Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
Internet www.metrohm.com

tiamo User Manual

Program version 1.1

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Teachware
Metrohm AG
Oberdorfstrasse 68
CH-9101 Herisau
teachware@metrohm.com

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Although this tutorial has been prepared with the greatest care, errors cannot be completely excluded.
Should you notice any please contact the above address.

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Chapter 1 Introduction

1.1 Welcome to tiamo

tiamo = titration and more

tiamo is a control and database software for titrators, dosing devices and sample changers that allows complete laboratory automation, which is why the name ***tiamo*** stands for «**ti**tration **a**nd **mo**re» – ***tiamo*** can do far more than just titrate.

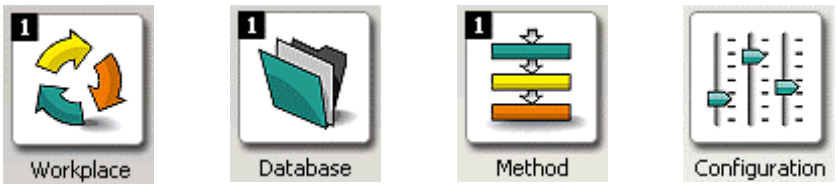
tiamo is the successor of the TiNet and Workcell software. With it Metrohm now offers worldwide a uniform software product for laboratory automation. This means that an internationally operating concern can now use the same software platform for processing all its samples and exchange data and methods without any loss.

The most important program features

- Easy to use and configurable user interface
- Easy integration of instruments and accessories
- Comfortable method editor
- Database program with client/server functionality
- Manifold import and export possibilities
- FDA compatibility according to 21 CFR Part 11
- Extensive online help

1.2 User interface

The modern **user interface** makes it easy for users to familiarize themselves with *tiamo* quickly. All command and control functions are located where users would expect them. The *tiamo bar* on the left-hand side of the screen allows access to the four basic tiamo components:



Whether these buttons are visible or concealed depends on the user's rights of access. The menu bar is located in the upper part of the screen. Again, each individual command can be concealed in accordance with the rights of access of the user.

In the center of the screen are the **information windows**, in which settings, sample input templates, real-time curves or results are shown. This display can be adjusted individually for each user with the aid of the new Layout Manager. This means that each user can only see the windows or buttons necessary for his or her work. This shortens the familiarization time for users carrying out routine work to a minimum; operating errors resulting from a cluttered screen are now a thing of the past.

The **methods and calculation templates** successfully introduced with the Titrando system are also available with tiamo. Numerous tried and tested methods allow users to draw up their own individual methods quickly and simply and to use them immediately.

1.3 Integration of devices

tiamo brings together the world of **Titrino devices** with the new generation of the **Titrando system**. In the software sector such compatibility with existing Metrohm devices is not just a matter of course. The whole Titrino family, which was previously also controlled by TiNet, can continue to be operated under *tiamo*, and this after more than 10 years on the market! In addition, sample changers, some of which are no longer in our sales program, can also be operated under tiamo. That's how Metrohm protects your investments!

Of course, all the models of the latest Titrando generation as well as the new Sample Processors are compatible with *tiamo*. In this way all the advantages of USB communication, such as plug and play or recognition of the intelligent dosing systems, can be utilized to the full with tiamo. Even the mixed operation of older RS 232-controlled and the new USB-controlled instruments is possible without any problems.

Devices compatible with *tiamo*

- **Titrando**
  808, 809, 835, 836, 841, 842, 855
- **Titrino**
  702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799
- **Conductometer**
  712
- **KF Coulometer**
  756, 831
- **Sample Changer**
  730, 774, 778, 789, 814, 815, 855
- **Miscellaneous**
  846 Dosing Interface, balances, barcode readers ...

1.4 Method editor

The new graphical **Method Editor** makes more of your titration system. Methods can be drawn up quickly and simply by using the numerous templates. Methods that have been proved in practice are available for most routine and automation tasks. A few clicks are all that is needed to adapt them and make them ready for use.

It is now possible to program and link activities that take place in **parallel**. This means that, together with the new Titrando system and the Robotic Sample Processors, a sample can now be titrated while the next sample is already being prepared. This saves time and increases sample throughput. The crowning achievement is the simultaneous processing of several samples – one Titrando can carry out two titrations at the same time. This doubles sample throughput!

tiamo is flexible and adapts itself to the analytical sequence, not vice versa.

Overview of functions

- Graphical method editor
- Method manager
- Access rights management for each method group
- Templates for method development and calculations
- Method test
- Comments for methods
- Parallel track function
- Loop function

1.5 Database

tiamo is based on an industrially tested, **object-oriented database**. The **configuration database** contains all settings, the user administration, methods and templates. The determination data are stored in **determination databases** defined by the user. These databases can be installed locally on the computer used and represent a simple titration system. However, *tiamo* is also scaleable and grows to meet the operating requirements. As soon as data security and central data administration come to the fore, *tiamo* can be set up in a **client-server configuration**, with the *tiamo* database installed on a server. All measuring and office computers then act as clients. In this titration network all results are stored centrally and can be viewed and recalculated by all client PCs. In addition, all clients can access the same pool of methods.

The new database provides all the necessary tools for managing results as well as for searching for them and grouping them together. Quick Filters allow users to search through thousands of determinations in a few seconds and present the search results in a clear manner. Control charts provide a rapid overview of the chronological sequence of the results.

All the possibilities for **recalculation and re-evaluation** are available to the users.

Overview of functions

- Object-oriented Client/Server database
- Quick filter and powerful search functions
- Access rights management for each database
- Automatic database backup function
- Layout manager for database view
- Reprocessing function for variables, methods, statistics, and curve evaluation
- Control charts

1.6 Communication

Easy and inexpensive **integration** into existing laboratory information systems, central databases and long-term archiving systems is crucial for the acceptance of PC-controlled analytical systems.

tiamo is communicative. **LIMS systems** can easily import work lists into *tiamo's* own sample table and also control them remotely, without any additional modules. Data generated in *tiamo* are now exported in XML format. This enables the simple incorporation into all LIMS systems currently on the market. Export to long-term archiving systems such as NuGenesis SDMS or Scientific Software CyberLABlab is also supported.

With the new **Report Designer** the analysis reports can now be drawn up simply and flexibly. The Report Designer allows report templates to be freely defined. In this way reports of one or more determinations can be produced at any time with a selectable layout in pdf format or as a paper printout.

A special feature of *tiamo* is that status messages, error messages or results can be transmitted from the method sequence to the user by **E-Mail**.

Overview of functions

- Import of sample data
- Several data export formats,such as XML, CSV, SLK
- Direct export to NuGenesis SDMS, Scientific Software CyberLAB, etc.
- Report designer
- E-mail function for status messages, error messages, or results
- Import of external measured values

1.7 Compliance

tiamo also sets new standards with respect to **compliance with GMP, GLP and FDA requirements**. The latest quality standards and validation procedures have been used during the development and programming of the software. Right from the very start *tiamo* has been designed to comply with the demands of **FDA Regulation 21 CFR Part 11** and its customer-specific interpretations. This is confirmed by a compliance certificate. A central user administration determines rights of access to program functions, methods and results. Any number of users with freely definable user profiles are possible. The system administrator has comfortable access to the user administration from any *tiamo* client. Access to the software is password-protected and either the *tiamo* or Windows login can be selected.

The use of **digital signatures** allows to sign methods and results. Two signatures with different features are available. With the Level 1 Signature (Review) the user confirms the he has correctly programmed the method or correctly performed the analysis, whatever the case. The Level 2 Signature (Release) is used to release the method or the result and protect it against further changes. This means that company-specific workflows can be displayed in *tiamo*.

All data are managed by **version control** and protected against unauthorized access, alteration or deletion in the database. The database itself controls access to the data in network operation and offers archiving and recovery functions.

The **Audit Trail** protocols all user actions as well as important system events.

Compliance features of *tiamo*

- Designed and validated for compliance
- Central user administration
- Detailed access rights management
- tiamo or Windows *password protection*
- Digital signature with two levels
- Different signatures for methods and results
- Method and results history
- Detailed Audit Trail guarantees traceability

1.8 Versions

tiamo is available in **three versions**; these differ in the range of functions offered. An **upgrade** is possible at any time.

	tiamo 1.1 light	tiamo 1.1 full	tiamo 1.1 multi
Article	6.6056.111	6.6056.112	6.6056.113
Maximum number of instruments per PC	2	unlimited	unlimited
Compliant with FDA 21 CFR Part 11		●	●
User administration	●	●	●
Security policies		●	●
Audit Trail		●	●
Client-server support			●
Number of licenses	1	1	3
Additional licenses (optional)			●
XML data export to LIMS		●	●
Parallel titrations		●	●
Upgrade available	●	●	

1.9 Online Help

Help call

tiamo contains an extensive and detailed online help that can be called in two different ways:

- **General call**
  With the menu item **Help, tiamo Help** or the icon the online help opens with the subject Welcome. From there you can jump to desired subject via **Content**, **Index** or **Search**.
- **Context-sensitive call**
  By pressing the key [F1] on the keypad the online help opens directly with the subject showing information about the activated element (dialog window, tab).

1.10 What's new in tiamo 1.1?

New devices

- 842 Titrando
- 855 Robotic Titrosampler

New commands

- **STAT pH**
  STAT Titration with pH electrodes (measuring quantity pH).
- **STAT U**
  STAT Titration with metal electrodes (measuring quantity U).
- **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.
- **DOS pH**
  Controlled dosing with measurement quantity pH.
- **DOS U**
  Controlled dosing with measurement quantity U.

New features in the Workplace program part

- If **Sample size** and/or **Unit** are entered or imported in an opened Sample table on the **Single determinations** tab or in the working sample table on the **Determination series** tab then in addition the time of data input and the data source will be saved automatically. This data is stored together with the determination and shown in the subwindow **Information** under **Sample/Sample data** as **Input date** and **Data source**.
- If a command is canceled manually or the method is stopped manually then the data of the incompletely carried out command will be newly saved in the database.
- In the Report window the name of the **Current report** tab will be altered to **Latest report**.
- In Manual operation the filling of exchange and dosing units is now also possible for Titrinos.

New features in the Database program part

- If sample data are altered live in the run window on the **Single determinations** tab or in the working sample table on the **Determination series** tab then these alterations will not only be recorded in the Audit Trail, but also saved in the determination as messages.
- The appearance of the dialog window **Edit filter conditions** has been altered.
- In methods containing the command **STDADD** the standard addition curves are shown in the **Calibration curve** window.

New features in the Method program part

- The command **ADD** can now also be carried out with a Tandem dosing device.
- Introduction of new Command variables: **.CYL, .RE, .MRT, .MRS, .MRC, .RES, .VAR**.

New features in the Configuration program part

- The **Security settings** can be printed out.
- The **User administration** data can be printed out.
- In the dialog window **Program administration** the **Computer identification** tab has been replaced by the **Clients** tab, on which the status of the client is additionally shown (active, inactive).
- Metrohm USB devices can now be initialized with the menu item **Initialize**.
- For Metrohm RS232 devices the **Baud rate** can now be adjusted.
- For 778, 789, 814, 815 and 855 Sample Changers the **Axis offset** (distance between the rotary axis of the sample rack and rotary axis of the robotic arm) is no longer entered in the dialog window **Robotic arm configuration**, but on the **Tower#** tab.
- For Sartorius balances you can now enter whether the balance has a **Data storage under legal control** feature or not.

Chapter 2 General program functions

2.1 Program parts

tiamo has four different program parts which can be opened by clicking on the corresponding symbol in the vertical bar at the left-hand margin. The symbole for the program part opened is shown in color, the symbols for the other program parts in black and white. The menues, toolbars, and the content of the main window depend on the program part opened.

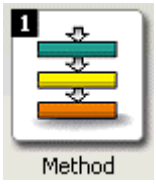
Program part Workplace

- Open/close workplaces
- Start single determinations and determination series
- Sample tables
- Manual operation of instruments

Program part Database

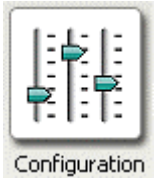
- Open/close databases
- Database manager
- Reprocessing
- Creation of report templates

Program part Method



- Open/close existing methods
- Create new methods
- Method manager

Program part Configuration



- Configuration of instruments, solutions, sensors, common variables, and rack data
- Security settings
- User administration
- Program administration
- Audit Trail

Note
The access to the different program parts can be switched off in the User administration. In this case, the corresponding symbols will be hidden.

2.2 Login/Password protection

2.2.1 General

Login in *tiamo*

tiamo can be configured so that all users must log in with **User name** and **Password**; these entries are then checked automatically. A requirement for this is that a User administration has been set up and the corresponding Security settings have been made. This data is stored in the configuration database. In client/server systems this is found on the server and applies globally for all clients (central user administration).

FDA-conform settings

If FDA-conform work is to be carried out then the settings on the tab Login/Password protection in the dialog window **Security settings** as per 21 CFR 11 must be switched on with the button **[Set]**. The following conditions are then observed:

- Each time that the program is started a **Login with user name and password** is required.
- **Password administration** takes place in *tiamo*.
- **User names** must be **unambiguous**. Once users have been entered they cannot be deleted.
- **Passwords** must be **unambiguous** for each user. No password that has been used once by the user and has expired may be reused.
- Passwords must have a **minimum number of characters**.
- Passwords must have a defined **Validity period** after which they must be changed.
- The **number of incorrect attempts** for entering the password is limited. If this number is exceeded then the user is automatically given the status **inactive**.

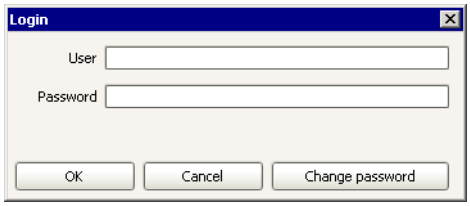
Actions

If login is switched on then the following actions can be carried out:

- Login at program start
- Manual logout
- Automatic logout
- Change password

2.2.2 Login

If the two options **Enforce login with user name** and **Enforce login with password** are switched on in the Security settings then each time the program is started and each time a user is logged out the dialog window **Login** will appear.



User

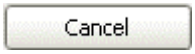
Entry of the short name of the user.

Password

Entry of the password.

> ***Note***
> *A user who is logging in for the first time or whose status has been reset from **inactive** or **removed** to **active** must log in with the Start password issued by the administrator. The window **Change password** then opens automatically for the password to be entered.*

Opens the window **Change password** in which the new password must be entered and confirmed.



The login is cancelled, the program is closed.

2.2.3 Manual logout

A logged-in user can log out at any time with the menu item **File, User, Logout**. The logout options defined in the Security settings apply. After the logout process has finished the **Login** window opens in which a new user can log in.

2.2.4 Automatic logout

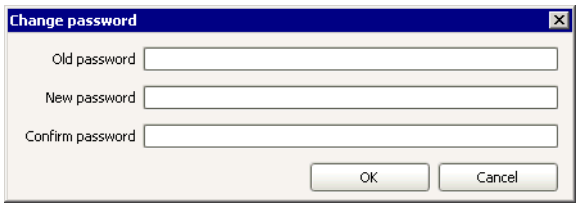
If automatic logout is switched on in the Security settings then the user will be logged out automatically if the mouse and keyboard are not used within the defined time. When this time has expired the **Login** window opens in which only the same user can log in again.

> ***Note***
> *Users with Administrator can always log in, an Emergency stop is also possible.*

2.2.5 Change password

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

> ***Note***
> *It is essential that the password is changed before the Validity period (see Security settings - Login/Password protection) of the password expires. This window will open automatically for a user who is logging in for the first time or whose status has been reset from* ***inactive*** *or* ***removed*** *to* ***active*** *after logging in with the Start password. For* ***Old password*** *the Start password issued by the Administrator must be entered.*



Old password

Entry of the previous password.

New password

24 characters

Entry of the new password. The Password options are defined in the security settings on the register card **Login/Password protection**.

Confirm password

24 characters

Confirms the new password.

2.3 Electronic signatures

2.3.1 Rules

In *tiamo* methods and determinations can be **electronically signed** at two levels. The following rules apply:

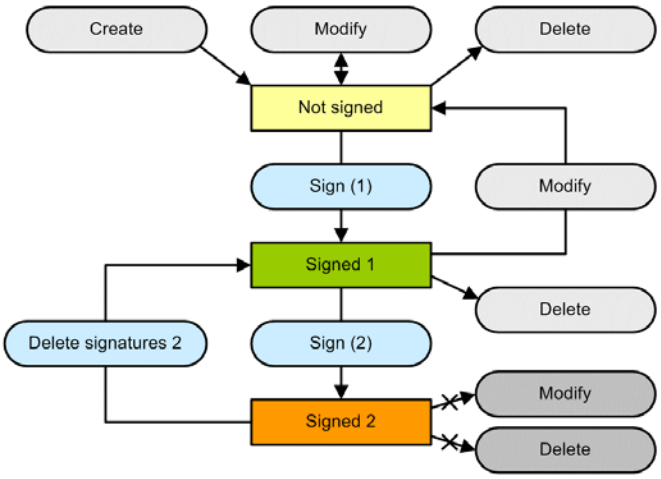
- **Signature levels**
  Methods and determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.
- **Multiple signing**
  Methods and determinations can be signed several times at each level. All the signatures are saved and documented 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 when signatures already exist at Level 1.
- **Different users**
  The same user can only sign at either Level 1 or Level 2.
- **Reason and note**
  Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can be entered additionally.
- **Saved data**
  The signature date, user name, full name, reason and note are saved for each signature.
- **Deleting Level 1 signatures**
  Signatures at Level 1 are automatically deleted when a new version is generated.
- **Deleting Level 2 signatures**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Signing methods**
  Methods can always only be signed individually.
- **Signature options**
  The options for electronic signatures are set on the tab Signatures in the dialog window **Security settings**.

2.3.2 Procedure

With respect to their signatures, methods and determinations can have one of the following three statuses (see flow diagram):

- **Not signed**
  Methods and determinations that have not been signed can be edited and deleted; a new version is generated for each alteration.
- **Signed (1)**
  When methods and determinations are signed at Level 1 no new versions are generated. If methods and determinations signed at Level 1 are edited then a new version is generated that contains no signatures. Methods and determinations signed at Level 1 can be deleted.

- **Signed (2)**
  When methods and determinations are signed at Level 2 no new versions are generated. Methods and determinations signed at Level 2 can neither be edited nor deleted. However, it is possible to delete Level 2 signatures while retaining the Level 1 signatures.



2.3.3 Signature Level 1

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

> ***Note***
> *Methods or determinations that have been signed at Level 1 can be edited and deleted. If the edited method or determination is saved as a new version then all the existing signatures will be deleted automatically, i.e. the method or determination must be signed again.*

Info

Information about signatures and the deletion of signatures is shown in this field. The following messages are possible:

Signature possible
The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)
The selected method or determination cannot 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 has already been marked for signature by another client.

User

Entry of the user name (short name).

Password

Entry of the password.

Reason

Selection from standard reasons

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

Comment

1000 characters

Entry of remarks about the signature.

Signs for method or determination. The window remains open.

> ***Note***
> *Methods and determinations can only be signed at Level 1 when the user belongs to a user group that has the appropriate rights (see User administration/User group/Signatures).*

2.3.4 Signature Level 2

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

> ***Note***
> *Methods or determinations that have been signed at Level 2 are **blocked**, i.e. they can neither be edited nor deleted. In order to be able to edit such methods or determinations again the signatures at Level 2 must first be deleted (see Delete Level 2 signatures).*

Info

Information about signatures and the deletion of signatures is shown in this field. The following messages are possible:

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 has already been marked for signature by another client.

User

Entry of the user name (short name).

Password

Entry of the password.

Reason

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

Comment

1000 characters
Entry of remarks about the signature.

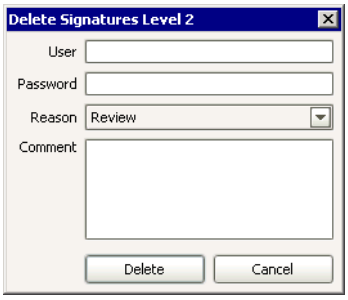
Sign

Signs for method or determination. The window remains open.

> ***Note***
> *Methods and determinations can only be signed at Level 2 when the user belongs to a user group that has the appropriate rights (see User administration/User group/Signatures).*

2.3.5 Delete Level 2 signatures

In the **Delete Level 2 signatures** window all the signatures at Level 2 for the selected method or determination can be deleted.



User

Entry of the user name (short name).

Password

Entry of the password.

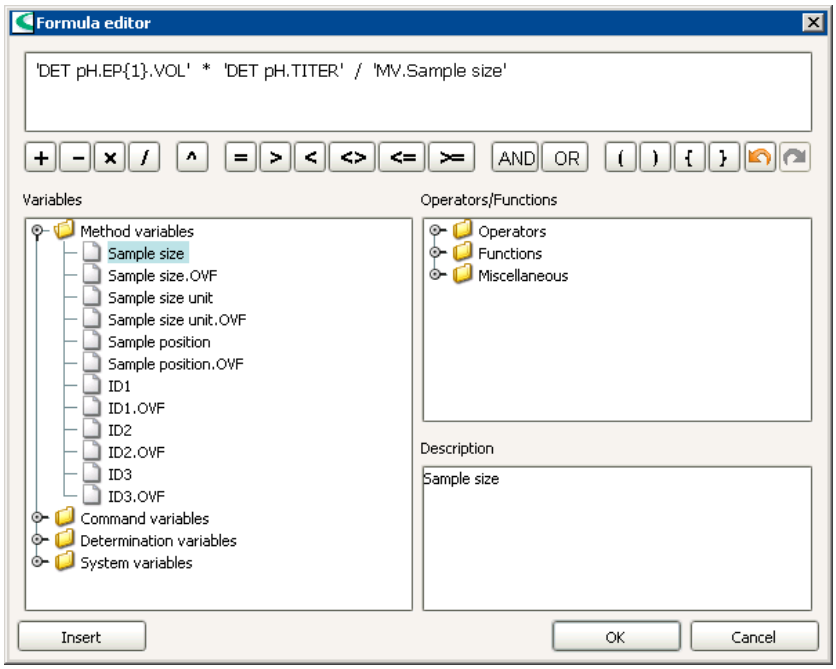
Delete

Delete Level 2 signatures 2.

> ***Note***
> *Level 2 signatures can only be deleted when the user belongs to a user group that has the appropriate rights (see User administration/User group/Signatures).*

2.4 Formula editor

2.4.1 Overview



The Formula editor is used for support in entering formulas for calculating the result. It has an automatic **Syntax check** that is triggered when the formula is adopted. The usual Rules of priority apply for computer operations *(see Operator functions - Overview)*.

The dialog window Formula editor contains the following items:

- **Input field**
  Etry of the calculation formula.
- **Function keys**
  Buttons for the quick input of operators and brackets.
- **Variables**
  Selection from the variables available for the calculation formula.
- **Operators/Functions**
  Selection from the operators and functions available for the calculation formula.
- **Description**
  Describes the selected variables, operators or functions.

2.4.2 Input field

In the Input field of the formula editor the Calculation formula is entered. The following possibilities exist for making entries:

Entry via keyboard

- **Numbers**
  Numbers and mathematical functions can be entered directly via the keyboard.

- **Text**
  Text must be introduced and terminated with inverted commas **"** (e.g. **"My text"**).
- **Variables**
  Variables must be introduced and terminated with an inverted comma **'** (e.g. **'MV.MyVariable'**).
- **Time**
  Time information must always be entered by using the function **Time()**.

Entries using the function keys

Mathematical operators and brackets can be easily inserted in the formula with the corresponding buttons. A space is inserted automatically before and after the character.

+ Addition	= Equal to	>= Logical AND
– Subtraction	> Larger than	OR Logical OR
× Multiplication	< Smaller than	( ) Round brackets
/ Division	<> Unequal	{ } Curly brackets e.g. for end point definition (e.g. **'DET pH 1.EP{1}.VOL'**)
^ Exponentiation	<= Smaller than or equal to	Undo last action
	>= Larger than or equal to	Restore last action

Input via selection

The item selected in the fields **Variables** or **Operators** can be entered in the formula with a double-click or Insert .

2.4.3 Arithmetic algorithms

Number format

The standard IEEE 754 (1985) for binary floating-point arithmetic has been implemented in the software as "double precision" (64Bit).

Rounding method

Measured values and results are displayed rounded, depending on user settings. For that purpose, arithmetic rounding is carried out according to a method known as "Banker's rounding" (rounding towrds the nearest evan number). With this method, **1, 2, 3, 4** are always rounded down and **6, 7, 8, 9** always rounded up. **5** is always rounded towards the even neighbor, so it is rounded down if the neigbor is even (incl. 0) and rounded up if it is odd.

Examples

2.33 gets **2.3**

2.35 gets **2.4**

2.45 gets **2.4**

2.47 gets **2.5**

2.53 gets **2.5**

2.55 gets **2.6**

-2.35 gets **-2.4**

-2.45 gets **-2.4**

Statistics

The following formulae are used for calculation of the arithmetic mean value as well as the absolute and relative standard deviation for results R:

Mean value

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

Absolute standard addition

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

Relative standard addition (in %)

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

The statistical calculations in the software have been implemented in such a way that they are as revisable as possible for the user. This is why the individual values used in the statistics are in full precision form.

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

You can influence the number of significant digits by selecting the unit and the number of decimal places. As the results unit to be set sometimes contains both the prefix "milli" and the physical unit itself, the number of significant digits is altered accordingly in such a case by three digits.

