** |
| Default value | **12 mm/s** |

### Swing rate

Swing rate for manual control of the Swing Head on the sample changer.

| | |
|---|---|
| Range | **10 ... 55 °/s** |
| Default value | **20 °/s** |

### [Initialize rack]

The rack in position is initialized.

**Note**

When initializing the rack, the following actions are carried out:

– Move rack in position to read out rack code.

– Transfer rack data for the rack code to sample changer.

– Move lifts upwards to 0 mm

– Move robotic arm back.

### 8.4.4.3 Sample changer - Move

Program part: **Manual Control**

Here the moving to desired rack, lift or robotic arm position can be triggered manually.

#### Rack position

Set rack position.

**Current position**

Shows the current rack position.

**Target position**

Select or enter the rack position to be moved to.

| | |
|---|---|
| Range | **1 ... n (depending on rack)** |
| Default value | **1** |

| | |
|---|---|
| Selection | **Special beaker 1...16** |

**[Start]**

Start moving to target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray) and **Move...** instead of **Ready** is displayed as status message.

Move to current rack position - 1.

Move to current rack position + 1.

#### Lift position

Set lift position for the selected tower.

**Current position**

Shows the current lift position in mm.

**Target position**

Enter or select the lift position that is to be moved to for the current rack position (normal beaker, special beaker, external position).

| | |
|---|---|
| Range | **0 ... 235 mm** |
| Default value | **0 mm** |

| | |
|---|---|
| Selection | **Home position** \| **Work position** \| **Shift position** \| **Rinse position** \| **Special position** |

**Shift position**
For normal beakers and external positions only.

**Rinse position**
For normal beakers and external positions only.

**Special position**
For normal beakers and external positions only.

**[Start]**

Start moving to target position. Start moving to target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray) and **Move...** instead of **Ready** is displayed as status message.

Move lift upwards as long as this button is pressed.

Move lift downwards as long as this button is pressed.

**Robotic arm position**

Set the robotic arm position (angle) on the selected tower.

**Current position**

Displays the current position of the robotic arm in °.

**Target position**

Enter or select the robotic arm position to be moved to.

| | |
|---|---|
| Range | **0.0 ... 330.0 °** |
| Default value | **0.0 °** |
| Selection | **External 1...4** |

**[Start]**

Start moving to target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray) and **Move...** instead of **Ready** is displayed as status message.

Move robotic arm to the left (toward **0°**) as long as this button is pressed.

Move robotic arm to the right (toward **330°**) as long as this button is pressed.

### 8.4.4.4 Sample changer - Assign position

Program part: **Manual Control**

Here the current rack, lift or robotic arm position can be assigned to a specific special position.

#### Rack position

Assign current rack position to a specific special beaker.

**Current position**

Shows the current rack position.

**Special beaker**

Select the special beaker to be assigned to the current rack position.

| | |
|---|---|
| Range | **1 ... 16** |
| Default value | **1** |

**[Assign]**

Trigger assignment. During the assignment the cursor is displayed as hourglass.

#### Lift position

Assign 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, of a special beaker or to an external position of the robotic arm.

*all except 730*

| | |
|---|---|
| Selection | **Tower 1** \| **Tower 2** \| **Special beaker 1...16** \| **External 1...4** |
| Default value | **Tower 1** |

*730 only*

| | |
|---|---|
| Selection | **Tower 1+2** \| **Special beaker 1...16** \| **External 1...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 1** \| **Tower 2** \| **External position** |
| Default value | **Tower 1** |

*730 only*

| | |
|---|---|
| Selection | **Tower 1+2** \| **External position** |
| 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 1** \| **Tower 2** |
| Default value | **Tower 1** |

*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 1** \| **Tower 2** |
| Default value | **Tower 1** |

*730 only*

| | |
|---|---|
| Selection | **Tower 1+2** |
| Default value | **Tower 1+2** |

### Swing position for

If this option is selected, the current lift position is assigned to the swing position of the robotic arm.

*all except 730*

| | |
|---|---|
| Selection | **Tower 1** \| **Tower 2** |
| Default value | **Tower 1** |

*730 only*

| | |
|---|---|
| Selection | **Tower 1+2** |
| Default value | **Tower 1+2** |

**[Assign]**

Trigger assignment. During the assignment the cursor is displayed as hourglass.

**Assign robotic arm position**

Assign current rack position to a specific external robotic arm position.

**Current position**

Displays the current position of the robotic arm in °.

**External position**

Select the external position to which the current robotic arm position is to be assigned.

| | |
|---|---|
| Range | **1 ... 4** |
| Default value | **1** |

**[Assign]**

Trigger assignment. During the assignment the cursor is displayed as hourglass.