Examples

The displayed result **1234.56789158763 mg/L** has 15 reliable digits. It is to be rounded to three decimal places according to the rounding method given above:

1234.568 mg/L (7 significant digits, 3 of which are decimal places)

With the unit "**g/L**" the same result **1.23456789158763 g/L** is also rounded to three decimal places:

1.235 g/L (4 significant digits, 3 of which are decimal places)

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

> ***Note***
> *The losses of accuracy by rounding described above in the range of the maximum reliable digits are only of theoretical relevance. Most of the time they are lower by several orders of magnitude than – as an example – the uncertainties resulting from weighing out the sample.*

2.4.4 Variables

Overview

Variable types

The following types of variable are differentiated:

Name/Syntax	Description
Method variables **'MV.Variable name.Variable identifier'**	Method variables are variables that are defined in the **START** command.
Command variables **'Command name.Variable identifier'**	Command variables are variables that are generated by the individual commands in the method sequence. The command variables are shown in the order in which the commands are carried out in the method sequence.
Result variables **'RS.Result name.Variable identifier'**	Result variables are special command variables that are generated by **CALC** commands and are available under their own name.
Determination variables **'DV.Variable identifier'**	Determination variables are general variables and cannot be assigned to individual commands.
System variables **'SV.Variable identifier'**	System variables are general variables and cannot be assigned to individual commands or determinations.
Common variables **'CV.Variable name.Variable identifiere'**	Common variables are method-independent variables that are accepted from the table in the configuration at the start of the determination (see Configuration - common variables).

Entering variables

Variables must always be entered enclosed by inverted commas **'** (e.g. **'MV.MyVariable'**).

> ***Note***
> *When using variables it is essential that their data type (**Number**, **Text** or **Date/Time**) is taken into account.*

Method variables

Method variables are variables that are defined in the **START** command of methods. The data type (**Text**, **Number**, **Date/Time**) of the variables can also be adapted there. These variables can be either sample data variables (**Sample size**, **Sample size unit**, **Sample position**, **ID1...ID8**, appear in the Run window of the Workplace) or are assigned values. In the **Variables** field of the Formula editor all the **Method variables** available for the current method are listed according to their sorted command name.

Syntax

'MV.Variable name.Variable identifier'

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

In order to avoid syntax errors the method variables can be selected directly in the Formula editor under **Variables/Method variables**.

Method variables

Identifier	Description	Commands
.VAL	Result value (facultative, i.e. **'RS.RS01'** = **'RS.RS01.VAL'**) (**Text**, **Number** or **Date/Time**)	START
.OVF	Limit infringement for method variable (**Number**: **1 = limit infringed**, **0 = limit not infringed**)	START
In the following lines you will find the method variables (sample data) that are available as standard, appear in the Sequence window and which can be edited and deleted in the START command of the corresponding method.		
Sample size.VAL	Value of 'Sample size' (**Number**)	START
Sample size.OVF	Limit infringement for 'Sample size' (**Number**)	START
Sample size unit.VAL	Value of 'Sample size unit' (**Text**)	START
Sample size unit.OVF	Limit infringement for 'Sample size unit' (**Number**)	START
Sample position.VAL	Value of 'Sample position' (**Number**)	START
Sample position.OVF	Limit infringement for 'Sample position' (**Number**)	START
ID1 (...3).VAL	Value of 'ID1...3' (**Text**)	START
ID1 (...3).OVF	Limit infringement for 'ID...3' (**Number**)	START

Command variables

The availability of the command variables depends on the commands used in the methods. Command variables also include solution and sensor variables, which at the start of the determination are automatically adopted for the device-dependent commands from the corresponding tables in the Configuration and assigned to the individual commands. In the **Variables** field of the Formula editor all the **Command variables** that are available for the current method are listed according to their sorted command name.

Syntax

'Command name.Variable identifier'

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

In order to avoid syntax errors the command variables can be selected directly in the Formula editor under **Variables/Command variables**.

Command variables

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

Note
*For variables with index **{x}** the desired number **1...9** must be entered for **x** (e.g. **.EP{3}.ERC** for the third end point).*
*Without index specification, the last index is used automatically (e.g. **.EP.ERC** for the last end point).*

Identifier	Description	Commands
.BLV	Blank value of the sensor used for the command (for ISE sensors only) or the blank value calculated during calibration (for CAL LOOP Conc)	DET U, MET U, SET U, STAT U, MEAS U, MEAS Conc, CAL LOOP Conc, DOS U
.BP{#}.DME	Difference in measured values for break point # (1...9)	MET
.BP{#}.ERC	ERC or 1st derivative for break point # (1...9)	DET
.BP{#}.MEA	Measured value for break point # (1...9) in the units of the measured value	DET, MET, MEAS (without T/Flow)
.BP{#}.TEM	Temperature for break point # (1...9) in °C	DET, MET, MEAS (without T/Flow)
.BP{#}.TIM	Time for break point # (1...9) in s	DET, MET, MEAS (without T/Flow)
.BP{#}.VOL	Volume at break point # (1...9) in mL	DET, MET
.BSY	Command status; **1 = BUSY**, **HOLD** or **ERROR**; **0 = READY**; **invalid** (variable not present) = Command has never been started	All except START and END
.CBY	Command status; **1 = conditioning active**, **0 = conditioning not active**	SET, KFT, KFC
.COK	Command status; **1 = conditioning criterion fulfilled**, **0** = **conditioning criterion not fulfilled**	SET, KFT, KFC
.CONC	Concentration of the solution used for the command	DET, MET, SET, KFT, STAT, ADD, DOS, LQH, STDADD
.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 processing the command in s	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, STDADD, DOS
.DRI	Current or last drift for drift correction in µL/min	SET, KFT, KFC
.DSC	Duration for processing all start conditions in s	DET, MET, SET, KFT, STAT
.DTI	Time for the drift correction (time from start of titration until end of command) in s	SET, KFT, KFC
.EGF	Last measured gas flow (measured value after processing the command) in mL/min	MEAS T/FLow
.EME	Final measured value (measured value after processing the command) in the units of the measured value	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, STDADD, DOS
.ENP	Electrode zero point of the sensor used for the command (dimensionless for pH sensor or in mV for ISE sensor) or the electrode zero point calculated from the calibration (for 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{#}.DME	Difference in measured values for end point # (1...9)	MET

Identifier	Description	Commands
.EP.DVT	Drift for the end point in µg/min	KFC
.EP{#}.ERC	ERC for the end point # (1...9)	DET
.EP.MEA	Measured value for the end point in mV	KFC
.EP{#}.MEA	Measured value for the end point # (1...9) in the units of the measured value	DET, MET, SET, KFT
.EP{#}.MEP	Number of end points in the window # (1...9); **1 = 1 end point**, **2 = 2 or more end points, 3 = EP corrected with auto drift, 4 = EP corrected with manual drift**	DET, MET, SET, KFT
.EP.QTY	Measured value (water) for the end point in µg	KFC
.EP{#}.TEM	Temperature for end point # (1...9) in °C	DET, MET. SET, KFT
.EP{#}.TIM	Time for reaching end point # (1...9) in s	DET, MET, SET, KFT, KFC
.EP{#}.VOL	Volume for end point # (1...9) in mL	DET, MET, SET, KFT
.ETE	Final temperature (temperature after processing the command) in °C	DET, MET, SET, KFT, KFC, STAT, MEAS (without T/Flow), CAL MEAS, STDADD, DOS
.EVT	Final volume (total volume added at the end of the command) in mL	DET, MET, SET, KFT, STAT, DOS
.FIN	Command status; **1 = command has been finished at least once**, **0**, **invalid** (variable not present) **= command has never been finished**	All except START and END
.FP{#}.DME	Difference in measured values for fixed end point # (1...9)	MET
.FP{#}.DVT	Drift for fixed end point # (1...9) in µg/min	KFC
.FP{#}.ERC	ERC for fixed end point # (1...9)	DET
.FP{#}.MEA	Measured value for fixed end point # (1...9) in mV	DET, MET, SET, KFT, STAT
.FP{#}.MEA	Measured value for fixed end point # (1...9) in the units of the measured value	KFC, MEAS (without T/Flow)
.FP{#}.QTY	Measured value (water) for fixed end point # (1...9) in µg	KFC
.FP{#}.TEM	Temperature for fixed end point # (1...9) in °C	DET, MET, SET, KFT, STAT, MEAS (without T/Flow)
.FP{#}.TIM	Time for reaching fixed end point # (1...9) in s	DET, MET, SET, KFT, KFC, STAT, MEAS (without T/Flow)
.FP{#}.VOL	Volume for fixed end point # (1...9) in mL	DET, MET, SET, KFT, STAT
.HP{#}.MEA	Measured value for HNP # (1...9) in mV (HNP = half-neutralization potential)	DET, MET
.HP{#}.TEM	Temperature for HNP # (1...9) in °C	DET, MET
.HP{#}.TIM	Time for reaching HNP # (1...9) in s	DET, MET
.HP{#}.VOL	Volume for HNP # (1...9) in mL	DET, MET

Identifier	Description	Commands
.IGF	Initial gas flow (measured value at start of command) in mL/min	MEAS T/Flow
.IME	Initial measured value (measured value before processing the start condition) in the units of the measured value	DET, MET, SET, KFT, STAT, MEAS, CAL MEAS, STDADD, DOS
.ITE	Initial temperature (temperature before processing the start conditions) in °C	DET, MET, SET, KFT, STAT, MEAS (without T/Flow), CAL MEAS, STDADD, DOS
.LCO	Loop counter = current number of completed loops both for Repeat and While loops	LOOP, CAL LOOP
.LP.CAx	Calculated value x (1...3) for the last measuring point	DET, MET, SET, KFT, KFC, STAT, MEAS, DOS
.LP.CHA	Charge for last measuring point in mA·s	KFC
.LP.DME	Difference in measured values for last measuring point	MET
.LP.DVT	dV/dt for the last measuring point (SET, KFT, STAT, DOS) or drift for last measuring point in µg/min (KFC)	SET, KFT, KFC, STAT, DOS
.LP.ERC	ERC for last measuring point	DET
.LP.EXx	External value x (1...3) for last measuring point	DET, MET, SET, KFT, KFC, STAT, MEAS, DOS
.LP.GFL	Gas flow value for last measuring point in mL/min	MEAS T/Flow
.LP.IGE	Current pulse current for last measuring point in mA	KFC
.LP.MEA	Measured value for last measuring point in the units of the measured value	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, DOS
.LP.QTY	Measured value (water) for last measuring point in µg	KFC
.LP.TEM	Temperature for last measuring point in °C	DET, MET, SET, KFT, STAT, MEAS, CAL MEAS, DOS
.LP.TIM	Time for reaching last measuring point in s	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, DOS
.LP.UGE	Potential at generator electrode for last measuring point; **0 = not defined**, **1 = <14 V**, **2 = 14...28 V**, **3 = >28 V**	KFC
.LP.VOL	Volume for last measuring point in mL	DET, MET, SET, KFT, STAT, DOS
.LPO	Current absolute lift position in mm (entry at end of command)	LIFT
.LST	Start time of loop command (**Date/Time**)	LOOP, CAL LOOP
.MA.GFL	Maximum gas flow in mL/min	MEAS T/Flow
.MA.MEA	Maximum measured value in the units of the measured value	DET, MET, SET, KFT, STAT, MEAS
.MA.TEM	Temperature for maximum measured value in °C	DET, MET, SET, KFT, STAT, MEAS
.MA.TIM	Time for reaching the maximum measured value in s	DET, MET, SET, KFT, STAT, MEAS

Identifier	Description	Commands
.MA.VOL	Volume for maximum measured value in mL	DET, MET, SET, KFT, STAT
.MI.GFL	Minimum gas flow in mL/min	MEAS T/Flow
.MI.MEA	Minimum measured value in the units of the measured value	DET, MET, SET, KFT, STAT, MEAS
.MI.TEM	Temperature for minimum measured value in °C	DET, MET, SET, KFT, STAT, MEAS
.MI.TIM	Time for minimum measured value in s	DET, MET, SET, KFT, STAT, MEAS
.MI.VOL	Volume for minimum measured value in mL	DET, MET, SET, KFT, STAT
.MR.MRC	Correlation coefficient for mean dosing rate for whole range	STAT, DOS
.MR.MRS	Standard deviation für mean dosing rate for whole range in mL/min	STAT, DOS
.MR.MRT	Mean dosing rate for whole range in mL/min	STAT, DOS
.MTE	Temperature measurement with sensor; **1 = on**, **0 = off**)	DET, MET, SET, KFT, STAT, MEAS (without T/Flow), CAL MEAS, STDADD, DOS
.NMP	Number of measuring points in list of measuring points	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, DOS
.RAN	Current absolute shift angle of the rack in ° referred to the axis of the selected tower (entry at end of 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 evaluation window x (1...9) in s	STAT
.RE{x}.RWH	Upper limit of evaluation window x (1...9) in s	STAT
.RES	Calculated result for standard addition in selected unit	STDADD
.RPO	Current rack position (entry at end of command); **0** means **'not defined'**	MOVE
.SAN	Current absolute swing angle of the swing head in ° (entry at end of command)	MOVE, SWING
.SLO	Electrode slope of the sensor used for the command (in % for pH sensor or mV for ISE sensor) or the 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	Starting measured value (measured value after processing the start conditions) in the units of the measured value	DET, MET, SET, KFT, KFC, STAT

Identifier	Description	Commands
.SPO	Current external position (entry at end of command); **0** means **invalid position**	SWING
.STE	Start temperature (temperature after processing the start conditions) in °C	DET, MET, SET, KFT, KFC, STAT
.STY	Stop type with which the command has been stopped: **1 = normal**;**0 = manual** or **after error**	DET, MET, SET, KFT, STAT, MEAS, CAL MEAS, STDADD, DOS
.SVA	Start volume absolute (volume added in accordance with the start condition "Start volume") in mL	DET, MET, SET, KFT, STAT
.SVM	Start volume measured value (volume added in accordance with the start condition "Start measured value") in mL	DET, MET
.SVS	Start volume measured value (volume added in accordance with the start condition "Start slope") in mL	DET, MET
.SVT	Start volume total (volume added in accordance with all three start conditions) in mL	DET, MET, SET, KFT, STAT
.TITER	Titer value for the solution used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH
.TOU	Timeout status: **1 = max. delay period elapsed**; **0 = max. delay period not elapsed**	RECEIVE, TRANSFER; SCAN
.VAR	Variance of the calculated standard addition result in selected unit	STDADD
.VOL	Added volume	STDADD, ADD, DOS, LQH

Result variables

Result variables are special command variables that are generated by **CALC commands**. In the **Variables** field of the Formula editor all the **Results** that are available for the current method are listed according to their result name.

Syntax

'RS.Result name.Variable identifier'

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

In order to avoid syntax errors the result variables can be selected directly in the Formula editor under **Variables/Results**.

Result variables

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

Identifier	Description	Command
.VAL	Result value, facultative, i.e. **'RS.RS01'** = **'RS.RS01.VAL'**	CALC
.ASD	Absolute standard deviation for the result	CALC
.MNV	Mean value of the result	CALC
.NSR	Statistics current counter for the result	CALC
.NST	Statistics set counter for the result	CALC
.OVF	Limit infringement for result; **1 = limit infringed**, **0 = limit not infringed**	CALC
.RSD	Relative standard deviation for result	CALC
.STS	Statistics status for result; **1 = statistics on**, **0 = statistics off**	CALC
.UNI	Result unit (**Text**)	CALC

Determination variables

Determination variables are variables which are assigned generally and not to individual commands that are generated in the method sequence. In the **Variables** field of the Formula editor all the **Determination variables** available for the current method are listed according to their sorted name.

Syntax

'DV.Variable identifier'

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

In order to avoid syntax errors the determination variables can be selected directly in the Formula editor under **Variables/Determination variables**.

Determination variables

Identifier	Description
.DUR	Duration of the determination in s (**Number**)
.STT	Time at which the determination was started (**Time/Date**)

System variables

System variables are general variables that are not assigned to individual commands or determinations that are accepted for the determination at the start of the determination. In the **Variables** field of the Formula editor all the **System variables** that are available for the current method are listed.

Syntax

'SV.Variable identifier'

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

In order to avoid syntax errors the system variables can be selected directly in the Formula editor under **Variables/System variables**.

System variables

Identifier	Description
.ACC	Autostart current counter (**Number**)
.ACE	Autostart set counter (**Number**)
.FUN	Full name of logged-in user (**Text**)
.REM	Remarks (**Text**)
.RUN	Sample number (**Number**)
.SEN	Indicates whether the end of the sample table has been reached; **1 = yes**, **0 = no** (**Number**)
.SIN	Indicates whether the determination was started as a single determination or within a series; **1 = single determination**, **0 = series determination** (**Number**)
.SLI	Sample table current line (**Number**)
.STA	Indicates whether statistics are switched on; **1 = yes**, **0 = no** (**Number**)
.STC	Start counter (**Number**)
.USN	Short name of logged-in user (**Text**)
.ORG	Method sequence: **1 = original determination**, **0 = reprocessed** (**Number**)
.STO	Indicates whether the determination was stopped (manual stop, stop via a SEND command, emergency stop); **1 = stopped**, **0 = terminated normally** (**Number**)

Common variables

Common variables are global variables that are loaded from the corresponding Table in the configuration at the start of the determination. In this table the common variables can be defined. In the **Variables** field of the Formula editor all the **Common variables** that are available are listed according to their sorted variable name.

Syntax

'CV.Variable name.Variable identifier'

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

In order to avoid syntax errors the common variables can be selected directly in the Formula editor under **Variables/Common Variables**.

Common variables

Identifier	Description
.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**)

2.4.5 Operators/Functions

Overview of operators and functions

Operators	Functions	Miscellaneous
Arithmetic: Addition (+) Subtraction (-) Multiplication (*) Division (/) Potentiation (^)	**Arithmetic:** Exponential function (Exp) Natural logarithm (Ln) Common logarithm (Log) Square root (Sqrt) Absolute value (Abs) Fraction (Frac) Integer (Int) Round integer (Round) Sign (sign)	Error Case
Logic: AND OR	**Date/Time:** Time() Time(Date) Time(Date + Time)	
Compare: Equal (=) Larger than (>) Larger than/equal to (>=) Smaller than (<) Smaller than/equal to (<=) Unequal (<>)	**Type conversion:** Number to text (NumberToText) Number to time (NumberToTime) Text to number (TextToNumber) Text to time (TextToTime) Time to number (TimeToNumber) Time to text (TimeToText)	
	Text: TextPosition SubText Trim	

Rules of priority for operators

The operators are processed in the sequence in which they are listed in the following table. It may be necessary to set operands in brackets to get the desired sequence.

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

Operators - Arithmetic

Addition

Syntax

Operand1 + Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Both operands of the same type:				
Number	Number	Number	**1.2 + 3 = 4.2**	-
Text	Text	Text	**"Metrohm" + "AG" = "Metrohm AG"**	If the maximum permitted length (65'536 characters) of the character string is exceeded by the addition of the operands then the excess characters will be cut off by the 2nd operand.
Time	Time	Time	**Time(1998;04;06) + Time(1964;02;03) = 59300.875** (for UTC+1)	**Time()**: see function Time(Date) Result: number of days calculated since December 1899, dependent on the system time
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Text	**1.2 + "Metrohm" = "1.2Metrohm"**	-
Text	Number	Text	**"Metrohm" + 1.2 = "Metrohm1.2"**	-

Operand1	Operand2	Result	Example	Remarks
Number	Time	Number	**2.0 + Time(1999;11;7) = 36472.96** (for UTC+1)	Result: number of days calculated since 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 since 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 an operand of type **Date/Time** is converted to **Text**.
Time	Text	Text	**Time(1999;01;7) + "Metrohm" = "1999-01-07 00:00:00 UTC+1Metrohm"**	In this case the same rules apply as for the previous operation.

Subtraction

Syntax

Operand1 - Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Both operands of the same type:				
Number	Number	Number	**1.2 - 3 = -1.8**	-
Text	Text	Text	**"Metrohm" - "AG" = invalid**	This operation is not permitted.
Time	Time	Number	**Time(1998;01;06) - Time(1964;12;03) = 12'087.00** (for UTC+1)	**Time()**: see function Time(Date) Result: number of days calculated since December 1899, dependent on the system time
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Text	**1.2 - "Metrohm" = invalid**	This operation is not permitted.
Text	Number	Text	**"Metrohm" - 1.2 = invalid**	This operation is not permitted.
Number	Time	Number	**2.0 - Time(1999;10;7) = -36'437.917** (for UTC+2)	Result: number of days calculated since 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 since December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" - Time(1999;10;7) = invalid**	This operation is not permitted.
Time	Text	Text	**Time(1999;10;7) - "Metrohm" = invalid**	This operation is not permitted.

Multiplication

Syntax

Operand1 * Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**1.2 * 3 = 3.6**	-
Text	Text	Text	**"Metrohm" * "AG" = invalid**	This operation is not permitted.
Time	Time	Number	**Time(1998;05;06) * Time(1902;02;03) = 27'478'004.545** (for UTC+1 or +2 for Summer time)	**Time()**: see function Time(Date) Result: number of days calculated since December 1899, dependent on the system time
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Text	**2 * "Metrohm" = "Metrohm-Metrohm"**	-
Text	Number	Text	**"Metrohm" * 2 = "Metrohm-Metrohm"**	-
Number	Time	Number	**2.0 * Time(1999;10;7) = 72'879.833** (for UTC+2)	Result: number of days calculated since 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 since December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" * Time(1999;10;7) = invalid**	This operation is not permitted.
Time	Text	Text	**Time(1999;10;7) * "Metrohm" = invalid**	This operation is not permitted.

Division

Syntax

Operand1 / Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
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 permitted.
Time	Time	Time	**Time(1998;04;06) / Time(1964;02;03) = 1.533** (for UTC+1 or +2 for Summer time)	**Time()**: see function Time(Date) Result: number of days calculated since December 1899, dependent on the system time
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Text	**1.2 / "Metrohm" = invalid**	This operation is not permitted.
Text	Number	Text	**"Metrohm" / 1.2 = ungültig**	This operation is not permitted.
Number	Time	Number	**10'000 / Time(1999;10;7) = 0.274** (for UTC+2)	Result: number of days calculated since 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 since December 1899, dependent on the system time
Text	Time	Text	**"Metrohm" / Time(1999;10;7) = invalid**	This operation is not permitted.
Time	Text	Text	**Time(1999;10;7) / "Metrohm" = invalid**	This operation is not permitted.

Potentiation

Syntax

Operand1 ^ Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**1.2 ^ 3 = 1.728**	Complex results (of the type: a+b*i*, i.e. made up from a real and an imaginary component) are shown as an error.
Text	Text	Text	**"Metrohm" ^ "AG" = invalid**	This operation is not permitted.
Time	Time	Time	**Time(1900;01;05) ^ Time(1900;01;02) = 196.371** (for UTC+1)	**Time()**: see function Time(Date) Result: number of days calculated since December 1899, dependent on the system time
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Text	**1.2 ^ "Metrohm" = invalid**	This operation is not permitted.
Text	Number	Text	**"Metrohm" ^ 1.2 = invalid**	This operation is not permitted.
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 permitted.
Time	Text	Text	**Time(1999;10;7) ^ "Metrohm" = invalid**	This operation is not permitted.

Operators - Logic

AND

Syntax

Operand1 AND Operand2

The operands can either be entered **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

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 AND 4 --> 1** **4 AND 0 --> 0**	Numbers larger than 0 are interpreted as **1** (true).
Text	Text	Number	**"Metrohm" AND "AG" --> 1** **"" AND "AG" --> 0**	An empty character string (**""**) is interpreted as **0** (false), everything else as **1** (true). This means that the first operation corresponds to **1 AND 1 --> 1.**
Time	Time	Number	**Time(1999;10;07) AND Time(1999;10;07) --> 1**	**Time()**: see function Time(Date)
Operands of different types:				
Number	Text	Number	**1.2 AND "1.2" --> 1** **0 AND "1" --> 1** **0 AND "0" --> 1** **0 AND "" --> 0**	Before the operation an operand of the type **Number** is converted to the type **Text**, as the conversion from **Text** to **Number** makes no sense. This means that in the 2nd operation the 0 is converted to **"0"**, which corresponds to the logical value **1** (true) as every non-empty character string 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** **0 AND Time(1999;10;07) --> 0**	Before the operation an operand of the type **Date/Time** is converted to the type **Number**; all dates from 30 December 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.

Operand1	Operand2	Result	Example	Remarks
Text	Time	Number	**"Metrohm" AND Time(1999;10;7) --> 1** **"" AND Time(1999;10;07) --> 0**	Before the operation is carried out an operand of the type **Date/Time** is converted to the type **Text** and each non-empty character string 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.

OR

Syntax

Operand1 OR Operand2

The operands can either be entered **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	Remarks
Operands of the same type:				
Number	Number	Number	**5 OR 4 --> 1** **4 OR 0 --> 0**	Numbers larger than 1 are automatically interpreted as 1 (true).
Text	Text	Number	**"Metrohm" OR "AG" --> 1** **"" OR "Metrohm" --> 1** **"" OR "" --> 0**	An empty character string (**""**) is interpreted as **0** (false), everything else as **1** (true). This means that the first operation corresponds to 1 OR 1 --> 1
Time	Time	Number	**Time(1999;10;07) OR Time(1964;02;03) --> 1**	**Time()**: see function Time(Date)
Operands of different types: the operand that does not correspond to the type of result is converted to the particular result type before the operation.				
Number	Text	Number	**1.2 OR "1.2" --> 1** **0 OR "" --> 1**	Before the operation an operand of the type **Number** is converted to the type **Text**, as the conversion from **Text** to **Number** makes no sense. This means that in the 2nd operation the 0 is converted to **"0"**, which corresponds to the logical value **1** (true) as every non-empty character string is interpreted as 1.