### 8.4.4.5 Sample changer - Pump

Program part: **Manual Control**

Here the pumps connected to the tower can be switched on and off.

**Pump 1**

Manually control pump 1 or valve 1 on the selected tower.

**Operation**

Select whether the pump or valve should be switched on/off manually or whether they should be switched on for a defined time and then automatically be switched off.

| | |
|---|---|
| Selection | **On/Off** \| **Duration** |
| Default value | **On/Off** |

**Duration**

Enter the duration during which the pump/valve should remain switched on. This field only appears for **Operation** = **Duration**.

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **60 s** |

**[Start]**

Start pump 1. In the status display the running time since start is shown.

**[Stop]**

Stop pump 1.

### Pump 2

Manually control pump 2 or valve 2 on the selected tower.

**Operation**

Select whether the pump or valve should be switched on/off manually or whether they should be switched on for a defined time and then automatically be switched off.

| | |
|---|---|
| Selection | **On/Off** \| **Duration** |
| Default value | **On/Off** |

**Duration**

Enter the duration during which the pump/valve should remain switched on. This field only appears for **Operation** = **Duration**.

| | |
|---|---|
| Range | **1 ... 999999 s** |
| Default value | **60 s** |

**[Start]**

Start pump 2. In the status display the running time since start is shown.

**[Stop]**

Stop pump 2-

## 8.4.4.6 Sample changer - Heater/Gas

Program part: **Manual Control**

Here the heater and gas flow on the 774 and 874 Oven Sample Processor can be switched on and off.

### Heater

Heat the oven up to the desired temperature during the defined heating up time.

**Temperature**

Temperature up to which heating should take place. With **Init** it is heated up to the initial temperature set on the device.

| | |
|---|---|
| Range | **50 ... 250 °C** |
| Default value | **50 °C** |

| | |
|---|---|
| Selection | **Init** |

**Heating up time**

Duration of the heating up period until reaching the desired temperature.

| | |
|---|---|
| Range | **1 ... 999 min** |
| Selection | **off** |
| Default value | **off** |

**[Start]**

Start heater. In the status display the current temperature is shown.

**[Stop]**

Stop heater.

### Gas flow

**Inlet**

Select the inlet of the carrier gas.

| | |
|---|---|
| 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*

| | |
|---|---|
| Range | **10 ... 150 mL/min** |
| Default value | **50 mL/min** |

**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 only displayed for **Gas type** = **Other gas**. The values for frequently used carrier gases are listed in the manual of the 774 and 874 Oven Sample Processor.

| | |
|---|---|
| Range | **1 ... 9.999** |
| Default value | **1.000** |

**[Start]**

Switch on gas flow. In the status display the running time since start is shown.

**[Stop]**

Switch off gas flow.

### Gas flow pump

Switch the gas flow pump on the Oven Sample Processor on/off.

**[Start]**

Switch on gas flow pump. In the status display the running time since start is shown.

**[Stop]**

Switch off gas flow pump.

### Inert gas valve

Switch the inert gas valve on the Oven Sample Processor on/off.

**[Start]**

Switch on inert gas valve. In the status display the running time since start is shown.

**[Stop]**

Switch off inert gas valve.

## 8.4.5 Measure

### 8.4.5.1 Measure - Overview

Program part: **Manual Control**

If in the subwindow for the device selection, a **measuring input** for a device is selected, then the functions and parameters belonging to this device are displayed in the subwindow Functions/Parameters.

### Measuring functions

The measuring functions are displayed on the following tabs:

- *Measure*
- *Intensity*
- *Sample spectrum*

### Devices

The measuring functions can be carried out with the following devices:

**Titrino:** 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 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 Measure - Measure

Program part: **Manual Control**

Here the measuring 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** |
|---|---|

**Note**

Which other parameters are displayed depends on the selected measured quantity.

#### Sensor

Select the sensor, the ones of the sensor table are available. Depending on the measured quantity only specific sensor types can be selected.

**Note**

If an intelligent sensor is connected to the measuring input it is displayed.