Operand1	Operand2	Result	Example	Remarks
Text	Number	Number	**"Metrohm" OR 1.2 --> 1**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 OR Time(1999;10;7) --> 1** **0 OR Time(1964;02;03) --> 1**	Before the operation an operand of the type **Date/Time** is converted to the type **Number**; all dates from 30 December 1899 are interpreted as **1** (true).
Time	Number	Number	**Time(1999;10;7) OR 2.5 --> 1**	The same rules apply here as for the previous operation.
Text	Time	Number	**"Metrohm" OR Time(1999;10;7) --> 1**	Before the operation an operand of the type **Date/Time** is converted to the type **Text** and each non-empty character string 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.

Operators - Compare

Equal

Syntax

Operand1 = Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 = 5 --> 1** **4 = 5 --> 0**	-
Text	Text	Number	**"Metrohm" = "AG" --> 0** **"aG" = "AG" --> 0**	In a comparison between two text the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Time	Time	Number	**Time(1998;04;06) = Time(1964;02;03) --> 0**	**Time()**: see function Time(Date)
Operands of different types:				
Number	Text	Number	**1.2 = "1.2" --> 1** **1.2 = "Metrohm" --> 0**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the ASCII table.

Operand1	Operand2	Result	Example	Remarks
Text	Number	Number	**"Metrohm" = 1.2 --> 0**	The same rules apply here as for the previous operation.
Number	Time	Number	**2.0 = Time(1999;10;07) --> 0**	Before the comparative operation the **Date/Time** is converted to **Number**. When the operation is carried out the exact value obtained after this conversion is always used, even when only a maximum of 5 decimal places can be shown (for details please refer to Type conversion "TimeToNumber", Note).
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 an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**), then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;07) = "Metrohm" --> 0**	The same rules apply here as for the previous operation.

Larger than

Syntax

Operand1 > Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 > 4 --> 1** **4 > 5 --> 0**	-
Text	Text	Number	**"Metrohm" > "AG" --> 1** **"Aarau" > "Zug" --> 0**	In a comparison between two texts the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Time	Time	Number	**Time(1998;04;06) > Time(1964;02;03) --> 1**	**Time()**: see function Time(Date)

Operand1	Operand2	Result	Example	Remarks
Operands of different types:				
Number	Text	Number	**1.2 > "Metrohm" --> 0** **1.23 > "1.2" --> 1**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the ASCII table.
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 **Date/Time** is converted to a **Number** (see Type conversion "TimeToNumber").
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 an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**) and then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;7) > "Metrohm" --> 0**	The same rules apply here as for the previous operation.

Larger than or equal to

Syntax

Operand1 >= Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 >= 4 --> 1** **4 >= 5 --> 0**	-
Text	Text	Number	**"Metrohm" >= "AG" --> 1**	In a comparison between two texts the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Time	Time	Number	**Time(1998;04;06) >= Time(1964;02;03) --> 1**	**Time()**: see function Time(Date)

Operand1	Operand2	Result	Example	Remarks
Operands of different types:				
Number	Text	Number	**1.2 >= "1.2" --> 1** **1.2 >= "Metrohm" --> 0**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the ASCII table.
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 **Date/Time** is converted to a **Number** (see Type conversion "TimeToNumber").
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 an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**) and then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;7) >= "Metrohm" --> 0**	The same rules apply here as for the previous operation.

Smaller than

Syntax

Operand1 < Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 < 4 --> 0** **4 < 5 --> 1**	-
Text	Text	Number	**"Metrohm" < "AG" --> 0**	In a comparison between two texts the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Time	Time	Number	**Time(1998;04;06) <** **Time(1964;02;03) --> 0**	**Time()**: see function Time(Date)
Operands of different types:				
Number	Text	Number	**1.2 < "Metrohm" --> 1** **1.2 < "1" --> 0**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the

Operand1	Operand2	Result	Example	Remarks
				ASCII table.
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 **Date/Time** is converted to a **Number** (see Type conversion "TimeToNumber").
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 an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**) and then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;7) < "Metrohm" --> 1**	The same rules apply here as for the previous operation.

Smaller than or equal to

Syntax

Operand1 <= Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 <= 4 --> 0** **4 <= 5 --> 1**	-
Text	Text	Number	**"Metrohm" <= "AG" --> 0**	In a comparison between two texts the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Time	Time	Number	**Time(1998;04;06) <= Time(1964;02;03) --> 0**	**Time()**: see function Time(Date)
Operands of different types:				
Number	Text	Number	**2 <= "1.2" --> 0** **1.2 <= "Metrohm" --> 1**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the ASCII table.
Text	Number	Number	**"Metrohm" <= 1.2 --> 0**	The same rules apply here as for the previous operation.

Operand1	Operand2	Result	Example	Remarks
Number	Time	Number	**2.0 <= Time(1999;10;07) --> 1**	Before the comparison the **Date/Time** is converted to a **Number** (see Type conversion "TimeToNumber").
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 an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**) and then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;7) <= "Metrohm" --> 1**	The same rules apply here as for the previous operation.

Unequal

Syntax

Operand1 <> Operand2

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

Examples

Operand1	Operand2	Result	Example	Remarks
Operands of the same type:				
Number	Number	Number	**5 <> 4 --> 1** **5 <> 5 --> 0**	In a comparison between two texts the ASCII values (see ASCII table) of the character strings are compared. **Note:** upper and lower case letters have different values!
Text	Text	Number	**"Metrohm" <> "AG" --> 1**	dfg
Time	Time	Number	**Time(1998;04;06) <> Time(1964;02;03) --> 1**	**Time()**: see function Time(Date)
Operands of different types:				
Number	Text	Number	**1.2 <> "1.2" --> 0** **1.2 <> "Metrohm" --> 1**	Before the comparative operation the **Number** is converted to **Text** and then the texts are compared according to the ASCII table.
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 **Date/Time** is converted to a **Number** (see Type conversion "TimeToNumber").
Time	Number	Number	**Time(1999;10;07) <> 2.5 --> 1**	The same rules apply here as for

Operand1	Operand2	Result	Example	Remarks
				the previous operation.
Text	Time	Number	**"Metrohm" <> Time(1999;10;07) --> 1**	Before the operation an operand of type **Date/Time** is converted to **Text** (i.e.: **"1999-10-07 00:00:00 UTC+2"**) and then the texts are compared according to the ASCII table.
Time	Text	Number	**Time(1999;10;7) <> "Metrohm" --> 1**	The same rules apply here as for the previous operation.

Functions - Arithmetic

Exponential function

Syntax

y = exp(number)

Calculates e ^ **Number**. Another way of writing $y = e^{(number)}$, where e is the exponential (e = 2.71828...).

Parameter

Number Exponent

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Exp(1.5) = 4.48169

Exp('CV.MeanTemp') = potential of the exponent (Common variable) based on e

Natural logarithm

Syntax

y = ln(number)

Returns the logarithm of the entered number based on e. Another way of writing $y = \log_e(\text{Number})$, where e is the exponential (e = 2.71828...).

Parameter

Number >0

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Ln(3) = 1.09861

Ln('CV.MeanTemp') = natural logarithm of the value of the Common variable based on e

Common logarithm

Syntax

y = log(number)

Gives the logarithm of the entered number to the base 10. Another way of writing y = $\log_{10}$(number).

Parameter

Number > 0

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Log(10) = 1

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

Square root

Syntax

y = sqrt(Number)

Returns the square root of the entered number. Another way of writing y = $\sqrt{}$**Number** or y = $\sqrt[2]{}$**Number**.

Parameter

Number >=0

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Sqrt(33) = 5.745

Sqrt('CV.MeanTemp') = square root of the value of the Common variable

Absolute value

Syntax

y = Abs(number)

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

Parameter

Number

The parameter can either be entered directly as a number or as a Variable of type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextTo-Number"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Abs(-55.3) = 55.3

Abs('CV.MeanTemp') = value of the Common variable without sign

Fraction

Syntax

y = Frac(number)

Returns the fractional part of the entered number.

> ***Note***
> *In the Result properties under Definition it is essential that the number of* ***Decimal places*** *of the result is entered, as otherwise the decimal fraction cannot be shown.*

Parameter

Number

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Frac(-55.325) =0.325

Frac('CV.MeanTemp') = value of the Common variable without sign

Integer

Syntax

y = Int(Number)

Returns the integer of the entered number.

Parameter

Number

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Int(-55.325) = -55

Int('CV.MeanTemp') = integer part of the value of the Common variable

Round integer

Syntax

y = Round(Number)

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

> ***Note***
> *If the value to be rounded lies exactly between two whole numbers then it will be rounded to the next whole even number: 1.5 -> 2, 4.5 -> 4, 0.5 -> 0*

Parameter

Number

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Round(-55.5259) = -56

Round('CV.MeanTemp') = rounded value of the Common variable

Sign

Syntax

y = Sign(Number)

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

Parameter

Number

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

Examples

Sign(-55.3) = -1

Sign(26.115) = 1

Sign('CV.MeanTemp') = sign of the value of the Common variable

Functions - Date/Time

Time()

Syntax

y = Time()

Returns the current date and current time.

Parameter

none

Return value

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

> ***Note***
> *UTC = Universal Time Coordinated: reference time for the different time zones on the earth. MET (Mean European Time) equals UTC plus 1 hour, in the summer time UTC plus 2 hours.*

Time(Date)

Syntax

y = Time(year; month; day)

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

Parameter

year	00...99 or 1000...9999
month	1...12
day	1...31

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

> ***Note***
> *Only the whole number part will be used for all parameters.*
>
> *A variable of the type **Date/Time** cannot be transferred as a parameter here.*
>
> *In both the automatic and the explicit conversion of a **Time** into the type **Number** the number of days since **30 December 1899** at **01 a.m.** will be counted.*
> ***Note:** 30 December 1899 01 a.m. = 0.00000 days, this number is **rounded** to 5 decimal places; however, e.g. a comparative operation will be 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 Coordinated: reference time for the different time zones on the earth. MET (Mean European Time) equals 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 (depends on the system time)

Time('CV.Testyear';'CV.Testmonth';'CV.Testday') = date complied from the Common variables

Time(Date + Time)

Syntax

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

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

Parameter

year	00...99 or 1000...9999
month	1...12
day	1...31
hour	0...23
minute	0...59
second	0...59

The parameter can either be entered directly as a number or as a Variable of the type **Number**. If the parameter does not correspond to the selected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If this is not possible then "**invalid**" will be returned as the result of this operation.

> ***Note***
> *Only the whole number part will be used for all parameters.*
>
> *A variable of the type **Date/Time** cannot be transferred as a parameter here.*
>
> *In both the automatic and the explicit conversion of a **Time** into the type **Number** the number of days since **30 December 1899** at **01 a.m.** will be counted.* ***Note:*** *30 December 1899 01 a.m. = 0.00000 days, this number is **rounded** to 5 decimal places; however, in e.g. a comparative operation it will be 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 Coordinated: reference time for the different time zones on the earth. MET (Mean European Time) equals 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 (depends on the system time)

Time('CV.Testyear';'CV.Testmonth';'CV.Testday';'CV.TestHour';'CV.TestMin';'CV.TestSec') = date complied from the Common variables

Functions - Type conversion

NumberToText

Syntax

y = NumberToText(Number)

Returns the entered number as **Text**.

Parameter

Number

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

Examples

NumberToText(-55.3) = -55.3

NumberToText('CV.MeanTemp') = value of the Common variable as **Text**

NumberToTime

Syntax

y = NumberToTime(Number)

Returns the entered number as **Date/Time**, with the number being interpreted as the number of days since 30 December 1899 at 01 a.m.

Parameter

Number

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

Examples

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

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

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

TextToNumber

Syntax

y = TextToNumber(Text)

Returns the entered text as **Number**.

Parameter

Text

The parameter must only contain **numerical characters** or Variables of the type **Text** as otherwise type conversion is not possible. The result of this conversion or calculation would be "**invalid**". The text must also be enclosed by **Inverted commas**.

Examples

TextToNumber("-55.3") = -55.3

TextToNumber('CV.MeanTemp') = value of the Common variable as a **Number**

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

TextToTime

Syntax

y = TextToTime(Text;Format)

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

Parameter

Text

The parameter must only contain **numerical characters** or Variables of the type **Text** as otherwise type conversion is not possible (result = "**invalid**"). You can use the following characters as **Separators** between year, month, etc.: slash (**/**), full stop (**.**), minus (-), semicolon (**;**), colon (**:**), empty space and comma. You can determine the **Sequence** of the individual entries yourself, but these must be entered in the parameter **Format**.

Format

Defines in which format or sequence the text must be entered. This parameter must be enclosed with **Inverted commas** and can be composed of the following code characters:

Character	Meaning
y	Year
M	Month
d	Day
H	Hour 0...23
h	Stunde AM/PM
m	Minute
s	Second
a	AM/PM marking

> ***Note***
> *If you enter the time in the format **AM**/**PM** then in addition to the formatting character **h** you must us 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 (depends on the system time)

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

TextToTime('CV.TestDate';'CV.TestFormat') = values of the Common variables in the entered time format

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

TimeToNumber

Syntax

y = TimeToNumber(Time)

Returns the entered time as **Number**.

> ***Note***
> *In both the automatic and the explicit conversion of a **Time** into the type **Number** the number of days since **30 December 1899 at 01 a.m.** will be counted.*
> ***Note:** 30 December 1899 01 a.m. = 0.00000 days, this number is **rounded** to 5 decimal places; however, e.g. a comparative operation will be carried out with the exact value.*

Parameter

Time

This parameter can be entered in either the form of a Time function or as a Variable of the type **Time**.

Examples

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

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

TimeToNumber(Time('TestYear';'TestMonth';'TestDay')) = value of the Common variables as number of days as **Number**

TimeToText

Syntax

y = TimeToText(Time)

Returns the entered time as **Text**.

y = TimeToText(Time;Format)

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

Parameter

Time

This parameter can be entered in either the form of a Time function or as a Variable of the type **Date/Time**.

Format

Defines in which format or sequence the text must be entered. This parameter must be enclosed with **Inverted commas** and can be composed of the following code characters:

Character	Meaning	Example
y	2-place date in years	**03**
yyyy	4-place date in years	**1999**
M	1- or 2-place date in months	**4, 12**
MM	2-place date in months	**04, 12**
MMM	Abbreviated name of month	**Jul, Aug**
MMMM	Month name	**July, August**
d	1- or 2-place date in days	**2, 25**
dd	2-place date in days	**02, 25**
h	1- or 2-place time in hours (1...12 AM/PM)	**5, 11**
hh	2-place time in hours (1...12 AM/PM)	**05, 11**
H	1- or 2-place time in hours (0...23)	**8, 17**
HH	2-place time in hours (0...23)	**08, 17**
m	1- or 2-place time in minutes	**2, 25**
mm	2-place time in minutes	**02, 25**
s	1- or 2-place time in seconds	**3, 55**

Character	Meaning	Example
ss	2-place time in seconds	**03, 55**
E	Abbreviated day of week	**Mo, Tu, We**
EEEE	Day of week	**Monday, Tuesday**
D	1- , 2- or 3-place number of day in year	**2, 35, 142**
DD	2- or 3-place number of day in year	**02, 35, 142**
DDD	3-place number of day in year	**002, 035, 142**
F	1-place number of day in month, e.g. the **2**nd Monday in May	**2**
w	1- or 2-place number of week in year	**5, 25**
ww	2-place number of week in year	**05, 25**
W	1-place number of week in month	**3**
a	Format AM/PM	**AM, PM**
'	Introductory and terminating characters for entering any text	
''	Enters '	**'**

Note
*If you want to return the time in the format **AM**/**PM** then in addition to the formatting character **h** you must use the AM/PM marking **a**.*

Examples

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

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

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

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

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

Functions - Text

TextPosition

Syntax

y = TextPosition(Text ; Sample text)

Returns the **Index** that indicates at which position the **Sample text** first occurs in the **Text**. The numbering of the index starts at **1**!

Parameter

Text

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

Sample text

The parameter can either be entered **directly** or as a **Variable** of the type **Text**, **Number** or **Date/Time**. If the types of the two parameters are not identical then the type **Sample text** will always be converted to **Text** (see Functions - type conversion). If the **Sample text** is not contained in the **Text** then "**invalid**" will be returned.

> ***Note***
> *Entries of the type **Number** are always given with one decimal place.*
> *Example: **TextPosition("12345";3) = invalid**, as before the operation the 3 is converted to 3.0 and this is not contained in the text.*

Examples

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

TextPosition("Citric acid";"Acidic") = invalid, the word "**Acidic**" (with a capital letter) does not occur in the text

TextPosition("Citric 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**" first starts in ID2

SubText

Syntax

y = SubText(Text ; Position ; Length)

Returns that text part from **Text** that starts at the index **Position** and has the length **Length**.

Parameter

Text

The parameter can either be entered **directly as text** or as a **Variable** of the type **Text**. If the parameter does not correspond to the expected type then it will be automatically converted to it (see Type conversion "NumberToText" or "TimeToText"). If this type conversion is not possible then the result of this operation will be returned as "**invalid**".

Position

The numbering of the **Position** starts at **1**. The parameter can either be entered **directly as a number** or as a **Variable** of the type **Number** . If the parameter does not correspond to the expected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If the type conversion is not possible or if the position does not exist then the result of this operation will be returned as "**invalid**".

Length

The parameter can either be entered **directly as number** or as a **Variable** of the type **Number**. If the parameter does not correspond to the expected type then it will be automatically converted to it (see Type conversion "TextToNumber"). If the type conversion is not possible or if the length given here is longer than the length of the subtext then "**invalid**" will be returned

Examples

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

SubText("Citric acid";9;6) = invalid, from the position 9 only five characters are present

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

Trim

Syntax

y = Trim(Text)

Returns the **Text** without any empty spaces in front of it or behind it.

y = Trim(Text ; Sample text)

Returns the **Text** without **Sample text**.

Parameter

Text

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

Sample text

The parameter can either be entered **directly** or as a **Variable** of the type **Text**, **Number** or **Date/Time**. If the types of the two parameters are not identical then the type **Sample text** will always be converted to the type **Text** (see Functions - Type conversion).

> ***Note***
> *Entries of the type **Number** are always given with one decimal place.*
> *Example: **TextPosition("12345";3) = invalid**, as before the operation the 3 is converted to 3.0 and this is not contained in the text.*

Examples

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

Trim("Citric acid";"acid") = lemons

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

Miscellaneous functions

Case

Syntax

y = Case(condition ; Value_true ; Value_false)

y = Case(condition ; Value_true ; Value_false ; Value_error)

Returns **Value_true** if the condition is true. Otherwise **Value_false** will be returned. If an error occurs in the condition (Result "**invalid**") then **Value_error** will be returned.

Parameters

Condition Number

Any Variable (type **numb**er) can be entered here, or a Compare or logic operation can be carried out whose operators are either adopted directly or transferred as a Variable. This could be of the type **Text**, **Number** or **Date/Time** (**Time()**).

Value_true

If the **Condition <> 0** then this parameter will be saved as the result of the function.
This parameter can either be transferred directly or as a Variable and can be of the type **Text**, **Number** or **Date/Time** (**Time()**). Complete Operations can also be transferred here.

Value_false

If the **Condition = 0** then this parameter will be saved as the result of the function.
This parameter can either be transferred directly or as a Variable and can be of the type **Text**, **Number** or **Date/Time** (**Time()**). Complete Operations can also be transferred here.

Value_error

If the **Condition = invalid** then this parameter will be saved as the result of the function.
This parameter can either be transferred directly or as a Variable and can be of the type **Text**, **Number** or **Date/Time** (**Time()**). Complete Operations can also be transferred here.

Examples

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

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

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

Error

Syntax

y = Error(value)

Returns **+1** if **Value invalid** (error) or **0** if **Value valid**. This function can be used, for example, to check whether variables exist or if they are valid.

Parameters

Value

The variable to be tested.

Examples

Error('RS.InterRes') = 0: the intermediate result could be calculated.
Error('RS.InterRes') = 1: the intermediate result is invalid.

Error('DET pH 6.EP{1}.MEA') = 0: the variable for the measured value at Endpoint 1 exists.
Error('DET pH 6.EP{1}.MEA') = 1, no variable exists for the measured value or no EP is present.

ASCII table

Only characters that can be printed out are shown in the following table:

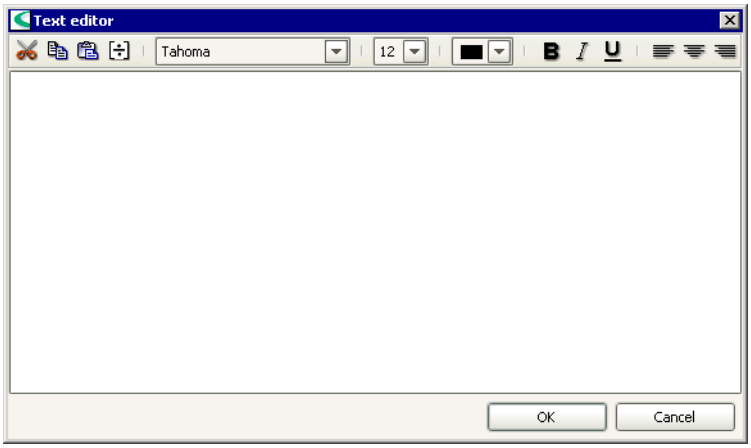
ASCII value (dec)	Character	ASCII value (dec)	Character	ASCII value (dec)	Character
32	Blank character	64	'At' sign (@)	96	Accent grave (`)
33	Exclamation mark (!)	65	A	97	a
34	Inverted commas (")	66	B	98	b
35	Lozenge (#)	67	C	99	c
36	Dollar ($)	68	D	100	d
37	Percent (%)	69	E	101	e
38	Ampersand "and" (&)	70	F	102	f
39	Inverted comma (')	71	G	103	g
40	Open round brackets (()	72	H	104	h
41	Close round brackets ())	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	Full stop (.)	78	N	110	n
47	Slash (/)	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q

ASCII value (dec)	Character	ASCII value (dec)	Character	ASCII value (dec)	Character
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	Colon (:)	90	Z	122	z
59	Semicolon (;)	91	Open square bracket ([)	123	Open curly bracket ({)
60	Smaller than (<)	92	Backslash (\)	124	Vertical line (¦)
61	Equals (=)	93	Close square bracket (])	125	Close curly bracket (})
62	Larger than (>)	94	Circumflex (^)	126	Tilde (~)
63	Question mark (?)	95	Underscore (_)		

2.5 Edit

2.5.1 Text editor

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



The symbol bar of the text editor contains the following functions:

Cuts selected text and copies it to the clipboard.

Copies selected text to the clipboard.

Pastes text from clipboard.

Opens the Formula editor for entering calculation formulas.

> ***Note***
> *In order that the results of formulas of the type **Date** are shown correctly they must be converted to **Text** in the text window with the function TimeToText().*

Font size in pt.

Selects the text color.

B

Bold.

I

Italic.

<u>U</u>

Underlined.

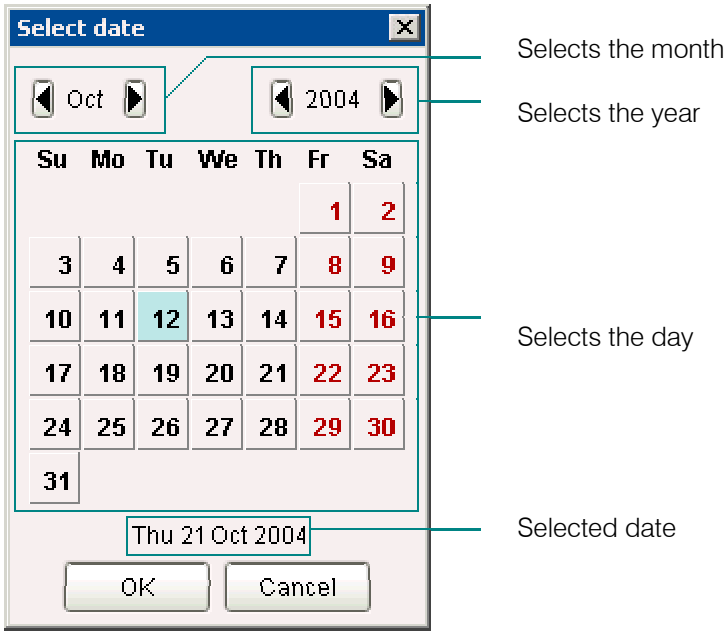
Justified left.

Centered.

Justified right.

2.5.2 Select date

In order to be able to enter a date in a field the dialog window **Select date** must be used; this is opened with the button .



2.6 Manual control

2.6.1 General

Open

Manual control of devices is carried out in the independent dialog window **Manual control** which can be called up from all program parts at any time (even while a determination is running) with **Tools, Manual control** or the symbol . The title line of the window contains the usual Windows buttons for closing, diminishing, maximizing and minimizing.

Close

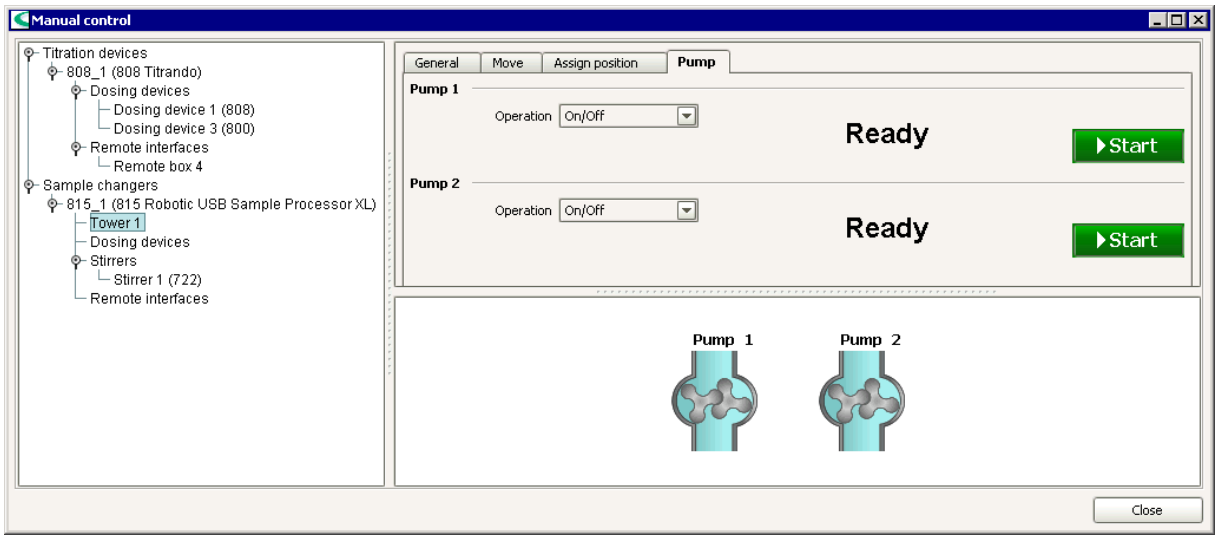
The dialog window **Manual control** can be closed with **[Close]** or the Windows button for closing.

> ***Note***
> *Manual control can only be closed when no manually triggered actions are being carried out (exception: stirrer switched on).*

Subwindows

The dialog window **Manual control** contains the following three subwindows which can be enlarged and diminished by dragging the separating bar between the windows:

- Select device
- Functions/Parameters
- Graphic function display



2.6.2 Select device

In the subwindow for device selection the devices (or functional units of the devices) can be selected whose functions are to be triggered manually. These are shown in a tree structure. All the devices configured in the device table with the status "**ok**" are shown with the device name and (in brackets) the number of the device type. The currently selected device is shown with a blue background. Devices that are still carrying out manually triggered actions are shown in red.

2.6.3 Functions

In the subwindow for functions/parameters both the functions for manual control of the selected device as well as their associated parameters can be selected. In addition the measured values for running actions and messages are shown here.

Depending on the device the following functions are possible:

- Dosing
- Stirring
- Remote functions
- Sample changer functions

2.6.4 Graphic display

In the subwindow for graphic display the manually triggered functions that are running are shown graphically.

2.6.5 Dosing

If in the Select device subwindow the group **Dosing devices** or a single **Dosing device** is selected then in the subwindow for Functions/Parameters the functions and parameters that are possible with these dosing devices will appear.

Dosing functions

Dosing functions for exchange and dosing units are shown on the following register cards:

- General
- Prepare
- Fill
- Empty
- Add fixed volume
- Dosing

Devices

The dosing functions can be carried out with dosing devices that are built into or connected to the following instruments :

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 784, 785, 794, 795, 798, 799

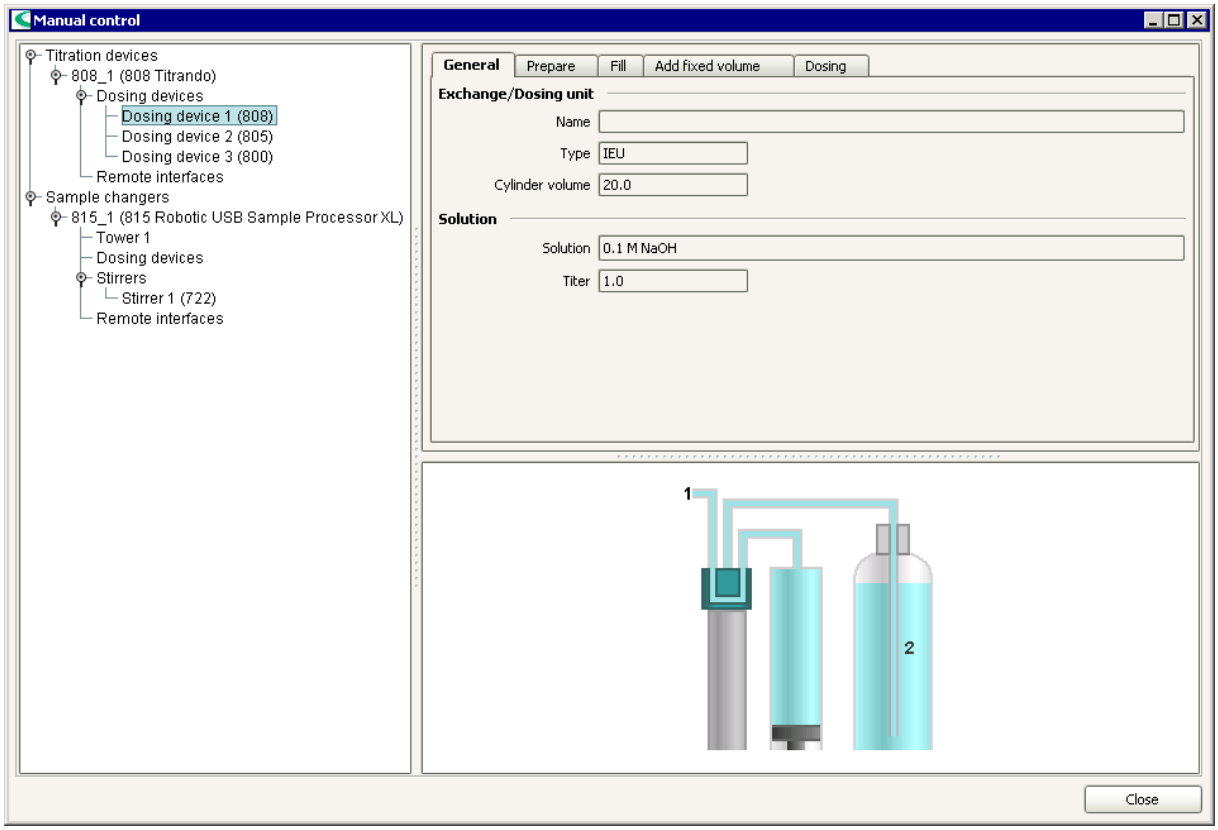
Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Sample changer: 814, 815, 855

General

Information about the selected dosing device, the attached exchange/dosing unit and the solution it contains is shown here. This tab only appears when a single dosing device is selected.



Exchange/Dosing unit

Name

Shows the entered name of the Exchange unit or Dosing unit defined under Configuration. This field always appears for intelligent exchange/dosing units. With non-intelligent exchange/dosing units it only appears if a solution has been selected under **Solution**.

Type

Shows the type of exchange/dosing unit attached to the dosing device (**EU**, **IEU**, **DU**, **IDU**).

Cylinder volume

Shows the cylinder volume of the exchange/dosing unit attached to the dosing device.

Solution

Solution

Titrant/Solution, [not defined]

Selection from the titrants and solutions listed in the Solution table for non-intelligent exchange/dosing units. For intelligent exchange/dosing units only the name is shown.

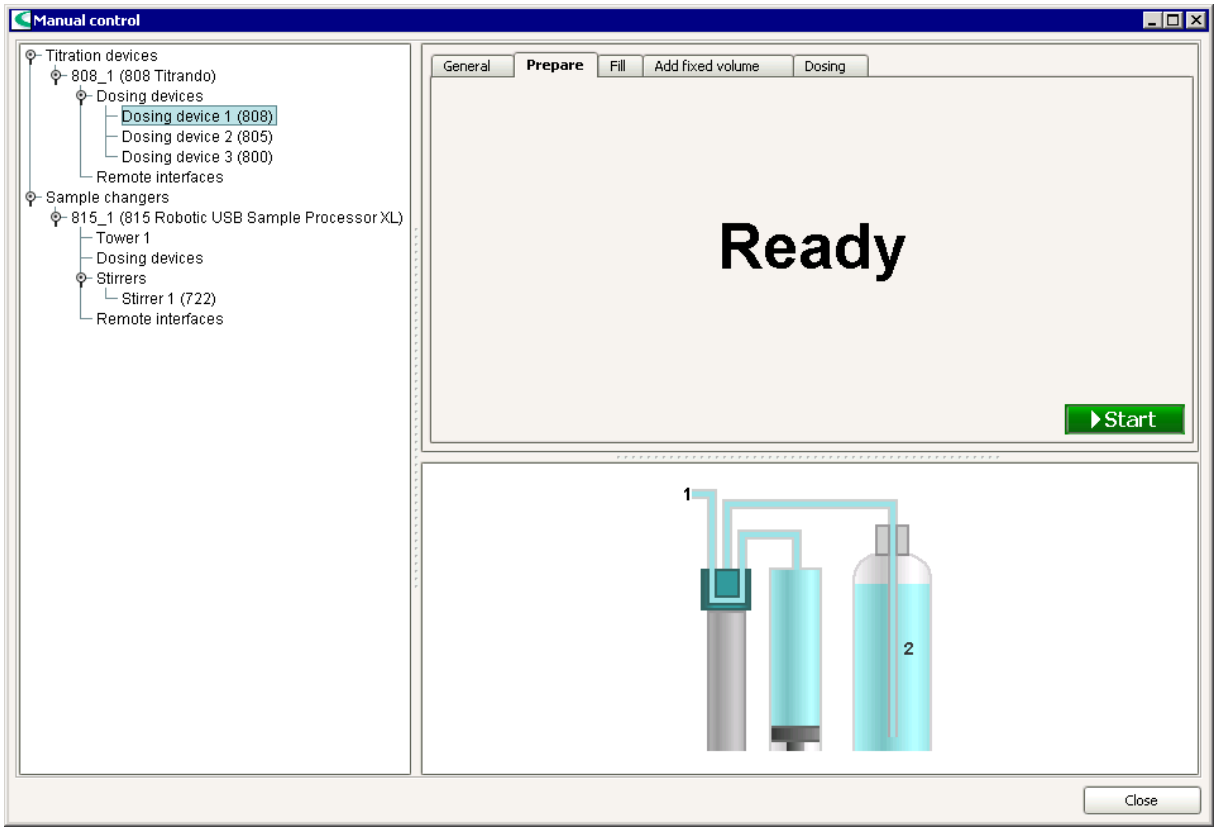
Titer

Shows the titer of the solution in the exchange/dosing unit. This field only appears for intelligent exchange/dosing units, or if a solution has been selected for non-intelligent exchange/dosing units.

Prepare

The preparation of exchange/dosing units can be started and stopped here. This tab appears for the selection of a single dosing device as well as for all dosing devices.

> ***Note***
> *This tab will not be displayed for the internal dosing devices on* ***Titrinos 702, 716, 718, 719, 720, 721, 784, 785, 794, 795, 798.***

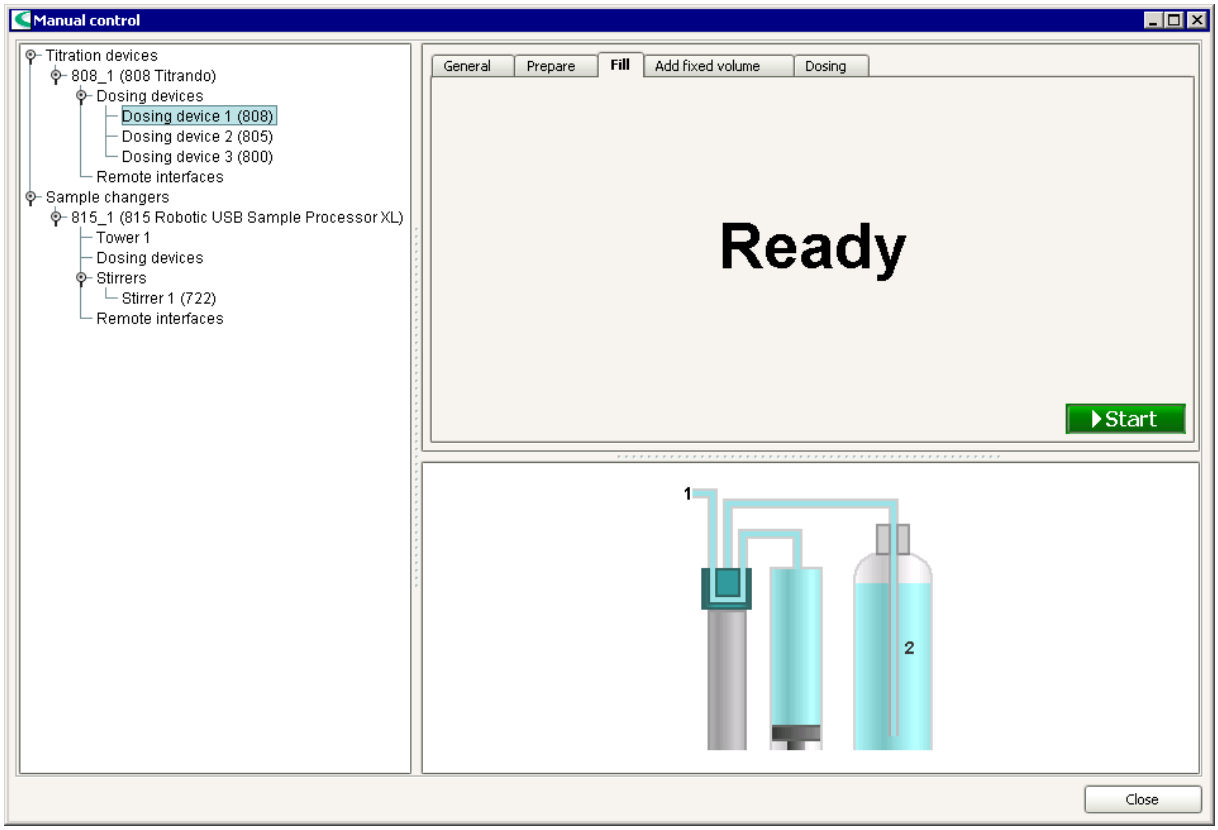


Start preparing the selected dosing device(s). The parameters defined for the Exchange unit or Dosing unit will be used.

Stop preparing the selected dosing device(s).

Fill

Filling exchange/dosing units can be started and stopped here. This tab appears for the selection of a single dosing device as well as for all dosing devices.



Note
Before filling dosing devices connected to Titrinos, make sure that the exchange or dosing devices are mounted. If the filiing process is started nevertheless, it may be that the Titrino does not respond any more and must be switched off and on again.

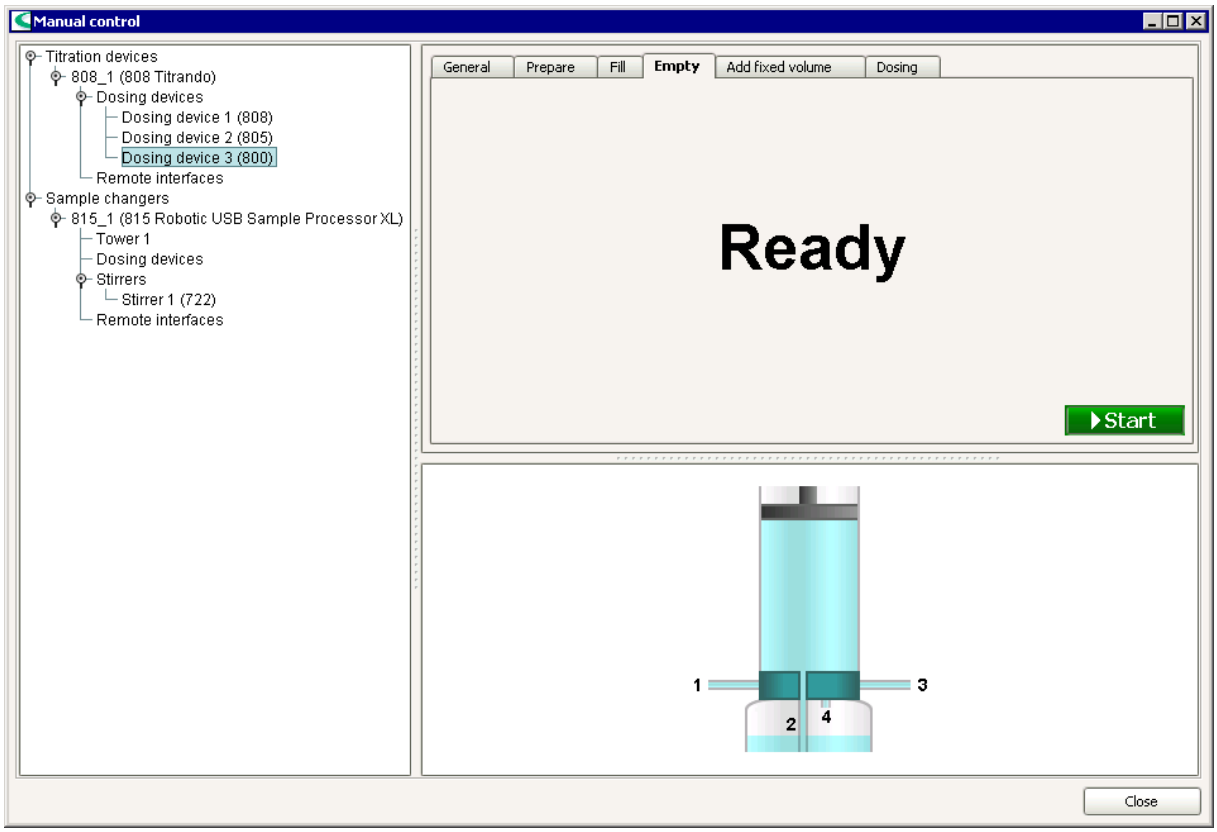
Start filling the selected dosing device(s).

Stop filling the selected dosing device(s).

Empty

Emptying dosing units can be started and stopped here. This tab appears for the selection of a single dosing device as well as for all dosing devices.

> ***Note***
> *This tab will not be displayed for external dosing devices on* ***Titrinos 736, 751, 756, 799.***



Start

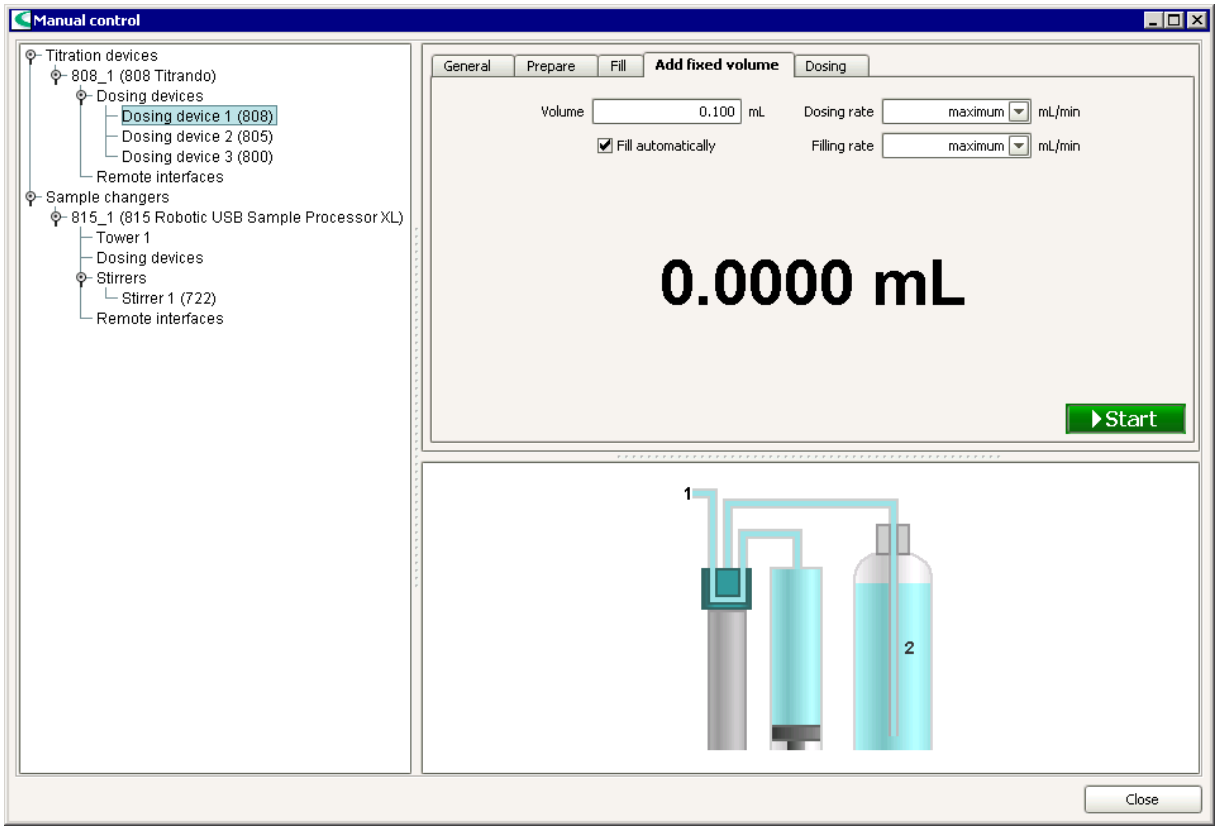
Start emptying the selected dosing device(s). The parameters defined for the Dosing unit will be used.

Stop

Stop emptying the selected dosing device(s).

Add fixed volume

Adding a predefined volume can be started and stopped here. This tab only appears when a single dosing device has been selected.



Volume

[0.100] ... 99999.9 mL
Fixed volume to be added.

Dosing rate

[maximum]
0.01 ... 166.00 mL/min (Titrando, 814, 815, 855)
0.01 ... 160.00 mL/min (730, 774, 778, 789)
0.01 ... 150.00 mL/min (Titrino)
The volume is added at this speed. The maximum dosing speed 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 then during dosing it will automatically be reduced to the largest possible value.

> ***Note***
> *The dosing rate should be reduced for viscous liquids.*

Filling rate

[maximum]
0.01 ... 166.00 mL/min (Titrando, 814, 815, 855)
0.01 ... 160.00 mL/min (730, 774, 778, 789)
0.01 ... 150.00 mL/min (Titrino)
After dosing the buret will be refilled at this speed. The maximum filling speed 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 then during filling it will automatically be reduced to the largest possible value.

> ***Note***
> *The filling rate should be reduced for viscous liquids.*

Fill automatically

This parameter is only visible for Titrandos, Dosing Interface and the USB Sample Processor.

[on], off

If this option is switched on then the buret will be refilled automatically after dosing. During the filling procedure the volume display is reset to **0.0000 mL**. If this option is switched off then the added volume will be displayed cumulatively.

Start adding the fixed volume for the selected dosing device. The added volume is shown live.

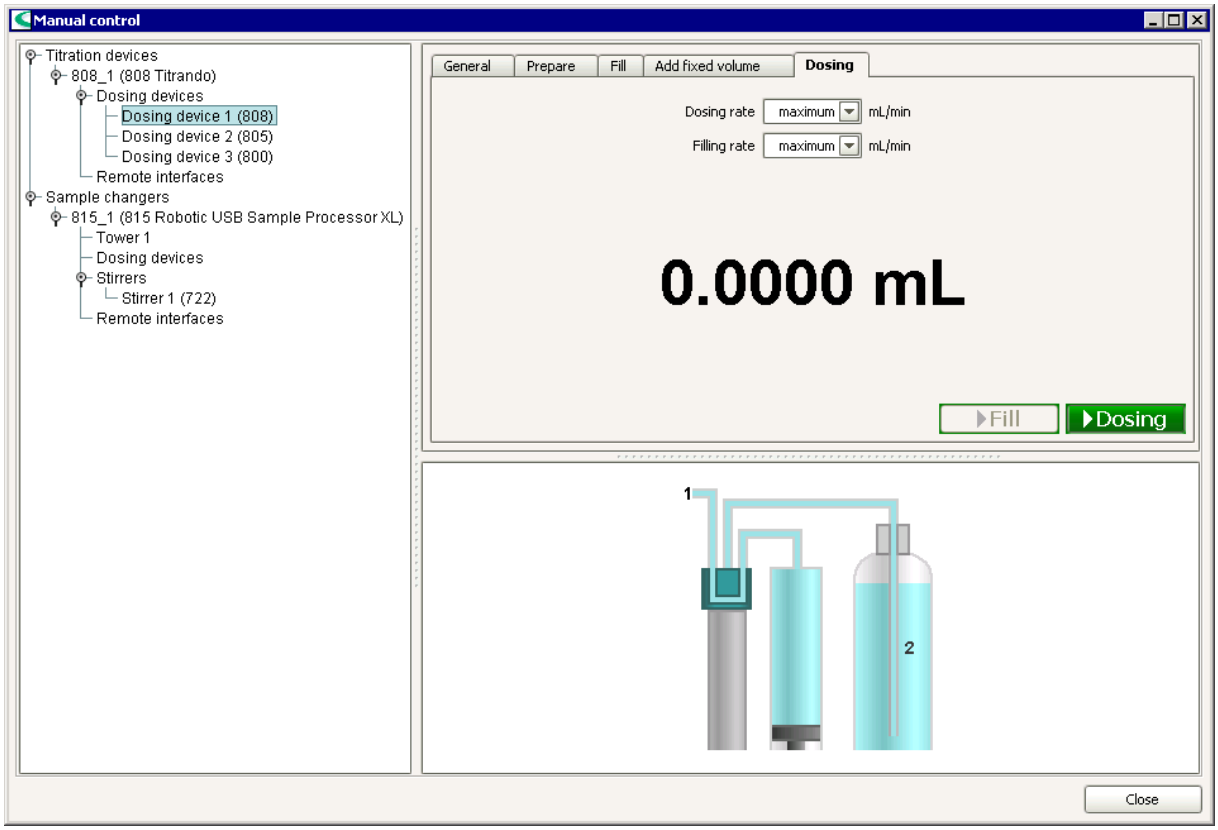
> ***Note***
> *Parameters that are altered after dosing has started only apply to the next dosing procedure.*

Start filling the buret for the selected dosing device. This button is only present when **Fill automatically** is switched off. During the filling procedure the volume display is reset to **0.0000 mL**.