#### Measurement 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*

| | |
|---|---|
| Range | **-20.0 ... 150.0 °C** |
| Default value | **25.0 °C** |

*Titrino*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **25.0 °C** |

#### I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-125.0 ... 125.0 µA** (Increment: **0.5**) |
| Default value | **5.0 µA** |

*Titrino*

| | |
|---|---|
| Range | **-127 ... 127 µA** (Increment: **1**) |
| Default value | **5 µA** |

### U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

*Titrando, 855*

| | |
|---|---|
| Range | **-1250 ... 1250 mV** (Increment: **25**) |
| Default value | **400 mV** |

*Titrino*

| | |
|---|---|
| Range | **-1270 ... 1270 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*

| | |
|---|---|
| Range | **-170.0 ... 500.0 °C** |
| Default value | **20.0** |

*856*

| | |
|---|---|
| Range | **-20.0 ... 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**
Manually enter a constant temperature coefficient.

**Sample solution**
Select a function for the temperature coefficient from the table **Sample solutions (TC conductivity)**.

**Temperature coefficient**

| | |
|---|---|
| Range | **0.00 ... 9.99 %/°C** |

**Sample solution**

Select name from the table **Sample solution (TC conductivity)**.

| | |
|---|---|
| Selection | **DIN** \| **Entries of the table** |
| Default value | **DIN** |

**[Start]**

Start measuring.

**[Stop]**

Stop measuring.

### 8.4.5.3 Measure - Intensity

Program part: **Manual Control**

Here the intensity of an uncorrected spectrum can be measured and displayed.

**Start wavelength**

Lower limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **400.0 nm** |

**End wavelength**

Upper limit of the spectrum.

| | |
|---|---|
| Range | **200.0 ... 1100.0 nm** |
| Default value | **1000.0 nm** |

**Integration time**

Integration time for spectrum recording.

| | |
|---|---|
| Range | **0.01 ... 600000 ms** |
| Default value | **6 ms** |

**Averaged spectra**

The number of spectra that are recorded and averaged.

| | |
|---|---|
| Range | **1 ... 10000** |
| Default value | **10** |

**Smoothing**

Number of neighboring pixels with which the value for each measurement pixel is determined.

| | |
|---|---|
| Range | **0 ... 100 Pixels** |
| Default value | **0 Pixels** |

**[Measuring]**

Start measuring of the intensity. The parameters defined will be used.

#### 8.4.5.4 Measure - Sample spectrum

Program part: **Manual Control**

Here a sample spectrum can be measured and displayed.

**Note**

Before a sample spectrum can be measured, a reference spectrum has to be recorded in a determination by a spectrometer.

The parameters **Start wavelength**, **End wavelength**, **Integration time**, **Averaged spectra** and **Smoothing** are read out of the reference spectrum and displayed, they cannot be modified.

**[Measure]**

Start measuring of the sample spectrum. The parameters defined will be used. Only active, if a reference spectrum is available.

## 8.5 Manual Control - Graphical display

**Program window:Manual control**

In the subwindow for the graphical display all running, manually triggered functions are displayed graphically.

# 9 How to proceed?

## 9.1 Audit Trail

### 9.1.1 Opening Audit Trail

How to proceed?

**Note**

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.

**Note**

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.

**Note**

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?

**Note**

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.

**Note**

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.

**Note**

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?

**Note**

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 database

How to proceed?

### General

In **tiamo**, **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. 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.

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 drives administered centrally by the server and are available globally throughout the entire Client/Server system, i.e. all users with the appropriate access rights can use these databases.

**Note**

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files be copied to an external directory or to a CD/DVD.

## Backing up database manually

1 Select program part **Database**.

2 Click on the symbol or menu item **File** ▸ **Database manager…**.

The dialog window **Database manager** opens.

3 Select database.

4 Click on **[Backup]** in the dialog window **Database manager**.

The dialog window **Backup database 'Database name'** is opened.

5 Select the directory for the backup in the field **Backup directory**.

6 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.

**Note**

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** field because the backup date information is not available when restoring.

7 Click on **[Start]**.

The manual backup of the database is started and the database is backed up to the selected directory.

## Backing up database automatically

1 Select program part **Database**.

2 Click on the symbol or menu item **File** ▸ **Database manager…**.

The dialog window **Database manager** opens.

3 Select desired database and click on **[Properties]**.

The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.

4 On the tab **General** enter a comment on the database in the field **Comment**.

5 On the tab **Backup** enable the check box **Backup monitoring**.

6 Enter **Interval** for backup monitoring or date for the next backup in the field **Next backup**.

7 Activate the **Start backup automatically** check box.

8 Select the directory for the backup in the field **Backup directory**.

9 Click on **[OK]**.

The dialog window **Properties - Database** is closed and the database will be backed up to the selected directory at the desired time.

### 9.2.2 Restoring database

How to proceed?

1 Select program part **Database**.

2 Click on the symbol or menu item **File** ▸ **Database manager…**.

The **Database manager** window 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 in the **Backup name** list box.

6 Enter the name under **Save as** under which the database is to be restored.

7 Click on **[Start]**.

The database restoring is started.

**Note**

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 in **tiamo** is saved in the **Configuration database**. Under configuration data is to be understood all settings for devices, titrants/solutions, sensors, common variables and rack data applying to all methods; configuration data also includes **Methods**, **Security settings** *(see Chapter 6.2.2.1, page 1212)*, **User administration** *(see Chapter 6.2.1.1, page 1203)*, **Program administration** *(see Chapter 6.2.3.1, page 1222)*, templates and **Audit Trail** *(see Chapter 6.4, page 1244)*.

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder 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 saves and contains all the configuration data of all computers (clients) that are connected to this server.

**Note**

It is strongly recommended that the configuration database be backed up periodically.

### 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. Select the directory for the backup in the field **Backup directory**.
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.

**Note**

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]**.

The manual backup is started and the configuration database is backed up to the selected directory.

**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 **Interval** for backup monitoring or date for the next backup in the field **Next backup**.

5 Select the directory for the backup in the field **Backup directory**.

6 Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed and the configuration database will be backed up to the selected directory at the desired time.

### 9.2.4 Restoring configuration data

How to proceed?

**tiamolight,tiamo full**

1 Exit **tiamo**.

2 Start the file **ConfigRestore.exe** in the program directory **...\tiamo \bin**.

The dialog window **Restore configuration data** opens.

3 Select the directory in the **Backup directory** field in which the desired database was backed up.

4 Select or enter the name for the desired backup file in the **Backup name** list box.

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 file **ConfigRestore.exe** in the program directory**…\tiamo \bin** on the server.

The dialog window **Restore configuration data** opens.

3 Select the directory in the **Backup directory** field in which the configuration database was backed up.

4 Select or enter the name for the desired backup file in the **Backup name** list box.

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 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 externally from **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 Select the directory for the backup in the field **Backup directory**.

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.

.

**Note**

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]**.

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 **Interval** for backup monitoring or date for the **Next backup**.

5 Select the directory for the backup in the field **Backup directory**.

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 where the method should be exported to and click on **[OK]**.

The selected methods are each exported as files named **'Method name'.mmet**.

**Note**

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

## 9.2.6 Archive Audit Trail

How to proceed?

**Note**

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 Click on the 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.

**Note**

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.

**Note**

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.

# 9.3 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.

**Note**

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.

**Note**

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.

**Note**

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.

**Note**

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.

**Note**

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

**Note**

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 1206)*.

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.

**Note**

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

**Note**

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 1206)*.

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.

**Note**

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.

**Note**

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.

**Note**

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?

**Note**

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**.

**Note**

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

**Note**

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

**Note**

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.

**Note**

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

**Note**

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.

**Note**

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**.

**Note**

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.

**Note**

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

In **tiamo**, **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. 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.

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 drives administered centrally by the server and are available globally throughout the entire Client/Server system, i.e. all users with the appropriate access rights can use these databases.

**Note**

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files be copied to an external directory or to a CD/DVD.

## 9.4.2 Open database

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.

**Note**

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.

## 9.4.3 Close database

How to proceed?

**Closing single database**

1. Select program part **Database**.
2. Click on the symbol or the menu item **File ▸ Close...**.

   The focused database will be closed.

**Closing all databases**

1 Select program part **Database**.

2 Click on menu item **File ▸ Close all…**.

All opened databases will be closed.

### 9.4.4 Create 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 the menu item **Edit ▸ New…**.

The dialog window **New database** opens.

4 Enter a name for the new database.

5 Click on **[OK]**.

The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.

**Note**

The database name must be unambiguous in the whole Client/Server system.

6 On the tab **General** enter a comment on the database in the field **Comment**.

7 On tab **Access rights**, define access rights for reading and editing the new database for the different user groups.

8 On tab **Backup**, define backup monitoring and automatic backup for the new database.

9 On tab **Monitoring**, define monitoring of size and number of data sets.

### 9.4.5 Backing up database

How to proceed?

**Backing up database manually**

1 Select program part **Database**.

2 Click on the symbol or menu item **File ▸ Database manager…**.

The window **Database manager** opens.

3 Click on **[Backup]**.

The window **Backup database** opens.

4 Select the directory for the backup in the field **Backup directory**.

5 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.

**Note**

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.

6 Click on **[Start]**.

The manual backup is started and the database is backed up to the selected directory.

**Backing up database automatically**

1 Select program part **Database**.

2 Click on the symbol or menu item **File ▸ Database manager…**.

The dialog window **Database manager** opens.