Stop adding the fixed volume for the selected dosing device. Once dosing has been stopped it can no longer be restarted.

Dosing

Manual dosing can be started and stopped here. This tab only appears if a single dosing device has been selected; it does not appear for **Titrino**-type dosing devices.



Dosing rate

[maximum]

0.01 ... 166.00 mL/min (Titrando, 814, 815, 855)

0.01 ... 160.00 mL/min (778, 789)

Speed at which dosing is to be carried out. The maximum dosing speed 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 then during dosing it will automatically be reduced to the largest possible value.

> ***Note***
> *The dosing rate should be reduced for viscous liquids.*

Filling rate

[maximum]

0.01 ... 166.00 mL/min (Titrando, 814, 815, 855)

0.01 ... 160.00 mL/min (778, 789)

After dosing the buret will be refilled at this speed. The maximum filling speed 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 then during filling it will automatically be reduced to the largest possible value.

> ***Note***
> *The filling rate should be reduced for viscous liquids.*

Dosing

Start manual dosing for the selected dosing device. Dosing will continue for as long as the button is pressed down. The added volume is shown live.

> ***Note***
> *Parameters that are altered after dosing has started only apply to the next dosing procedure.*

Fill

Start filling the buret for the selected dosing device. During the filling procedure the volume display is reset to **0.0000 mL**.

2.6.6 Stirring

If a stirrer connected via MSB or a stirrer connection is selected in the Select device subwindow then all the possible functions and parameters for the stirrers will appear in the Functions/Parameters subwindow.

Stirrer functions

The stirrer functions are shown 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 instruments:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 784, 785, 794, 795, 798, 799

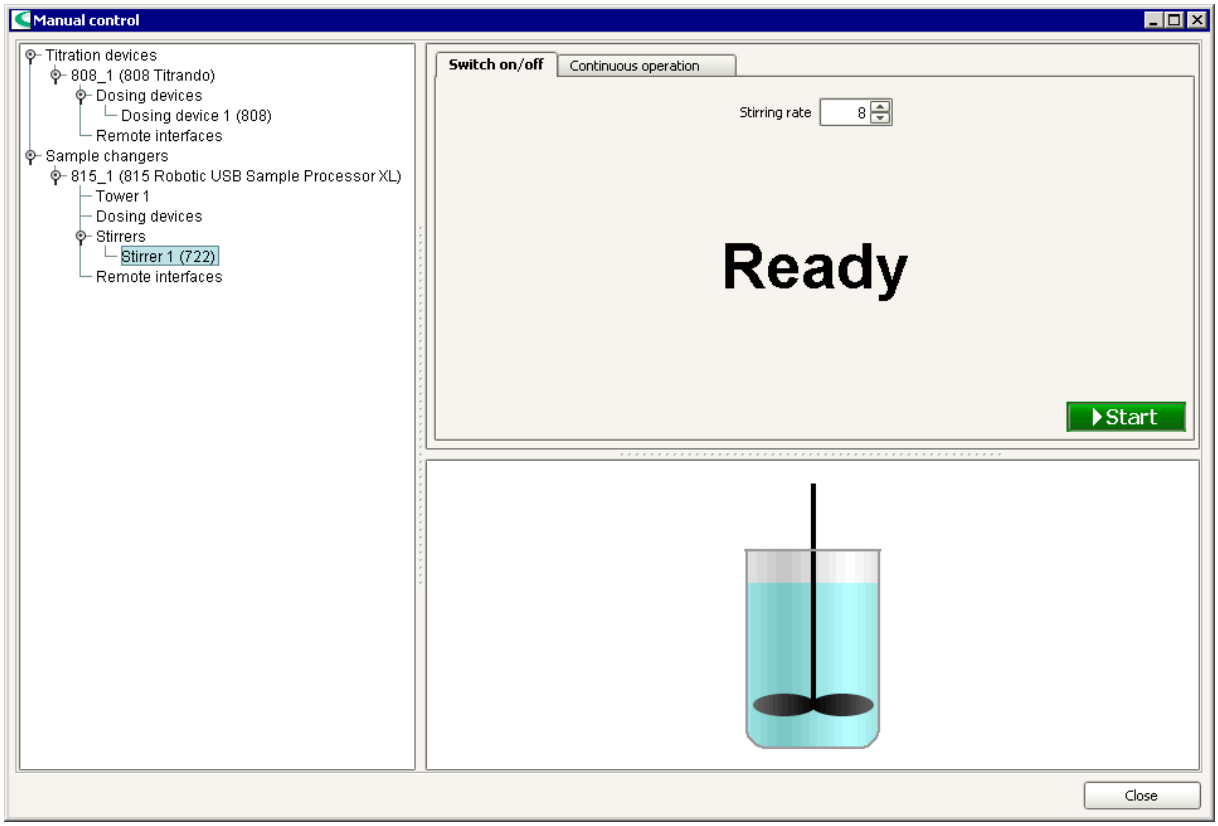
Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Sample Changer: 730, 774, 778, 789, 814, 815, 855

Switch on/off

Stirrers can be switched on and off here. This tab appears for the selection of a single stirrer as well as for all stirrers.



Stirring rate

-15 ... -1, 1 ... [8] ... 15

Selects the stirring speed. This parameter can also be altered live.

Start

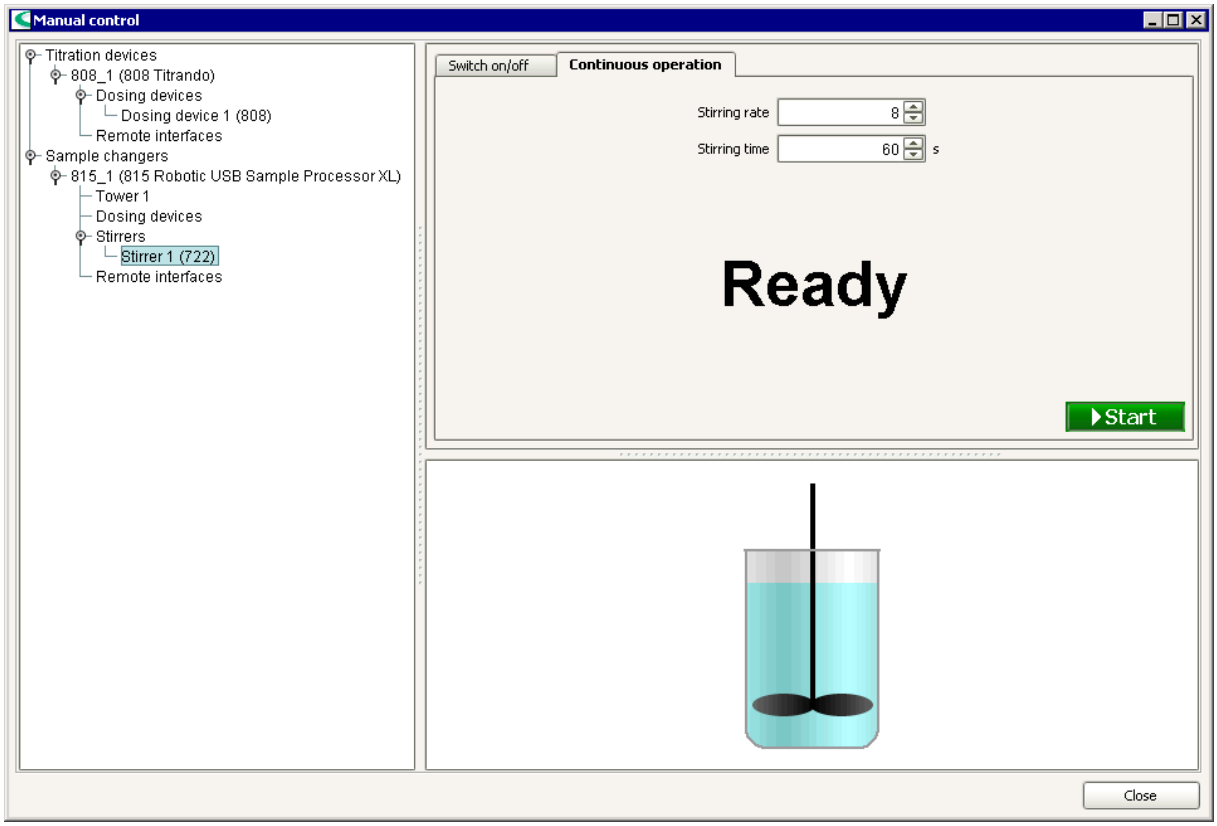
Start stirring for the selected stirrer(s).

Stop

Stop stirring for the selected stirrer(s).

Continuous operation

Stirrers can be switched on for a defined period here. This tab appears oy for the selection of a single stirrer.



Stirring rate

-15 ... -1, 1 ... [8] ... 15

Selection of the stirring speed. This parameter can also be altered live.

Stirring period

1 ... [60] ... 999999 s

Entry of the time during which stirring is to take place. If this parameter is altered after stirring has started then it will only apply to the next stirring procedure.

Start

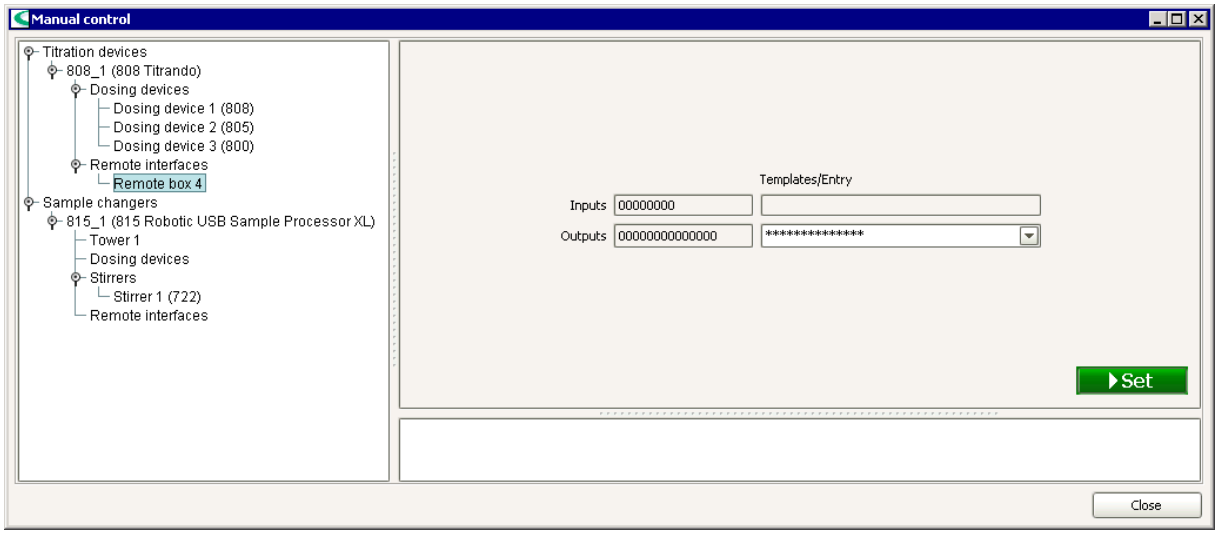
Start continuous operation for the selected stirrer(s). The remaining time is shown in the status display. When the stirring period has expired the stirrer will be switched off automatically.

Stop

Stop continuous operation for the selected stirrer(s).

2.6.7 Remote functions

If in the subwindow for Select device a remote box or remote interface is selected then in the subwindow for Functions/Parameters the functions and parameters that are possible for the device will appear.



Devices

The remote functions can be carried out with the following instruments:

Titrino: 702*, 716*, 718*, 719*, 720*, 721*, 736*, 751, 758, 784, 785, 794*, 795, 798, 799 (* instruments with only 3 outputs)

Titrando: 808, 809, 835, 836, 841, 842, 846, 855

Coulometer: 756, 831

Sample Changer: 730, 774, 778, 789, 814, 815, 855

Inputs

Current status

Shows the current status of the 8 input lines.

Templates/Entry

If the current status corresponds to one of the defined Templates for the inputs then the corresponding name will be shown here.

> ***Note***
> *Only templates without stars * are recognized.*

Outputs

Current status

Shows the current status of the 14 output lines.

Templates/Entry

Binary pattern consisting of exactly 14 characters (0, 1, *, p), [********], signal template**

Input of the binary pattern for the output signal of exactly 14 characters or selects a predefined Signal template.

The following characters can be entered:
0 = line inactive,
1 = line active,
***** = any line status
p = set impulse (not for 730, 774, 778, 789). The impulse length is 200 ms.

If the output is to be an impulse with a different length then an appropriate template must be defined for it.

The output lines and 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

Examples:

**************1*** sets output line 1 to active (= set) which would correspond to a Stop command, e.g. for a connected Titrino.

**************0*** sets the line to inactive.

Note
*We recommend that non-relevant output lines are masked with an asterisk * so that the status of these lines is not altered.*

Note
For Titrinos with 3 output lines only 3 characters can be entered. If a signal template is selected, only the first 3 characters are used.

Set the binary pattern defined under **Outputs**.

2.6.8 Sample changer functions

If in the subwindow for Select device a sample changer tower is selected then the subwindow Functions/Parameters opens and shows the functions that are possible with the sample changer together with their associated parameters.

Sample changer functions

The sample changer functions are shown on the following tabs:

- General
- Move
- Assign position
- Pump
- Heater/Gas

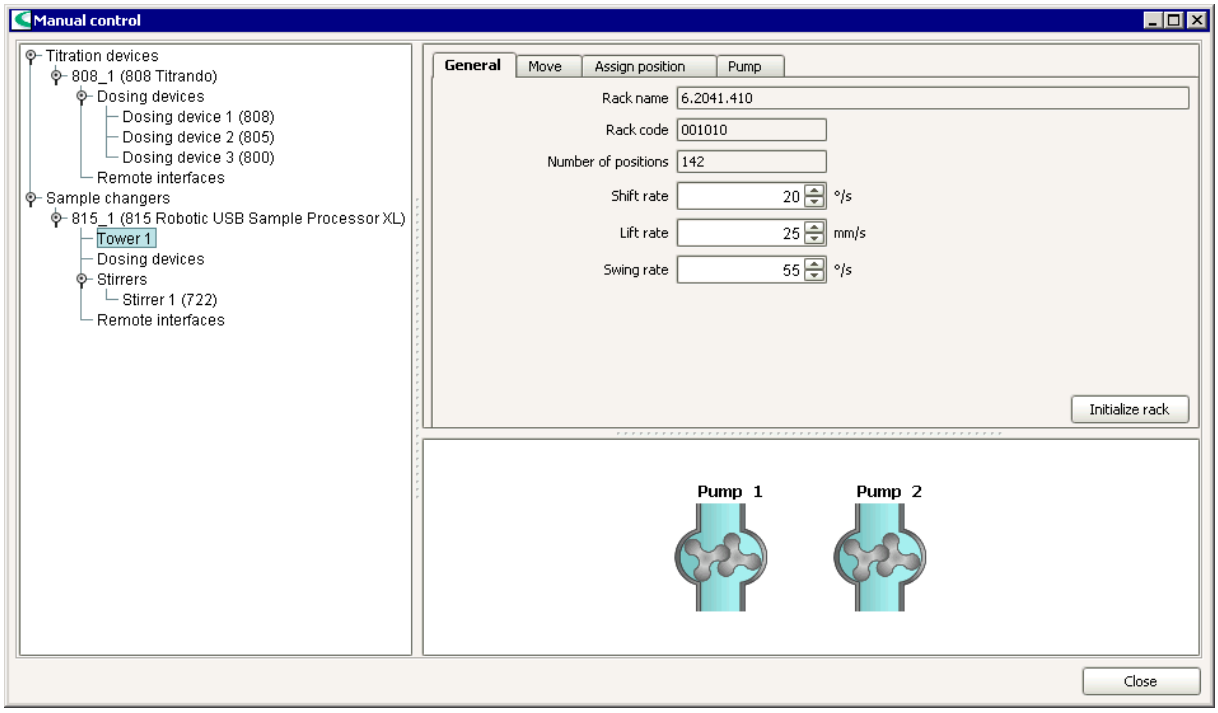
Devices

The sample changer functions can be carried out with the following instruments:

730, 774, 778, 789, 814, 815, 855

General

Information about the attached rack is shown here. In addition the speed of rotation and the lift speed for manual sample changer control can be set here.



Rack name

Shows the name of the attached rack. If no rack is attached then **--------** will be shown.

Rack code

Shows the rack code of the attached rack. If no rack is attached then **--------** will be shown.

Number of positions

Shows the number of positions of the attached rack. If no rack is attached then **--------** will be shown.

Shift rate

5 ... [20] °/s

Speed of rotation for manual operation of the sample changer.

Lift rate

5 ... [25] mm/s

Lift speed for manual operation at the selected tower.

Swing rate

10 ... [55] °/s

Swing speed for manual operation of the swing head on the sample changer.

Initialize rack

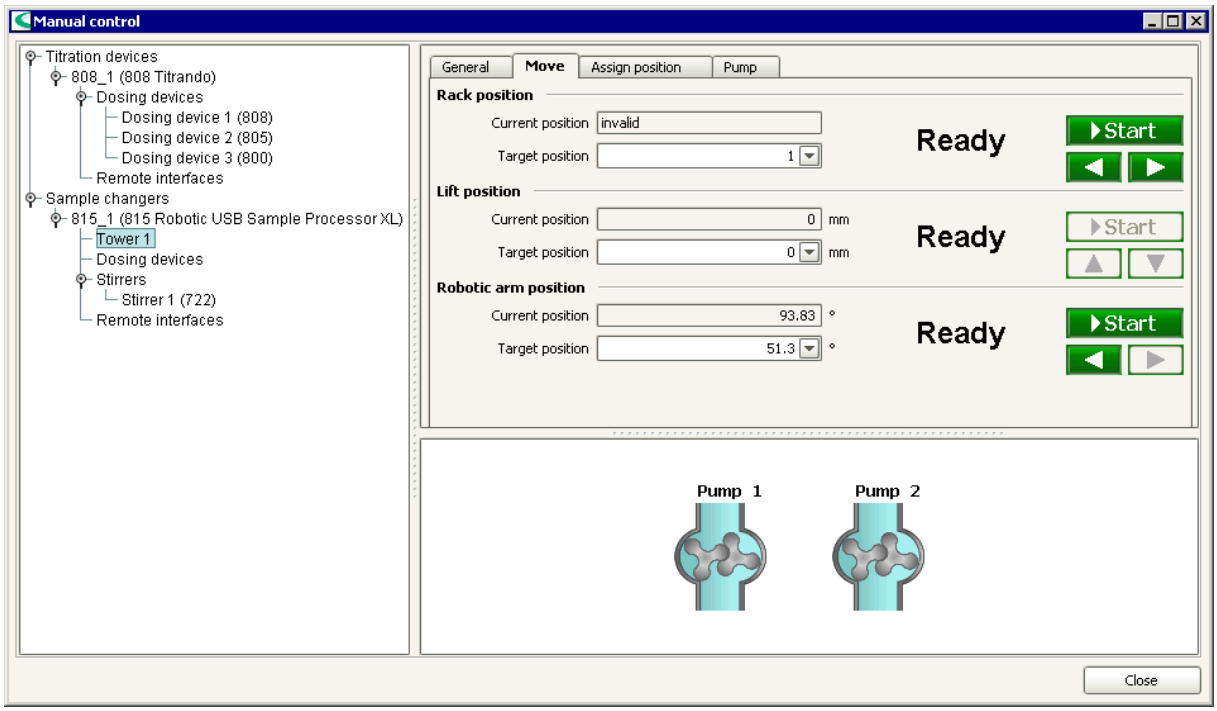
Initialize the attached rack.

Note

During the initialization of the rack the following actions are carried out:
– Rack rotates to position for reading the rack code.
– Rack data from rack code is transferred to sample changer.
– Lifts are raised to 0 mm.
– Swing head moves back.

Move

This is where a move to the desired rack, lift or swing head position can be started manually.



Rack position

Set rack position.

Current position

Shows the current rack position.

Target position

[1] ... n (depends on the rack), **Special beaker 1...16**
Entry or selection of the rack position to be moved to.

Start the move to the target position. After the start the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray), and the status display changes from **Ready** to **Move...**.

Move to current rack position – 1.

Move to current rack position + 1.

Lift position

Set the lift position for the selected tower.

Current position

Shows the current lift position in mm.

Target position

[0] ... 235 mm, Home position, Work position, Shift position (only for normal beakers and ext. pos.), **Rinse position** (only for normal beakers and ext. pos.),

Special position (only for normal beakers and ext. pos.)
Selection or input of the lift position to be moved to for the current rack position (normal beakers, special beakers, external position).

Start the move to the target position. After the start the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray), and the status display changes from **Ready** to **Move...**.

Move the lift upward for as long as the button is pressed.

Move the lift downward for as long as the button is pressed.

Swing head position

Set the position (angle) of the swing head at the selected tower.

Current position
Shows the current position of the swing head in °.

Target position
[0.0] ...330.0 °, External 1...4
Entry or selection of the swing head position to be moved to.

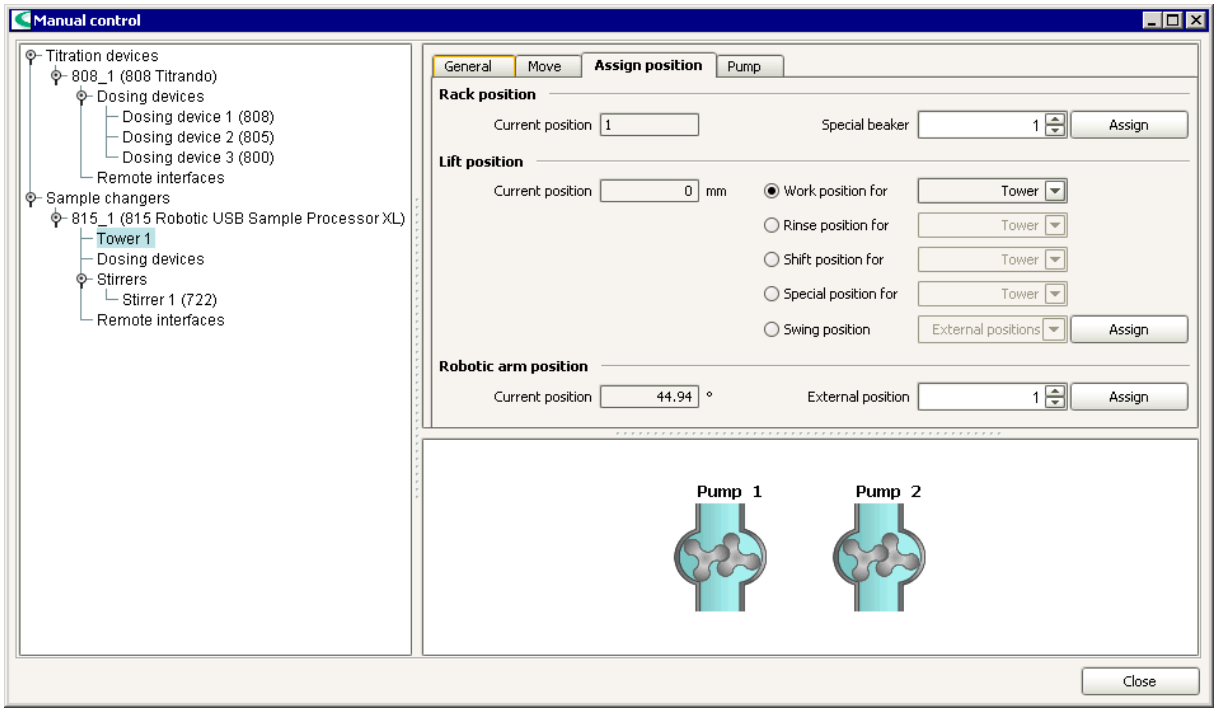
Start the move to the target position. After the start the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray), and the status display changes from **Ready** to **Move...**.

Move the swing head to the left (toward **0°**) for as long as the button is pressed.

Move the swing head to the right (toward **330°**) for as long as the button is pressed.

Assign position

The current rack, lift or swing head position can be assigned as a particular special position.



Rack position

Assigns the current rack position to a particular special beaker.

Current position

Shows the current rack position.

Special beaker

[1] ... 16

Selection of the special beaker to which the current rack position is to be assigned.

Trigger the assignment. During the assignment the cursor appears as an hourglass.

Lift position

Assign the current lift position to a particular special position.

Current position

Shows the current lift position in mm.

Work position

If this option is enabled then the current lift position is assigned as the work position of the tower, a special beaker or an external position of the swing head.

Selection:

[Tower 1], Tower 2 (not for 730 Sample Changer),
Tower 1+2 (only for 730 Sample Changer),
Special beaker 1...16,
External 1...4 (not for 730 Sample Changer)

Rinse position

If this option is enabled then the current lift position is assigned as the rinse position of the tower.

Selection:
[Tower 1], Tower 2 (not for 730 Sample Changer),
Tower 1+2 (only for 730 Sample Changer)

Shift position

If this option is enabled then the current lift position is assigned as the shift position of the tower.

Selection:
[Tower 1], Tower 2 (not for 730 Sample Changer),
Tower 1+2 (only for 730 Sample Changer)
External positions

Special position

If this option is enabled then the current lift position is assigned as the special position of the tower.

Selection:
[Tower 1], Tower 2 (not for 730 Sample Changer),
Tower 1+2 (only for 730 Sample Changer)

Swing position

If this option is enabled then the current lift position is assigned as the swing position of the swing head.

Selection:
[External positions]

Assign

Trigger the assignment. During the assignment the cursor appears as an hourglass.

Assign robotic arm position

Assigns the current rack position as a particular robotic arm external position.

Current position

Shows the current position of the robotic arm in °.

External position

[1] ... 4

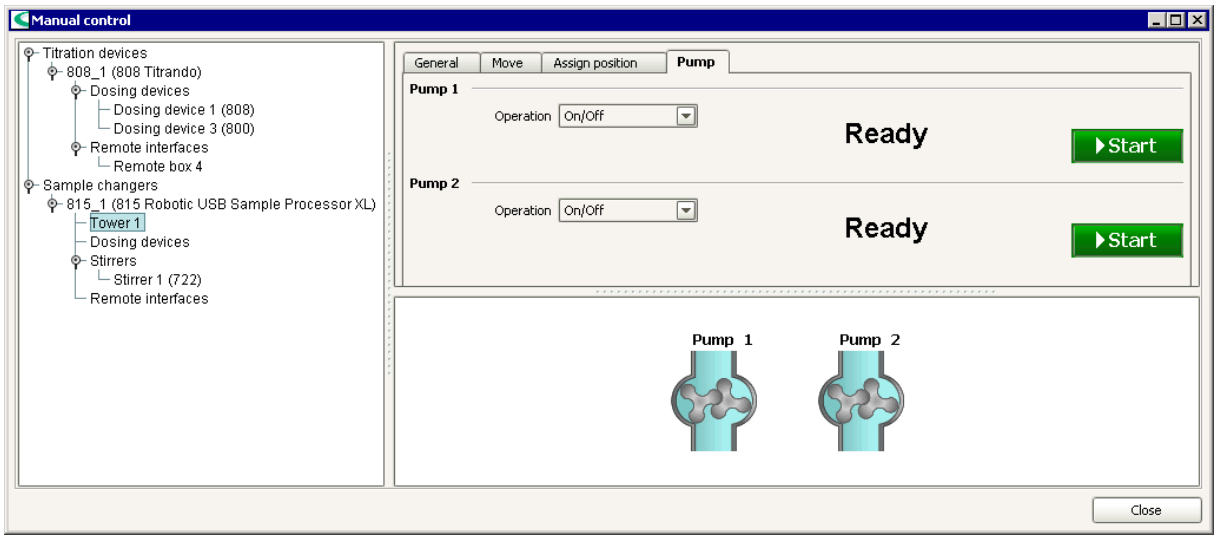
Selection of the external position to which the current robotic arm position is to be assigned.

Assign

Trigger the assignment. During the assignment the cursor appears as an hourglass.

Pump

The pumps connected to the tower can be switched on and off here.



Pump 1

Operate Pump 1 or Valve 1 at the selected tower manually.

Operation

[On/Off], Duration

Selection whether the pump or valve is to be switched on/off manually or whether it is to be switched on for a defined period and then switched off automatically.

Duration

1 ... [60] ... 999999 s

Time during which the pump/valve is to remain switched on. This field only appears for **Operation** = **Duration**.

Start

Start Pump 1. The status display shows the elapsed time since the start.

Stop

Stop Pump 1.

Pump 2

Operate Pump 2 or Valve 2 at the selected tower manually.

Operation

[on/off], Duration

Selection whether the pump or valve is to be switched on/off manually or whether it is to be switched on for a defined period and then switched off automatically.

Duration

1 ... [60] ... 999999 s

Time during which the pump/valve is to remain switched on. This field only appears for **Operation** = **Duration**.

Start

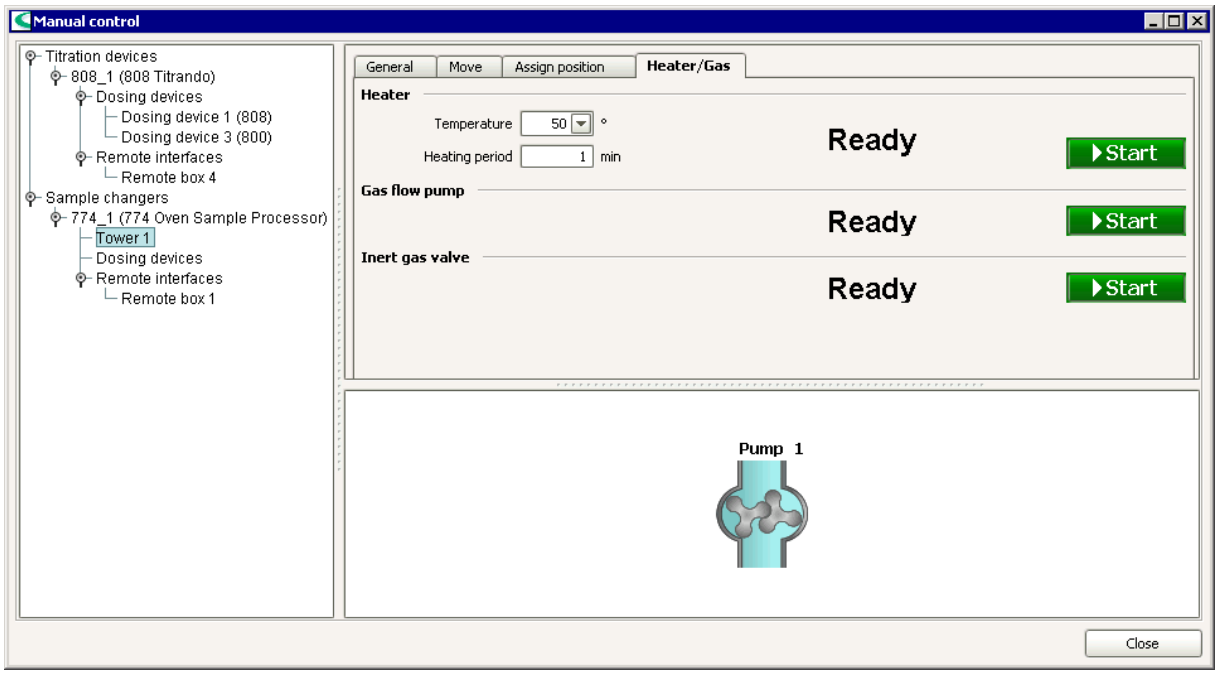
Start Pump 2. The status display shows the elapsed time since the start.

Stop

Stop Pump 2.

Heater/Gas

The heating, gas flow pump and inert gas valve of the 774 Oven Sample Processor are switched on and off here.



Heater

Heats the oven to the required temperature for the defined heating duration.

Temperature

[50] ... 250 °C, Init

Temperature to which the oven is to be heated. With **Init** heating will be carried out up to the initial temperature set on the device.

Heating period

[1] ... 999 min

Duration of the heating-up phase until the required temperature has been achieved.

Start

Start heating. The current temperature is shown in the status display.

Stop

Stop heating.

Gas flow pump

Switch the gas flow pump at the 774 Oven Sample Processor on and off.

Switch the gas flow pump on. The elapsed time since the start is shown in the status display.

Switch the gas flow pump off.

Inert gas valve

Switch the inert gas valve at the 774 Oven Sample Processor on and off.

Switch the inert gas valve on. The elapsed time since the start is shown in the status display.

Switch the inert gas valve off.

Chapter 3 Workplace

3.1 General

3.1.1 General

Definition

In *tiamo* the program part in which up to 4 workplaces can be opened at the same time for the simultaneous and independent carrying out of determinations is known as the **Workplace**.

3.1.2 Desktop

Workplace symbol

By clicking on the workplace symbol in the vertical bar at the left-hand margin the program part **Workplace** opens; at the same time the workplace symbol is shown in color. In the left top corner of the symbol is a black field in which the number of workplaces that are currently open is shown (see Workplace selection).

Tools

The desktop of the program part **Workplace** includes the following tools:

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

3.1.3 Menu bar

The menu bar in the program part **Workplace** includes 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 subwindow.
- **Tools**
  Manual control, run test, sample tables, sample assignment tables, text templates.
- **Help**
  Open *tiamo* Help, show info about *tiamo*.

Menu File

Workplace/New...
Open new workplace.

Workplace/Properties
Edit properties of the selected workplace.

Workplace/Close
Close the selected workplace.

Method/Save
Save the method with the modified live parameters.

Method/Save as...
Save the method with the modified live parameters under a new name.

Logout...
Logout user.

Exit
End program.

Menu View

Change layout...
Alter layout of loaded workplace view.

Load view...
Load a saved workplace view.

Save view...
Save the current workplace view.

Tile horizontally
Show two workplace windows next to each other.

Tile vertically
Show two workplace windows one below the other.

Unsplit
Unsplit the workplace window.

Properties/Properties Run window
Sets properties for the tab **Single determination** or **Determination series** in the subwindow **Run**.

Properties/Properties Live display 1
Sets properties for the subwindow **Live display 1**.

Properties/Properties Live display 2
Sets properties for the subwindow **Live display 2**.

Toolbar
Switches toolbar display on/off.

Menu Tools

Manual control
Open the dialog window for the manual control of the devices.

Run test
Carry out start test for the determination(s).

Sample table/New...
Open a new and empty sample table.

Sample table/Open...
Open a saved sample table.

Sample table/Manager...
Open the sample table manager.

Sample assignment table...
Define sample identifications which a certain method can be assigned to.

Text templates...
Create text templates for the sample identifications **ID1...ID8** and for **Remark**.

Menu Help

tiamo Help
Open *tiamo* Help.

Info
Display information about the program and the installation.

3.1.4 Toolbar

Sample table/New...
Open a new and empty sample table.

Sample table/Open...
Open a saved sample table.

Sample table/Manager...
Open the sample table manager.

Change layout
Change the layout of the loaded workplace view.

Load view
Load a saved workplace view.

Save view
Save the current workplace view.

Run test
Carry out run test for determination(s).

Manual control
Open the dialog window for the manual control of devices.

Tile horizontally
Show two workplace windows next to each other.

Tile vertically
Show two workplace windows next to each other.

Unsplit
Unsplit the workplace window.

Logout
Logout user.

tiamo Help
Open *tiamo* Help.

3.1.5 Subwindows

Selection

The following 5 subwindows can be shown in the main window:

- **Run**
  Window for controlling runs and entering sample data. This subwindow is always shown.
- **Method**
  Shows the currently loaded method.
- **Live display 1**
  Shows live curves, measured values and messages for the running determination.
- **Live display 2**
  Shows live curves, measured values and messages for the running determination.
- **Report**
  Shows reports for the recorded determinations.

Presentation

The subwindows can be enlarged or diminished as required by dragging the separating bar between the windows.

With a click on the button ☐ at the top right the subwindow can be maximized so that only 1 subwindow is shown in the main window. By clicking again on the button ☐ in the maximized subwindow you will return to the original view with all subwindows.

3.1.6 Functions

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

View

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

Workplaces

- Create workplace
- Edit workplace
- Workplace selection
- Close workplace

Sample tables

- Create sample table
- Open sample table
- Edit sample table
- Save sample table
- Print sample table

- Define properties
- Manage sample tables

Single determination

- Start/Stop single determination
- Hold/Continue single determination
- Enter sample data
- Modify sample data live
- Define properties

Determination series

- Start/Stop series
- Hold/Continue determination
- Hold/Continue series
- Load sample table
- Edit sample table
- Enter sample data
- Modify sample data live
- Define properties

Subwindow Method

- Zoom
- Modify parameters live
- Terminate command

Subwindow Live display

- Define properties

Subwindow Report

- Select report

Tools

- Carry out run test
- Edit sample assignment table
- Define text templates

3.1.7 Workplace views

Definition

The contents and layout of the main window in the program part **Workplace** is known as the **Workplace view**. The workplace view is made up of the following parts:

- Number, layout, sequence and size of the subwindows.
- Presentation within the individual subwindows, e.g. display of sample data columns or porperties of curve display.

Functions

The following functions are possible for workplace views:

- **Change layout**
  Define the number, layout and sequence of the subwindows for the current workplace view.
- **Save view**
  Save the current workplace view.
- **Load view**
  Load a saved workplace view.
- **Rename view**
  Rename a saved workplace view.
- **Delete view**
  Delete a saved workplace view.

Save automatically

If in the options on the tab **Save** the item **Workplace settings** is switched on under **Save on closing** then the current workplace view will be saved automatically when *tiamo* is exited.

Load automatically

The workplace view saved when *tiamo* is exited is automatically loaded the next time that *tiamo* is opened as standard. As an alternative a Default workplace view can be defined for each group of users that will be loaded automatically the first time that the program part **Workplace** is opened.

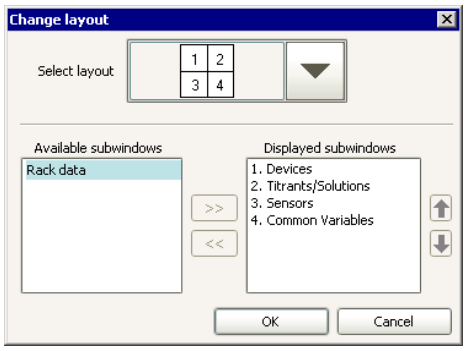
> ***Note***
> *On the first program start of all a workplace view with the 4 subwindows **Run**, **Method**, **Live display 1** and **Report** opens as standard.*

Export/Import

Workplace views can also be exported and imported. This means that views can be exchanged between different client/server systems.

Change layout

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



Select layout

Selection of possible combinations

Selection of a graphic symbol for the number and arrangement of the sub-windows.

Available subwindows

Selection of subwindows

Displays the subwindows that are still available for showing in the view.

Displayed subwindows

Subwindows

Displays the subwindows shown in the view.

Adds the selected subwindow to the view.

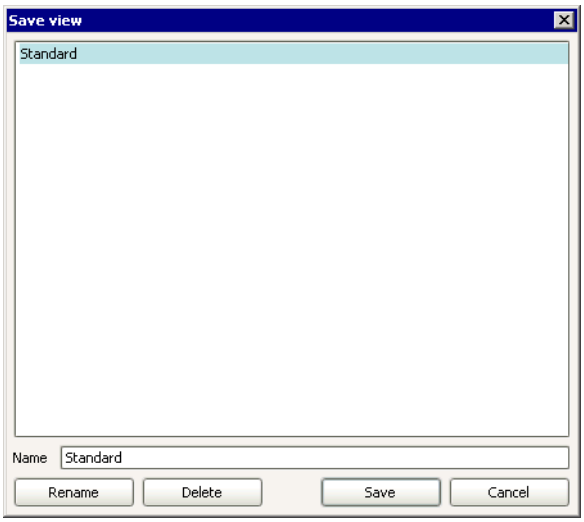
Removes the selected subwindow from the view.

Moves the selected subwindow upward (changes the sequence).

Moves the selected subwindow downward (changes the sequence).

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.

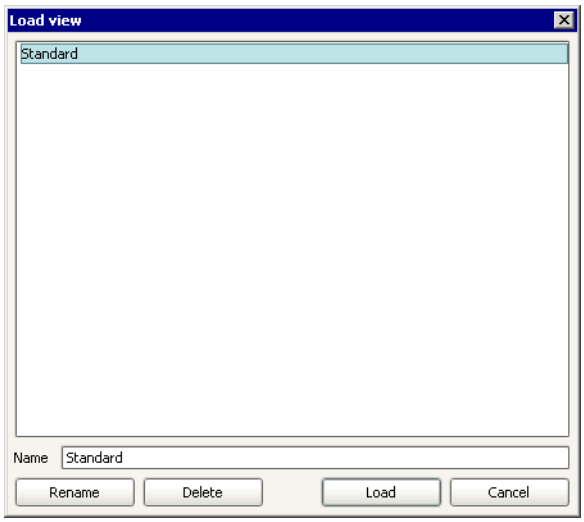
Rename selected view.

Delete selected view.

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

Load view

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



Name

Name of view to be loaded.

Rename

Rename selected view .

Delete

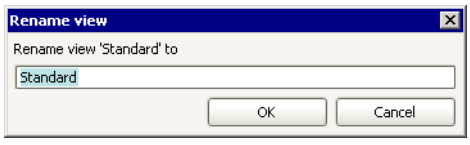
Delete selected view.

Load

Load selected view.

Rename view

In order to rename a view either the dialog window **Load view** or **Save view** must be open and the button Rename pressed. The window **Rename view** then opens.



Rename view to

50 characters, ['Old name']

Enter a new name for the view.

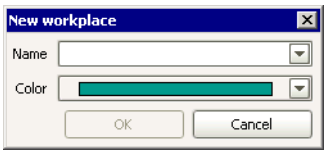
Delete view

In order to delete a view either the dialog window **Load view** or **Save view** must be opened and the Delete button pressed. The deletion process must then be confirmed.

3.2 Workplaces

3.2.1 Create new workplace

With the menu item **File, Workplace, New...** the window **New workplace** opens in which the properties of the new workplace can be defined.



Name

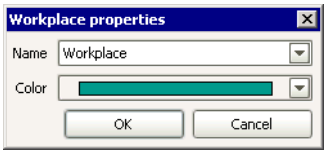
50 characters
Input of a name for the new workplace or selection from the list of the last 10 names to have been used.

Color

green, blue, ocher, brown
Color for the title bar of the new window and the status symbol of the new workplace in the status bar.

3.2.2 Edit workplace

With the menu item **File, Workplace, Properties...** the window **Workplace properties** opens in which the properties for the selected workplace can be defined.



Name

50 characters
Input of the name for the selected workplace or selection from the list of the last 10 names to have been used.

Color

green, blue, ocher, brown
Color for the title bar of the subwindow and the status symbol of the selected workplace in the status bar.

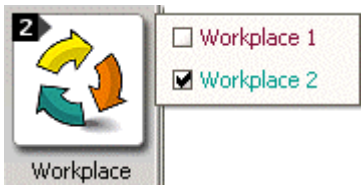
3.2.3 Show workplace

Select workplace in workplace symbol

In the left top corner of the workplace symbol the number of opened workplaces is shown. If 2 or workplaces are open then the two workplaces that can be shown beside each other or one below the other in the main window, can be selected by using the workplace symbol.

A workplace is open and is shown in the main window.

Two workplaces are open. Normally only one workplace is shown in the main window, but it is also possible to show two workplaces beside each other or one below the other.



A click with the left or right-hand mouse key on the workplace symbol opens a menu in which the names of all the open workplaces are shown. The workplaces shown in the main window are indicated by a tick. If you click on the required workplace then this will be shown in the workplace window instead of the previously selected workplace.

Show single workplace

The last workplace to have been opened is always shown alone in the main window as standard. If the display of 2 workplaces is switched on then it can be switched back to showing a single workplace with the symbol or the menu item **View, Unsplit**.

Show workplaces beside each other

With the symbol or the menu item **View, Tile horizontally** two workplaces will be shown beside each other in the main window.

Show workplaces one below the other

With the symbol or the menu item **View, Tile vertically** two workplaces are shown one below the other in the main window.

3.2.4 Close workplace

With the menu item **File, Close** the selected workplace is closed.

3.3 Sample tables

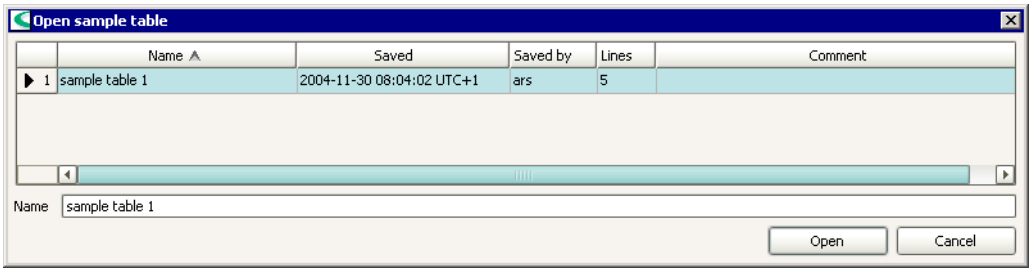
3.3.1 Edit

Create new sample table

With the symbol or the menu item **Tools, Sample table, New...** the dialog window **Sample table 'New sample table'** opens with an empty sample table which can then be edited.

Open sample table

With the symbol or the menu item **Tools, Sample table, Open...** the window **Open sample table** opens in which one of the globally available sample tables that is to be opened can be selected.



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 (column **Name**, **Saved**, **Saved by**, **Lines**, **Comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of sample table.

Saved
Date and time at which 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
Comments about the sample table that have been entered on the tab **Comment**.

Open sample table

Name

50 characters

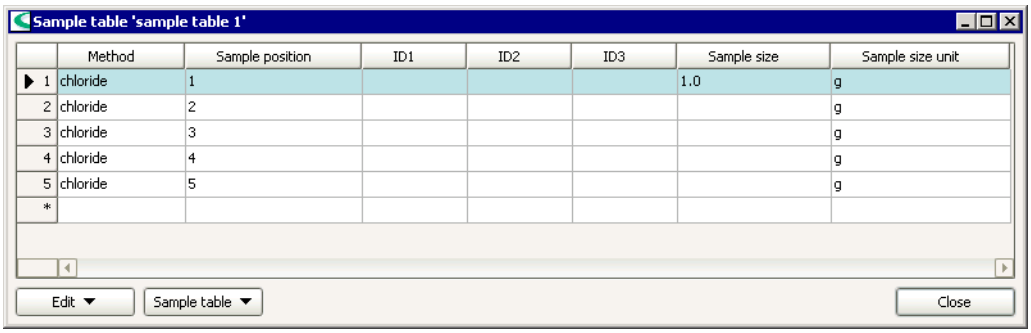
Name of the sample table that is to be opened. If one of the sample tables in the table is selected then the name will be entered automatically in this field. It can also be entered manually.

Open

Opens the dialog window **Sample table 'Name'** in which the selected sample table is shown and can be edited.

Edit sample table

A newly generated or opened sample table can be edited and saved in the dialog window **Sample table**.



Sample data table

The table contains the sample data lines already saved in the sample table together with a line for entering new data; this contains an asterisk instead of the line number. The table cannot be directly edited or sorted.

For the meaning of the columns please see Edit sample data.

Window menus

The menu **Edit** below the sample table contains the following menu items:

Edit line
Opens the window **Edit line** in which the sample data of the selected line can be edited.

Insert new line
Inserts a new empty line above the selected line. This automatically opens the window **Edit line** in which the sample data for the new line can be edited.

Cut lines
Transfers the selected lines to the clipboard.

Copy lines
Copies the selected lines to the clipboard.

Paste lines
Inserts lines from the clipboard above the selected line.

Delete lines
Deletes the selected lines.

Increment
With the cursor, that has the form ✜, it is possible to select a column section in the table that is to be automatically incremented. This means that in the selected cells of a column (**Sample position**, **ID1...ID8**), starting from the first selected cell, the number at the end of the expression will be automatically increased by 1. This functions with both pure numbers and text expressions at whose end a number is to be found (e.g. **ABC10** → **ABC11** → **ABC12** ...).

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** 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.

The menu **Sample table** beneath the sample table contains the following menu items:

Save

Saves the current sample table under the same name.

Save as...

Opens the window **Save sample table** for saving the current sample table under a new name.

Print (PDF)

Opens the window **Print sample table (PDF)** in which the output format can be defined. The sample table is then produced as a PDF file.

Properties...

Opens the window **Properties - Sample table** in which the properties for the selected sample table can be set.

Import data...

Opens the window **Select files to import** for the import of external data.

Move lines by drag & drop

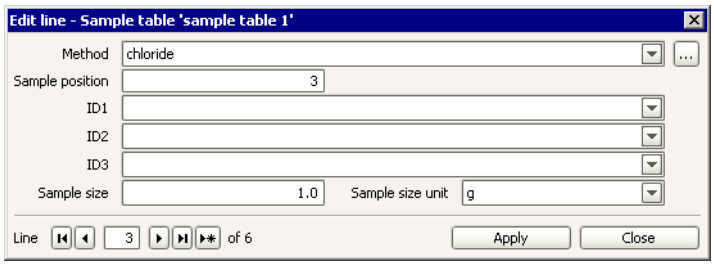
The lines selected in the sample table can be moved by drag&drop into the Working sample table.

Copy lines by drag & drop

The lines selected in the sample table can be copied with the **Ctrl key** pressed down by drag&drop into the Working sample table.

Edit sample data

With the menu item **Edit, Edit line** the dialog window **Edit line** opens.



Method

50 characters, method selection

Method from the current method group with which the determination is to be carried out.

Opens the window Open method for the extended method selection, if several method groups exist. If in this window a method from a different group to the current method group is selected then from now on this group will be the current method group for the quick selection of methods in the **Method** field.

Sample position

[1] ... 999

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this **Target** = **Sample position** must be set.

ID1 ... ID8

100 characters, selection from text templates

Sample identifications ID1...ID8. In this field any text can be entered, a check of the type and limits is only made at the start of the determination. For sample identifications of the **Date/Time** type the input must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If Text templates have been defined for sample identification then they can be selected.