3 Select desired database.

4 Click on **[Properties]**.

The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.

5 On the tab **General** enter a comment on the database in the field **Comment**.

6 On the tab **Backup** enable the check box **Backup monitoring**.

7 Enter **Interval** for backup monitoring or date for the **Next backup**.

8 Activate the **Start backup automatically** check box.

9 Select the directory for the backup in the field **Backup directory**.

10 Click on **[OK]**.

11 The dialog window **Properties - Database** is closed.

The database is automatically saved in the selected directory at the desired time.

### 9.4.6 Restoring 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]**.

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.

**Note**

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 Delete 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 Select desired database.

4 Click on the menu item **Edit ▸ New...**.

The selected database is deleted.

**Note**

Databases that are open cannot be deleted.

# 9.5 Configuration data

## 9.5.1 Configuration data in general

The configuration data in **tiamo** is saved in the **Configuration database**. Under configuration data is to be understood all settings for devices, titrants/solutions, sensors, common variables and rack data applying to all methods; configuration data also includes **Methods**, **Security settings** *(see Chapter 6.2.2.1, page 1212)*, **User administration** *(see Chapter 6.2.1.1, page 1203)*, **Program administration** *(see Chapter 6.2.3.1, page 1222)*, templates and **Audit Trail** *(see Chapter 6.4, page 1244)*.

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder 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 saves and contains all the configuration data of all computers (clients) that are connected to this server.

## 9.5.2 Export configuration data

How to proceed?

1. Select program part **Configuration**.
2. Click on the menu item **File ▶ Export...**.

   The dialog window **Export configuration data** opens.
3. Select desired configuration data.
4. Click on **[OK]**.

   The dialog window **Export configuration data** is closed and the dialog window **Save** opened.
5. Select or enter 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 program part **Configuration**.
2. Click on the menu item **Determinations ▸ Import...**.

   The dialog window **Open** opens.
3. Select or enter a new name and directory for the import file **MCFG**.
4. Click on **[Open]**.

   The dialog window **Import configuration data** opens.
5. Select desired configuration data.

   **Note**

   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?

**Note**

It is strongly recommended that the configuration database be backed up periodically.

**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. Select the directory for the backup in the field **Backup directory**.

4 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.

> **Note**
>
> 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]**.

The manual backup is started and the configuration database is backed up to the selected directory.

**Backup 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 **Interval** for backup monitoring or date for the **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.

The configuration database is automatically saved in the selected directory at the desired time.

### 9.5.5 Restoring configuration data

How to proceed?

**Exit tiamo light, tiamo full**

1 Exit **tiamo**.

2 Start the file **ConfigRestore.exe** in the program directory **…\tiamo \bin**.

The dialog window **Restore configuration data** opens.

3 Select the directory in the **Backup directory** field in which the configuration database was backed up.

4 Select or enter the name for the desired **Backup file**.

5 Click on **[Start]**.

The restoring of the configuration database is started.

### tiamomulti

1 Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.

2 Start the file **ConfigRestore.exe** in the program directory**…\tiamo \bin** on the server.

The dialog window **Restore configuration data** opens.

3 Select the directory in the **Backup directory** field in which the configuration database was backed up.

4 Select or enter the name for the desired **Backup file**.

5 Click on **[Start]**.

The restoring of the configuration database is started.

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# 9.6 Methods

## 9.6.1 Open 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.

**Note**

A maximum of 9 methods can be opened, but only 2 can be displayed at the same time.

## 9.6.2 Closing method

How to proceed?

**Close single method**

1 Select program part **Method**.

2 Click on the symbol or the menu item **File ▸ Close**.

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.

#### Close 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 Create 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 Save 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 dialog 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 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 1218)*, the window **Modification comment method** is displayed first when deleting methods.. In this window, a reason and a comment on deleting can be entered, which is logged in the **Audit Trail**.

**Note**

Locked methods cannot be deleted.

### 9.6.6 Exporting 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**.

**Note**

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, 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 Sign methods

How to proceed?

**Select 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**

**Note**

Methods 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 1206)*.

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.

**Note**

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**

**Note**

Methods 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 1206)*.

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.

**Note**

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 as level 2 must first be deleted *(see Chapter 2.3.5, page 24)*.

### 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 externally from **tiamo**.

**Manual configuration data backup**

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.

   **Note**

   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 restoring.
5. Click on **[Start]**.
6. The manual backup of the configuration database is started.

**Automatic configuration data backup**

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**.

**Note**

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, 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**.

   **Note**

   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 **Note**

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.

   **Note**

   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**.

**Note**

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.

**Note**

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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