Sample size

[1.0], numerical with max. 10 numbers

Sample size (weight). In this field only numbers, decimal point, **+**, –, **E** and **e** can be entered. A check of the limits is only made at the start of the determination.

Note

*If a value is entered or imported into this field then in addition the time of data input and the data source (**manual**, **'Name of balance'**, **'Name of barcode reader'** or **'Name of import file'**) will be automatically saved together with the determination and shown in the subwindow **Information** as **Input date** and **Data source**.*

Note

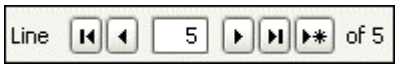
If a negative value is entered in this field (e.g. during data import from a balance during back-weighing), then it will also be calculated as negative in the Formula editor.

Sample size unit

16 characters, [g], mg, µg, mL, µL, pieces

Sample size unit (weight). Any text can be entered in this field.

Navigation



Shows the currently selected line in the sample table with the following functions:

Jumps to first line in the sample table.

Jumps to previous line in the sample table.

Possibility of entering the required line number, which will be moved to directly when [Enter] is pressed.

Jumps to next line in the sample table. If the end of the table has been reached then a new line will be generated automatically and also jumped to. This increases the line number by **+1**.

Jumps to last line in the sample table.

Jumps to a new empty line. This increases the line number by **+1**.

Functions

Apply

Applies the entered sample data in the corresponding line in 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 with the [Enter] key. However, with [Enter] the next line will also be jumped to automatically.

Close

Closes the input window. The current sample data will not be entered in the sample table (this must first be triggered with **[Apply]**).

Import sample data

With the menu item **Sample table, Import data...** in the window **sample table** the dialog window **Select files to import** opens, in which the file from which the sample data is to be imported must be selected.

File name

File name
Entry or selection of the file from which data is to be imported.

File type

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

Open

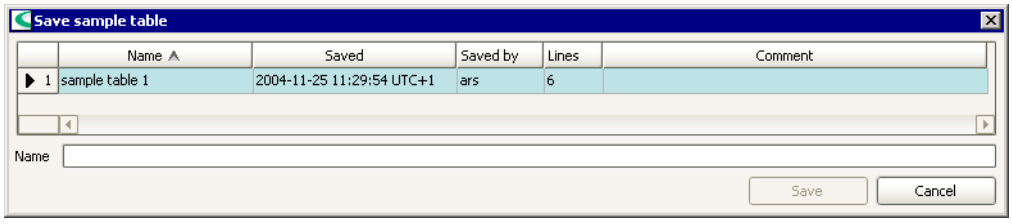
The sample data from the selected file is inserted at the end of the sample table.

> ***Note***
> *Irrespective of the number of data fields defined on the tab **Display**, all sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit** have to be defined in the import file for each line.*

Save sample table

With the menu item **Sample table, Save** in the window **Sample table** an existing sample table can be saved under its own name again without the window **Sample table, Save** needing to be open.

When saving a newly created sample table with the menu item **Sample table, Save** or when saving an existing sample table with the menu item **Sample table, Save as...** the window **Save sample table** opens in which a name for the sample table can be entered or selected.



List of sample tables

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

Name
Name of sample table.

Saved
Date and time at which 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
Comments about the sample table that have been entered on the tab **Comment**.

Save sample table

Name

50 characters
Name under which the sample table is to be saved.

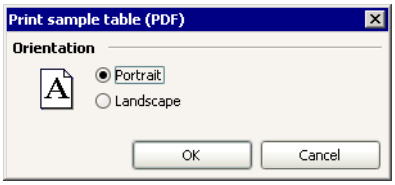
> ***Note***
> *The name of the sample table must be unique in the whole client/server system.*

Save

Saves the sample table under the required name.

Print sample table (PDF)

With the menu item **Sample table, Print (PDF)...** in the window **Sample table** the window **Print sample table (PDF)** opens, in which the output format for the PDF output can be selected.



Orientation

Portrait

[on], off
Output in portrait format.

Landscape

[on], off
Output in landscape format.

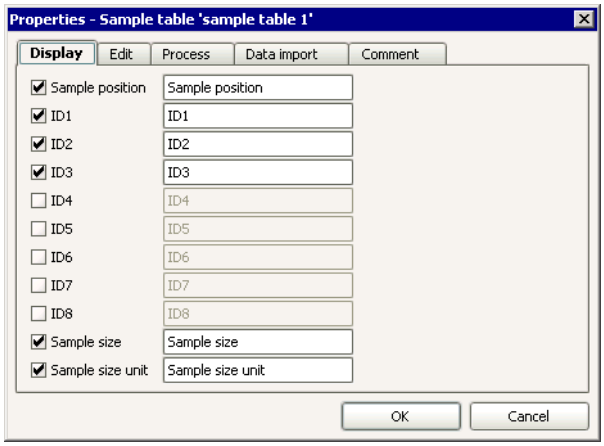
3.3.2 Properties

The properties for a sample table are set on the following 5 tabs:

- **Display**
  Defines the columns to be shown in the sample table.
- **Edit**
  Options for editing the sample table in the dialog windows **Sample table** and **Edit line**.
- **Process**
  Options for processing the sample table loaded in the Working sample table in the workplace window on the tab **Determination series**.
- **Data import**
  Switches the import of external data on and off for sample table fields.
- **Comment**
  Entry of a comment about the sample table.

Display

Defines the columns to be shown in the sample table.



Sample position
[on], off
[Sample position], 50 characters
Switches the display of the column **Sample position** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

ID1 ... ID3
[on], off
[ID1...3], 50 characters
Switches the display of the columns **ID1...ID3** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

ID4 ... ID8
on, [off]
[ID4...8], 50 characters
Switches the display of the columns **ID4...ID8** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

Sample size
[on], off
[Sample size], 50 characters
Switches the display of the column **Sample size** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

Sample size unit

[on], off

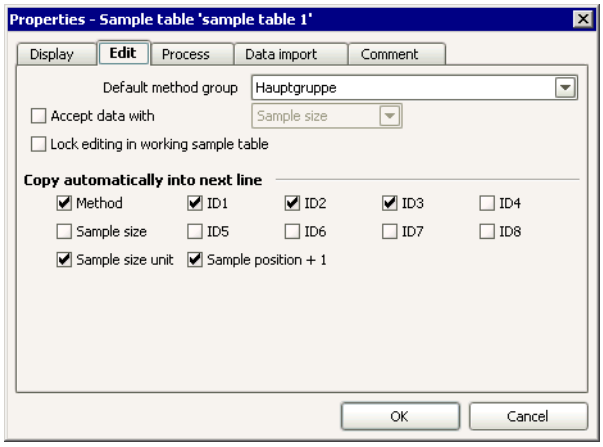
[Sample size unit], 50 characters

Switches the display of the column **Sample size unit** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

> ***Note***
> *The names defined in the **START** command under **Method variables** are always used for the determination data.*

Edit

Options for editing the sample table in the dialog windows **Sample table** and **Edit line**.



Default method group

[Main group], Method groups

Standard method group for the selection of methods in the sample table.

Accept data with

on, [off]

ID1 ... ID8, [Sample size],Sample size unit, Sample position

Selection of the data field that must be filled during automatic data import via balance, barcode reader or file so that the data in the line will be entered in the sample data silo and a switch will be made to the next line. If the particular column is empty then further imported data will be written into the same line. This means that it is e.g. possible to first enter sample identification via a barcode reader into a line and then to accept the sample size from a balance in the same line.

> ***Note***
> *For manual data input this option is irrelevant.*

Lock editing in working sample table

on, [off]

[ID4...8], 50 characters

If this option is switched on then editing lines in the sample table loaded in the Working sample table is disabled.

Copy automatically into next line

Method

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

ID1 ... ID3

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

ID4 ... ID8

on, [off]

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

Sample size

on, [off]

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

Sample size unit

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

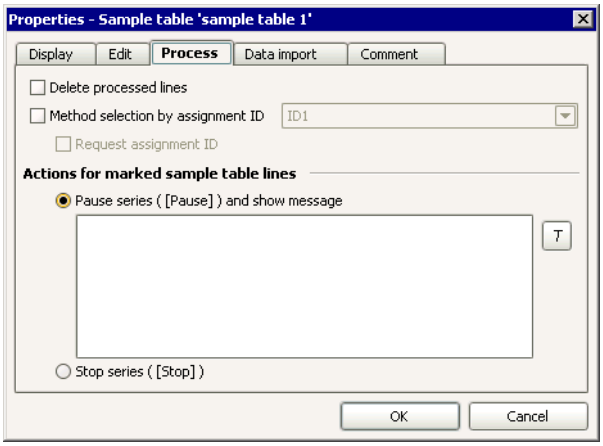
Sample position + 1

[on], off

If this option is switched on then the contents of this field will be automatically increased by **+1** when a new sample data line is created.

Process

Options for processing the Sample table loaded into the Working sample table in the Workplace window on the tab **Determination series**.



Delete processed lines

on, [off]

If this option is switched on then lines in the Working sample table that have been fully processed will be automatically deleted.

Method selection by assignment ID

on, [off]

[ID1] ... ID8

If this option is switched on then the selected sample identification for the method selection in the Working sample table will be used. This identification contains the descriptive **Assignment ID** that can no longer be edited. If this ID agrees with one of the assignment IDs in the Sample assignment table then the corresponding method will be entered in the field **Method** from this table.

Request assignment ID

on, [off]

If this option is switched on then the **Assignment ID** will be requested directly after the start of the determination in the dialog window **Sample assignment** (*see Workplace - Tools - Sample assignment table*).

Action for marked sample table lines

Pause series ([Pause]) and show message

[on], off

1000 characters

If this option has been selected then the series will be interrupted before the start of the marked line (corresponds to **[Pause]**). At the same time a message appears containing the text defined in the message field.

With or a double-click on the text field the Text editor starts with which the message can be entered and edited. Within the text field the Formula editor can also be called up.

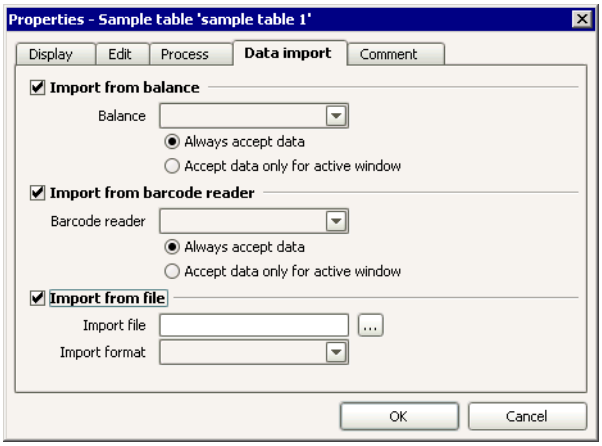
Stop series ([Stop])

[on], off

If this option is selected then the series will be stopped before the start of the marked line (corresponds to **[Stop]**).

Data import

Switches the import of external data on and off for sample table fields.



Import from balance

on, [off]

If this option is switched on 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 **Sample size unit**.

> ***Note***
> *In order to be able to import sample identifications from the balance the data export must be set accordingly on the balance (use names **ID1**, **ID2**, **ID3**, **ID4**).*

Balance

Device name

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

Always accept data

[on], off

If this option is selected then the data transmitted from the balance will be imported into the opened sample table for which this balance has been defined as the data source.

Accept data only for active window

on, [off]

If this option is selected then the data transmitted from the balance will only be imported into the opened sample table when this has the focus.

Import from barcode reader

on, [off]

If this option is selected then external data from the selected barcode reader will be imported in the opened sample table. The field into which the data is to be imported is defined in the device properties of the Barcode reader.

Barcode reader

Device name

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

Always accept data

[on], off

If this option is selected then the data transmitted from the barcode reader will be imported into the opened sample table for which this barcode reader has been defined as the data source.

Accept data only for active window

on, [off]

If this option is selected then the data transmitted from the barcode reader will only be imported into the opened sample table when this has the focus.

Import from file

on, [off]

If this option is selected then external data will be imported from a file (e.g. via LIMS) into a sample table. A check will be made that the given import file exists when opening the sample table, when loading the sample table into the working sample table as well as at regular intervals (every 10 s) when the sample table is open (but not when the dialog window **Edit line** is open). If the import file is present then the data from this file will be inserted automatically at the end of the sample table. The import file is deleted after each import.

> ***Note***
> *Irrespective of the number of data fields defined on the tab* ***Display****, all sample data in the format* ***Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit*** *have to be defined in the import file for each line.*

Import file

File name

Entry or selection the file from which the import is to take place.

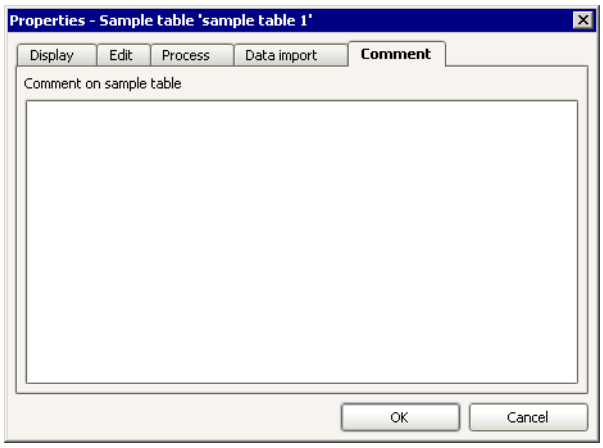
Import format

[*.csv]

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

Comment

Entry of a comment about the sample table.

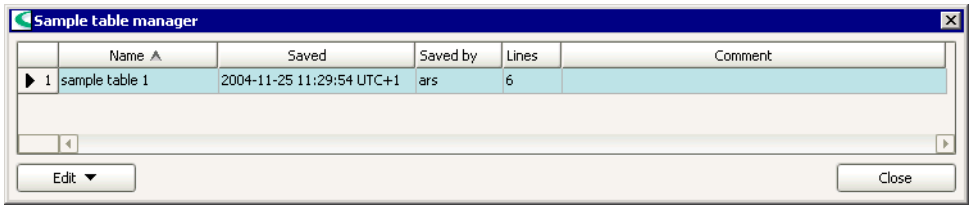


Comment on sample table
1000 characters
Entry of a comment about the sample table. This comment will also be shown in the column with the same name in the **Sample table**.

3.3.3 Manager

Sample table manager

With the symbol or the menu item **Tools, Sample table, Manager...** the window **Sample table manager** opens.



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 (column **Name**, **Saved**, **Saved by**, **Lines**, **Comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of sample table.

Saved
Date and time at which 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
Comments about the sample table that have been entered on the tab **Comment**.

Window menus

The menu **Edit** beneath the list of sample tables contains the following menu items:

Rename...
Renames the selected sample table.

Copy
Copies the selected sample table(s).

Delete...
Deletes the selected sample table(s).

Export...
Exports the selected sample table(s).

Import...
Imports sample table(s).

Rename sample table

With the menu item **Edit, Rename...** in the window **Sample table manager** the window **Rename sample table** opens for renaming the selected sample table.

Rename sample table 'Name' to 50 characters
Name for the sample table.

> ***Note***
> *The name of the sample table must be unique in the whole client/server system.*

Copy sample table

With the menu item **Edit, Copy** in the window **Sample table manager** the selected sample tables are copied under the names **Copy of 'Sample table name'**.

Delete sample table

With the menu item **Edit, Delete...** in the window **Sample table manager** the selected sample tables are deleted.

Export sample table

With the menu item **Edit, Export...** in the window **Sample table manager** each of the selected sample tables is exported in a file with the name **'Name'.mstab**. The dialog window **Select directory for export** opens in which the export folder must be selected.

Import sample table

With the menu item **Edit, Import...** in the window **Sample table manager** the dialog window **Select files to import** opens in which the sample tables to be imported must be selected. These sample tables are then imported.

3.4 Tools

3.4.1 Run test

On the tab **Single determination** with the ✔ or menu item **Tools, Run test** the Start test for the method defined under **Method** can be carried out. A requirement is that the workplace is in the **READY** status.

Method
Shows the method for the single determination.

Status display
One of the following status displays appears beneath the line number:

Run test running...
This display appears when the test sequence is running. A progress bar also appears; the test can be canceled with ✖ beside the bar.

Run test error
This display appears when an error occurs during the run test. In a determination series the user can determine to which line the error message produced by the error and shown in the normal message window belongs by using the line number.

Run test stopped manually
This display appears when the run test is canceled manually by the user.

Run test finished without errors
This display appears at the end of an error-free run test.

3.4.2 Sample assignment table

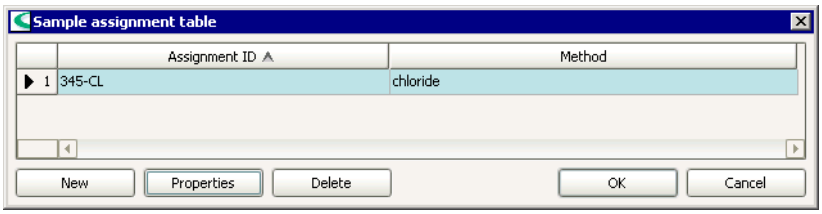
General

With the **Sample assignment table** you can ensure that samples will always be automatically processed by the **correct method** by using sample identifications. The method that is to be loaded automatically for a particular **Assignment ID** is defined in the sample assignment table. For this to work the option **Method selection by assignment ID** must be switched on in the tab **Process** of the **Properties** of the Single determination or Determination series and one of the sample identifications **ID1...ID8** must have been selected as the assignment ID. As soon as an **Assignment ID** is recognized during processing sample data for single determinations or sample data lines for determination series the corresponding method will be automatically entered in the field **Method**. This field can then no longer be edited and is shown in gray.

> ***Note***
> *The sample assignment table applies for all opened workplaces and is saved per client.*

Sample assignment table

With the menu item **Tools, Sample assignment table...** the window **Sample assignment table** opens.



The overview table shows all the defined assignment IDs and cannot itself be directly edited. With a click on the column title (column **Assignment ID**, **Method**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Assignment-ID

Identification that is assigned according to a method.

Method

Method to be loaded for the **Assignment ID**.

New

Opens the dialog window **Sample assignment** in which a new sample assignment can be entered.

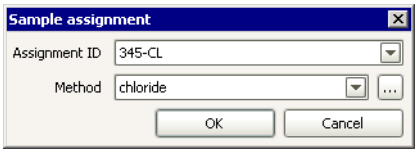
Properties

Opens the dialog window **Sample assignment** in which the sample assignment selected in the table can be edited.

Delete

Deletes the sample assignment selected in the table.

Sample assignment



Assignment ID

50 characters, selection from text templates

Entry of an identification that is assigned according to the method or selection of a defined text template. The assignment ID can contain any alphanumeric characters as well as wildcards (*). Each assignment ID must be unique, but several different assignment IDs can be assigned to the same method.

> ***Note***
> *The character * itself must be generated with **. It means any number of characters. When entering the pattern no identical pattern should be entered. If a character string fits several patterns then the first suitable pattern in the table will be used.*

Method

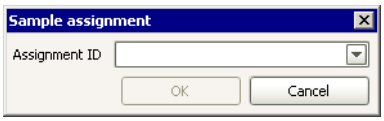
Method selection

Selection of the method in the current Method group. If the cursor is kept in this field then the name of the current method group appears as a tooltip

Group: 'Group name' if other groups are present in addition to the main group.

Opens the window Open method for the extended method selection if several method groups are present. If in this window a method is selected from a different group to the current method group then from now on this group will be the current method group for the quick selection of methods in the field **Method**.

Sample assignment request



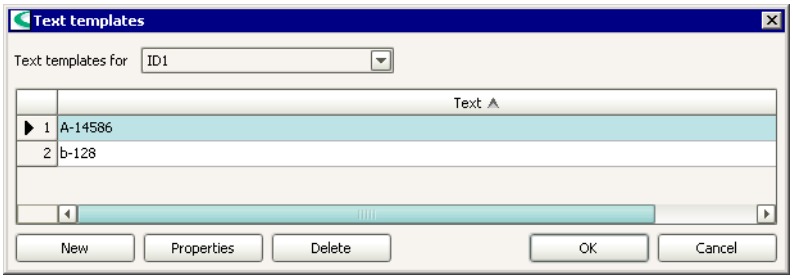
Assignment ID

50 characters, selection from text templates

Request of the assignment ID that is assigned according to the method or selection of a defined text template.

3.4.3 Text templates

For the fields **Remark** and **ID1...ID8** text templates can be defined which can be adopted for the entries in these fields on the tab **Single determination**, in the Sample table and in the Working sample table. Text templates are saved for each client.



Text templates for

[ID1], ID2, ID3, ID4, ID5, ID6, ID7, ID8, Remark

Selects the field for which the text templates are to be defined.

List of text templates

The list of text templates shows all the text templates that have been defined for the selected field. The table cannot be edited. With a click on the column **Text** the table can be sorted in increasing or decreasing sequence.

Text

Shows the defined text template for the selected field.

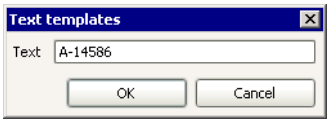
Adds a new text template.

Edits the selected text template.

Deletes the selected text template.

Edit text template

In the dialog window **Text template** the text templates can be edited.



Text

100 characters
Entry of the text template.

3.5 Subwindow Run

3.5.1 General

Subwindow Run

The subwindow **Run** contains the operating tools for controlling method runs and managing sample data. It is always shown in the program part **Workplace**, i.e. it cannot be removed from the Workplace view. The subwindow can be enlarged and diminished as required; it can also be maximized.

Tabs

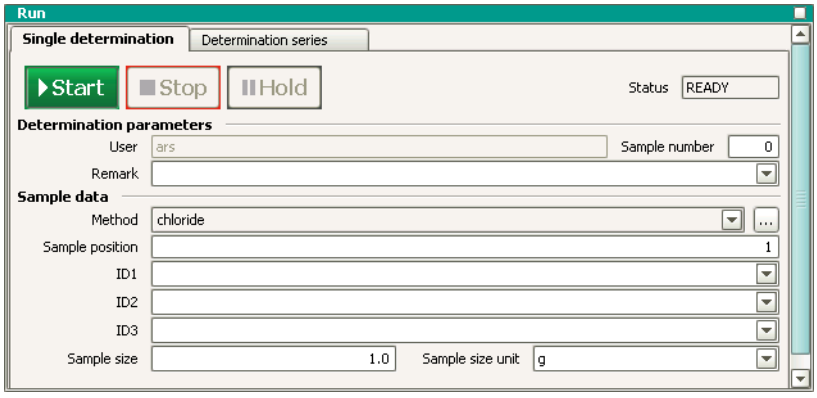
The subwindow **Run** consists of the two following tabs:

- **Single determination**
  Controls single determinations.
- **Determination series**
  Controls a determination series.

> ***Note***
> *If on the tab **Single determination** a sequence has been started (**Status** <> **READY**), then the tab **Determination series** cannot be accessed (inactive). The same applies for the tab **Single determination** if a sequence has been started on the tab **Determination series**.*

3.5.2 Single determination

Overview



On the tab **Single determination** in the subwindow **Run** the parameters and sample data for single determinations can be edited and run functions triggered. It includes the following tools and functions:

- **Operating tools**
  Buttons for starting, stopping, interrupting and continuing determinations.
- **Status display**
  Shows the current status of the workplace.
- **Determination parameters**
  Entry of general parameters for the determination.

- **Sample data**
  Entry of method and sample identification for the next determination.
- **Properties**
  Definition of the properties for the tab **Single determination**.

Operating tools

The tab **Single determination** contains the following operating tools:

Start single determination (short cut: **Ctrl G**)
This button is present in the status **READY** (no determination has been started), **COND READY** (conditioning criterion has been fulfilled) and **COND BUSY** (conditioning is running). When a start can be triggered it is green, otherwise light gray. For methods with conditioning the conditioning is started first.

Stop single determination (short cut: **Ctrl S**)
The button is present in the status **BUSY** (determination is running), **COND READY** (conditioning criterion has been fulfilled) and **COND BUSY** (conditioning is running), i.e. when conditioning has been started.

Interrupt Run
This button is active (dark gray) in the status **BUSY** (determination is running), **COND READY** (conditioning criterion has been fulfilled) and **COND BUSY** (conditioning is running). In all other cases the button is inactive (light gray). After pressing **[Hold]** the **[Cont]** button appears in its place.

Continue Run
This button is only present in the status **HOLD** (determination interrupted) and **COND HOLD** (conditioning interrupted). After pressing **[Cont]** the **[Hold]** button appears again.

Status display

On the tab **Single determination** the current status of the workplace is shown:

Status

READY
Ready for the start of a determination or for conditioning.

BUSY
Determination is running.

HOLD
Determination is interrupted.

COND BUSY
Conditioning is running.

COND READY
Conditioning criterion has been fulfilled.

COND HOLD
Conditioning is interrupted.

ERROR
Error.

Determination parameters

User

50 characters
If the option **Enforce login with user name** is switched on in the Security settings then the short name of the user currently logged in will be shown in this field. The field cannot then be edited. If work is carried out without login then a user name can be entered in this field (only in the status **READY**).

Sample number

[0] ... 99999
At each program start the sample number will be set to **0** for all workplaces. Each time that a determination is started it will be increased by **+1**. It can only be edited by the user in the status **READY**.

Remark

100 characters
Freely definable remark about the determination that is saved together with the determination. Instead of a manual entry it is also possible to select a prepared Text template.

> ***Note***
> *The field **Remark** can also be edited live while determinations are being carried out. With the context-sensitive menu item **Modify remark** the **Live modification** window opens.*

Statistics

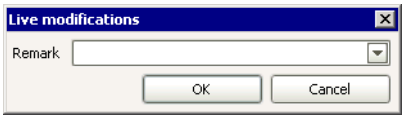
[on], off
This field is only shown when a method has been loaded in whose **START** command the option **Statistics** is switched on. The statistics defined in the method can be switched on and off manually here (only in the status **READY**).

The first field after **Statistics** shows the number of determinations that have already been carried out for the statistics (actual counter). This field cannot be edited, but in the status **READY** the context-sensitive menu item **Delete statistics** can be used to reset it to **0**, which at the same time deletes the statistics data that has already been calculated.

The second field after **Statistics** shows the number of determinations to be carried out for the statistics (set counter). It contains the value for the **Number of single determinations** defined in the **START** command as standard. This field can only be edited in the status **READY**.

Modify remark

With the context-sensitive menu item **Modify remarks** the dialog window **Live modifications** opens, in which the remark can be edited live during a running determination.



Remark

100 characters

Freely definable comments about the determination that are saved together with the determination. Instead of a manual entry it is also possible to select from prepared Text templates.

Sample data

Method

50 characters, method selection

Entry or selection of the method from the current method group that is to be used for carrying out the determination.

> ***Note***
> *If a method has been edited and saved in the Method editor or on Reprocessing then when a new determination is started the latest method version will be loaded.*

Opens the window Open method for the extended method selection if several groups of methods are present. If a method is selected in this window that is from a different method group than the current method group then this group will from now on be regarded as being the current method group for the quick selection of methods in the **Method** field.

Sample position

[1] ... 999

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. This means that **Target** = **Sample position** must be set.

ID1 ... ID8

100 characters, selection from text templates

Sample identifications ID1...ID8. In this field any text can be entered, a check for type and limits only takes place at 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 have been defined for the sample identifications then these can also be selected.

Sample size

[1.0], numerical with max. 10 numbers

Sample size (weight). In this field you can only enter numbers, decimal point, **+**, –, **E** and **e**. The limits will only be checked at the start of the determination.

> ***Note***
> *If a value is entered or imported into this field then in addition the time of data input and the data source (**manual**, **'Name of balance'**, **'Name of barcode reader'** or **'Name of import file'**) will be automatically saved together with the determination and shown in the subwindow **Information** as **Input date** and **Data source**.*
>
> ***Note***
> *If a negative value is entered in this field (e.g. during data import from a balance during back-weighing), then it will also be calculated as negative in the Formula editor.*

Sample size unit

16 characters, [g], mg, µg, mL, µL, pieces

Sample size unit (weight). Any text can be entered in this field.

Note

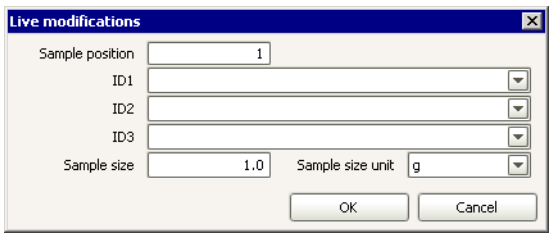
Sample position, ***ID1...ID8***, ***Sample size*** *and* ***Sample size unit*** *can be altered live during a running determination. In principle it is not possible to enter a formula in this field.*

Note

For the sample data variables ***ID1 ... ID8, Sample size, Sample size unit, Sample position*** *the name of the Method variable assigned in the* ***START*** *command will be shown automatically.*

Live modifications

With the context-sensitive menu item **Live modifications** the dialog window **Live modifications** opens, in which sample data can be altered live during a running determination.



Sample position

[1] ... 999

Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. This means that **Target** = **Sample position** must be set.

ID1 ... ID8

50 characters, selection from text templates

Sample identifications ID1...ID8. In this field any text can be entered, a check for type and limits only takes place at the start of the determination. For sample identifications of the type **Date/Tim**e the entry must be made in the format **YYYY-MM-DD hh:mm:ss**. If Text templates have been defined for the sample identifications then these can also be selected.

Sample size

[1.0], numerical with max. 10 numbers

Sample size (weight). In this field you can only enter numbers, decimal point, **+**, –, **E** and **e**. The limits will only be checked at the start of the determination.

Sample size unit

16 characters, [g], mg, µg, mL, µL, pieces

Sample size unit (weight). Any text can be entered in this field.

Note

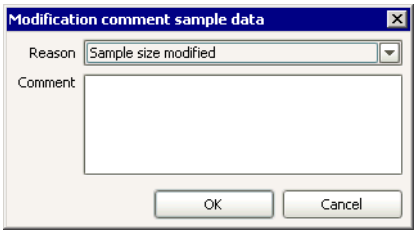
In principle it is not possible to enter a formula in the ***Sample position***, ***ID1...ID8***, ***Sample size*** *and* ***Sample size unit*** *fields.*

Note

If the option ***Comment on modification of sample data*** *is switched on in the Security settings window then before saving the window* ***Modification comment sample data*** *opens.*

Modification comment for sample data

If the option **Comments on modification of sample data** is switched on in the Security settings then before the edited sample data is accepted the window **Modification comment sample data** opens first, in which a reason for the modification must be selected and comments about the modification must be entered.



Reason

Selection from standard texts
Slection from the Default reasons defined in the dialog window **Security settings** for the category **Modification of sample data**.

Comment

1000 characters
Entry of comments about the modification to the sample data.

Determination run

A determination that is started on the tab **Single determination** in the subwindow **Run** takes place as follows:

1 - Load sample data

The Sample data entered on the tab **Single determination** is loaded for the determination.

2 - Select method

Method selection triggers the following actions:

- **Select method without assignment ID**
  If the option **Method selection by assignment ID** is not switched on on the tab **Process** then the method selected in the field **Method** will remain loaded.
- **Select method with assignment-ID**
  If the option **Method selection by assignment ID** is switched on on the tab **Process** then the **Sample assignment ID** will be used to load the method defined in the **Sample assignment table**.

3 - Carry out start test

During the Start test the following checks and actions are triggered:

- **Right to carry out the method?**
  Checks whether the logged-in user has the right to execute the particular method.
- **Method executable?**
  Checks whether the particular method is executable. If the method is non-executable then a message appears asking for the Method test to be carried out and the method edited accordingly.
- **Check device (module) and rack**
  Checks whether the devices (or device types), modules (e.g. measuring inputs, towers, etc.) and racks demanded in the device-specific commands are present and available or assigned. If the device has

not yet been assigned in a command then the window **Device assignment** appears for assigning the device.

- **Check solutions**
  Checks whether the solutions demanded in the device-specific commands are present and available.
- **Check sensors**
  Checks whether the sensors demanded in the device-specific commands are present and available.

> ***Note***
> *The Start test can also be triggered manually in the* ***READY*** *status with the menu item* ***Tools, Run test****.*

4 - Preconditioning (only for methods with conditioning)

In methods that contain commands with switched-on conditioning and in which the option **Automatic conditioning** is switched on in the **START** command then preconditioning will start for all these commands. Preconditioning does not belong to the determination itself and does not increase any counter (**Sample number**, **Statistics**).

- **Conditioning requirement not fulfilled**
  After the start of preconditioning the status changes to **COND BUSY**. In this status conditioning can be started with **[Start]** even though the conditioning requirement has not been fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and then continued with **[Cont]**. If an error occurs during conditioning then neither the Error track nor the Exit track will be carried out.
- **Conditioning requirement fulfilled**
  If the conditioning requirement has been fulfilled then the status changes to **COND READY**. In this status the determination can be started with **[Start]**. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and then continued with **[Cont]**. The conditioning requirement will continue to be monitored continuously until the determination has been started.

5 - Start method

At the start of the method the following checks and actions are triggered:

- **Check sample data**
  Checks that the entered Sample data corresponds to that defined in the Method variables and is valid.
- **Assign determination ID**
  An unambiguous determination ID is assigned for the determination.
- **Reserve device (module)**
  The devices (or their functional units) used by the device-dependent commands contained in the method are reserved for the duration of the determination, i.e. they cannot be used in other workplaces nor can they be operated manually.
- **Increment sample number**
  The **Sample number** is increased by **+1**.
- **Increment statistics counter**
  If statistics has been switched on in both the **START** command and on the tab **Single determinations** then the statistics counter is increased by **+1**. If a new method is loaded or if the statistics counter agrees with

the set counter then the current statistical data will first be deleted and the statistics counter reset to **0**.

6 - Main run

When processing the loaded method the following actions can be carried out:

- **Process main track**
  After the start of the Main track the status changes to **BUSY**. The commands of the main track and the other tracks that it calls up are processed in sequence. If the main track calls up tracks that are not free then a pause will be made until these tracks can be started.
- **Interrupt and continue run**
  A running determination can be interrupted at any time with **[Hold]** and then continued with **[Cont]**. All the active tracks will be stopped and continued together.
- **Cancel sequence**
  A running series can be canceled at any time with **[Stop]**. An Exit track may be carried out; the determination will be terminated.
- **Cancel by error**
  If when a determination is being carried out an error occurs that causes the cancellation of the determination then an Error track may be carried out; the determination will be terminated.
- **Process exit track**
  When the main track and all the other tracks that it has called up have been completed then an Exit track may be carried out; the determination will be terminated. After the end of the Main track the status changes to **READY**.

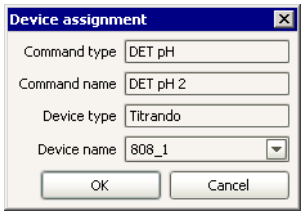
7 - Post-conditioning (only for methods with conditioning)

In methods that contain commands with switched-on conditioning and in which the option **Automatic conditioning** is switched on in the **START** command then for all these commands post-conditioning will be started automatically with the loaded method immediately after the end of the track that contains the conditioning command.

- **Conditioning requirement not fulfilled**
  After the start of post-conditioning the status changes to **COND BUSY**. In this status a new determination can be started with **[Start]**, even though the conditioning requirement has not been fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and then continued with **[Cont]**. If an error occurs during conditioning then neither the Error track nor the Exit track will be carried out.
- **Conditioning requirement fulfilled**
  If the conditioning requirement has been fulfilled then the status changes to **COND READY**. In this status a new determination can be started with **[Start]**. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and then continued with **[Cont]**. The conditioning requirement will continue to be monitored continuously until the determination has been started.

Device assignment

If at the Start test it is discovered that no device has been assigned for a device-specific command then the window **Device assignment** appears for assigning the device:



Command type
Shows the command type.

Command name
Shows the command name.

Device type
Shows the device type selected in the command.

Device name
Device name
Selection of a device from the device table. Only those devices being able to execute the command are selectable.

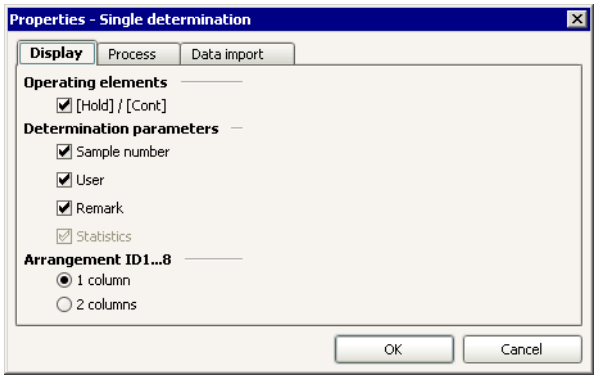
Properties

The properties for the tab **Single determination** are set on the following 3 tabs:

- **Display**
  Defines the columns to be shown on the tab **Single determination**.
- **Process**
  Options for processing single determinations.
- **Data import**
  Switches the import of external data on and off for the fields on the tab **Single determination**.

Display

Defines the operating elements and columns to be shown on the tab **Single determination**.



Operating elements

[Hold] / [Cont]
[on], off
Switches the display of the operating buttons **[Hold]** and **[Cont]** on and off.

Determination parameters

Sample number

[on], off

Switches the display of the field **Sample number** on and off.

User

[on], off

Switches the display of the field **User** on and off.

Remark

[on], off

Switches the display of the field **Remark** on and off.

Statistics

[on], off

Switches the display of the statistics fields on and off.

Arrangement ID1...8

1 column

[on], off

If this option is switched on then the sample identifications **ID1...ID8** are displayed in a single column.

2 columns

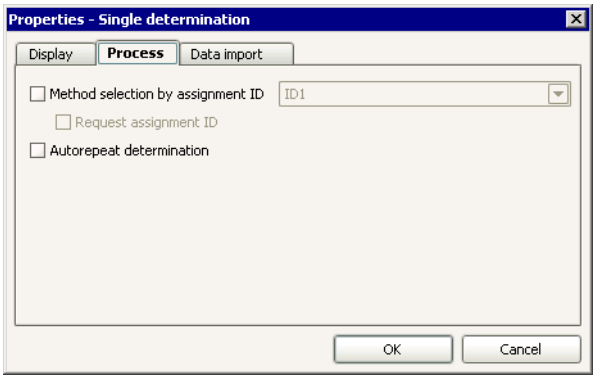
on, [off]

If this option is switched on then the sample identifications **ID1...ID8** are displayed in two columns.

> ***Note***
> *The fields **Sample size** and **Sample size unit** are always shown in one line horizontally.*

Process

Options for processing single determinations.



Method selection by assignment ID

on, [off]

[ID1] ... ID8

If this option is switched on then the selected sample identification for the method selection will be used. This identification contains the descriptive **Assignment ID** that can no longer be edited. If this ID agrees with one of the assignment IDs in the Sample assignment table then the corresponding method will be entered in the field **Method** from this table.

Request assignment ID

on, [off]

If this option is switched on then the **Assignment ID** will be requested directly after the start of the determination in the dialog window **Sample assignment** (*see Workplace - Tools - Sample assignment table - Sample assignment request*).

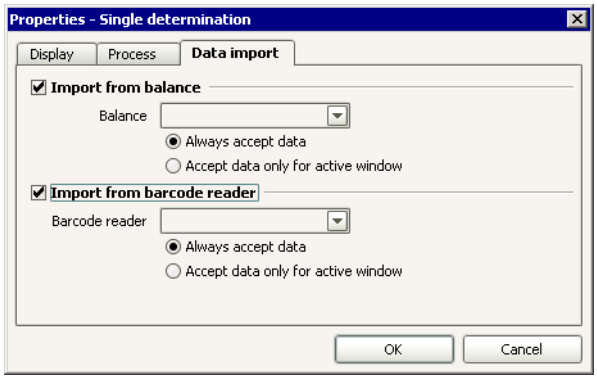
Autorepeat determination

on, [off]

If this option is switched on then at the end of a determination the next determination with the same method will be started automatically. In order to stop the autorepeat the determination has to be stopped with **[Stop]**.

Data import

Switches the import of external data on and off for the fields on the tab **Single determination**.



Import from balance

on, [off]

If this option is switched on 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 **Sample size unit**.

> ***Note***
> *In order to be able to import sample identifications from the balance the data export must be set accordingly on the balance (use names **ID1**, **ID2**, **ID3**, **ID4**).*

Balance

Device name

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

Always accept data

[on], off

If this option is selected then the data transmitted from the balance will be imported into the tabs **Single determination** of all opened workplaces for which this balance has been defined as the data source.

Accept data only for active window

on, [off]

If this option is selected then the data transmitted from the balance will only be imported into the tab **Single determination** of the active workplace.

Import from barcode reader

on, [off]

If this option is selected then external data from the selected barcode reader will be imported in the fields on the tab **Single determination**. The field into which the data is to be imported is defined in the device properties of the Barcode reader.

Barcode reader

Device name

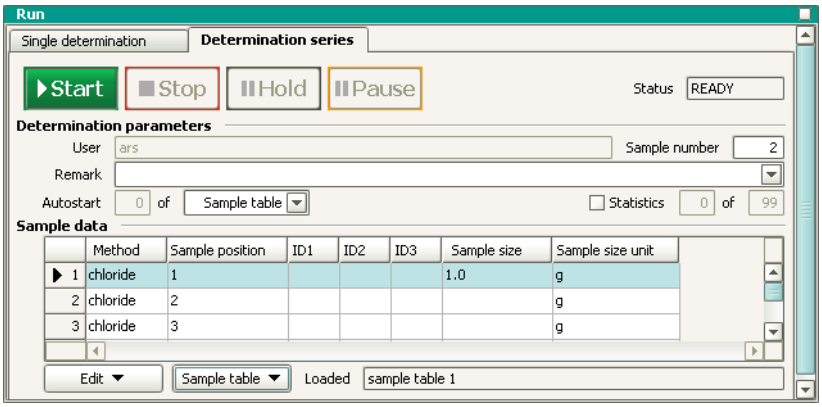
Selection of the barcode reader from which data is to be imported.

Always accept data
[on], off
If this option is selected then the data transmitted from the barcode reader will be imported into the tabs **Single determination** of all opened workplaces for which this barcode reader has been defined as the data source.

Accept data only for active window
on, [off]
If this option is selected then the data transmitted from the barcode reader will only be imported into the tab **Single determination** of the active workplace.

3.5.3 Determination series

Overview



On the tab **Determination series** in the subwindow **Run** parameters and sample data for a determination series can be edited and run functions triggered. It includes the following tools and function:

- **Operating tools**
  Buttons for starting, stopping, interrupting and continuing determinations and series.
- **Status display**
  Shows the current status of the workplace.
- **Determination parameters**
  Entry of general parameters for the determinations.
- **Sample data**
  Entry of sample data for the next determinations.
- **Properties**
  Definition of the properties for the tab **Determination series**.

Operating tools

On the tab **Determination series** the following operating tools can be found:

Start series (short cut: **Ctrl G**)
Starts the first determination of a sample series. The button is present in the status **READY** (no determination has been started). If a start can be triggered it is green, otherwise it is light gray. In methods with conditioning the conditioning is started first, and then (status **COND READY**) the determination starts automatically.

Stop series (short cut: **Ctrl S**)
Immediately stops the running determination (or conditioning) of a sample series. This button is present in the status **BUSY** (determination is running), **COND READY** (conditioning criterion has been fulfilled) and **COND BUSY** (conditioning is running) i.e. after conditioning has been started.

Interrupt run
Interrupts the run of the determination in a sample series. The button is active (dark gray) in the status **BUSY** (determination is running), **COND READY** (conditioning criterion has been fulfilled) and **COND BUSY** (conditioning is running). In all other cases the button is inactive (light gray). After pressing the **[Hold]** button the **[Cont]** button appears in its place.

Continue run
Continues the run of the determination in a sample series. The button is only present in the status **HOLD** (determination interrupted) and **COND HOLD** (conditioning interrupted). After pressing the **[Cont]** button the **[Hold]** button appears again.

Interrupt series
With this button the running determination in a sample series will be continued to its end, but no new determination will be started. The button is present in the status **BUSY** (determination is running). In all other cases the button is inactive (light gray). After pressing **[Pause]** the button **[Cont]** appears in its place.

Continue series
Starts the next determination in the interrupted sample series. The button is only present in the status **HOLD** (series interrupted). After pressing **[Cont]** the **[Pause]** button appears again in its place.

Status display

On the tab **Determination series** the current status of the workplace is shown:

Status

READY
Ready for the start of a determination or for conditioning.

BUSY
Determination is running.

HOLD
Determination is interrupted.

PAUSE

Series is interrupted.

COND BUSY
Conditioning is running.

COND READY
Conditioning criterion has been fulfilled.

COND HOLD
Conditioning is interrupted.

ERROR
Error.

Determination parameters

User

50 characters
If the option **Enforce login with user name** is switched on in the Security settings then the short name of the user currently logged in will be shown in this field. The field cannot then be edited. If work is carried out without log in then a user name can be entered in this field (only in the status **READY**).

Sample number

[0] ... 99999
At each program start the sample number will be set to **0** for all workplaces. Each time that a determination is started it will be increased by **+1**. It can only be edited by the user in the status **READY**.

Remark

100 characters
Freely definable remark about the determination that is saved together with the determination. Instead of a manual entry it is also possible to select a prepared Text template.

> ***Note***
> *The field **Remark** can also be edited live while determinations are being carried out. With the context-sensitive menu item **Modify remark** the **Live modifications** window opens.*

Autostart

1 ... 999, [Sample table]
Number of automatic, internal starts of determinations within a sample series.

The first field after **Autostart** shows the number of determinations that have already been carried out (actual counter). This field cannot be edited, but in the status **READY** or **PAUSE** the context-sensitive menu item **Reset autostart counter** can be used to reset it to **0**.

The second field after **Autostart** shows the total number of determinations to be carried out per series (set counter). It contains the entry **Sample table** as standard which indicates the number of lines of the working sample table. This field can only be edited in the status **READY**.

> ***Note***
> *The second field after **Autostart** can also be altered live while determinations are being carried out. With the context-sensitive menu item **Modify autostart counter** the window **Live modifications** opens.*

Statistics

[on], off
This field is only shown when a method has been loaded in whose **START** command the option **Statistics** is switched on. The statistics defined in the

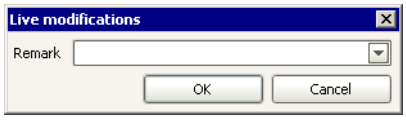
method can be switched on and off manually here (only in the status **READY**).

The first field after **Statistics** shows the number of determinations that have already been carried out for the statistics (actual counter). This field cannot be edited, but in the status **READY** the context-sensitive menu item **Delete statistics** can be used to reset it to **0**, which at the same time deletes the statistics data that has already been calculated.

The second field after **Statistics** shows the number of determinations to be carried out for the statistics (set counter). It contains the value for the **Number of single determinations** defined in the **START** command as standard. This field can only be edited in the status **READY**.

Modify remark

With the context-sensitive menu item **Modify remarks** the dialog window **Live modifications** opens, in which the remark can be edited live during a running determination.



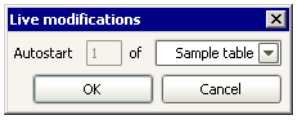
Remark

100 characters

Freely definable comments about the determination that are saved together with the determination. Instead of a manual entry it is also possible to select from prepared Text templates.

Modify autostart counter

With the context-sensitive menu item **Modify autostart counter** the dialog window **Live modifications** opens, in which the autostart counter can be altered live during a running determination.



Autostart

1 ... 999, [Sample table]

Number of automatic, internal starts of determinations within a sample series.

The first non-editable field after **Autostart** shows the number of determinations that have already been carried out (actual counter).

The second editable field after **Autostart** shows the total number of determinations to be carried out per series (set counter).

Sample data

Under **Sample data** the current working sample table is shown that contains the sample data for the determination series in tabular form. Each line corresponds to a single determination.

Working sample table

The table contains the sample data lines already saved in the sample table as well as a line for entering new data which contains an asterisk instead of the line number. The table cannot be directly edited or sorted.

For the meaning of the columns please refer to Edit sample data.

The lines in the working sample data table can have different background colors:

Light gray background
Processed lines. Data in these lines can no longer be altered. These lines only appear when on the tab **Process** in the properties of the determination series the option **Delete processed lines** is switched off.

Dark gray background
Selected processed line.

Light orange background
Currently running line.

Dark orange background
Selected currently running line. If sample data is only altered after the start of the determination (in the status **BUSY**) then this is regarded as being a live modification.

White background
Lines that have not yet been processed. These lines can be edited.

Turquoise background
Selected line that has not yet been processed.

Loaded
Shows the sample table whose data has been loaded into the working sample table with **Sample table, Load...**. If no sample table has been loaded or if all the lines have been deleted then this field will be empty. If data in a loaded sample table is later altered or if new lines are added then in addition to the name **(modified)** will be shown.

For possible ways of editing the working sample table and the window menu please refer to *Edit working sample data*.

Determination run

In a series of determinations that are started on the tab **Determination series** in the subwindow **Run** each determination takes place as follows:

1 - Load sample data

The sample data entered in the working sample table for the current line will be loaded for the determination.

2 - Select method

Method selection triggers the following actions:

- **Select method without assignment ID**
  If the option **Method selection by assignment ID** is not switched on the tab **Process** then the method selected in the field **Method** will remain loaded.

- **Select method with assignment ID**
  If the option **Method selection by assignment ID** is switched on the tab **Process** then the **Sample assignment ID** will be used to load the method defined in the **Sample assignment table**.

3 - Carry out start test

During the Start test the following checks and actions are triggered:

- **Right to carry out the method?**
  Checks whether the logged-in user has the right to execute the particular method.
- **Method executable?**
  Checks whether the particular method is executable. If the method is non-executable then a message appears asking for the method test to be carried out and the method edited accordingly.
- **Check device (module) and rack**
  Checks whether the devices (or device types), modules (e.g. measuring inputs, towers, etc.) and racks demanded in the device-specific commands are present and available or assigned. If the device has not yet been assigned in a command then the window **Device assignment** appears for assigning the device.
- **Check solutions**
  Checks whether the solutions demanded in the device-specific commands are present and available.
- **Check sensors**
  Checks whether the sensors demanded in the device-specific commands are present and available.
- **Check sample data**
  Checks whether the entered sample data corresponds to that defined in method variables and is valid.

> ***Note***
> *The Start test for the number of lines defined under **Autostart** can also be triggered manually in the **READY** status with the menu items **Tools, Run test** or **Sample table, Run test**.*

4 - Preconditioning (only for methods with conditioning)

In methods that contain commands with switched-on conditioning and in which the option **Automatic conditioning** is switched on in the **START** command then preconditioning will start for all these commands. Preconditioning does not belong to the determination itself and does not increase any counter (**Sample number** or **Statistics**).

- **Conditioning requirement not fulfilled**
  After the start of preconditioning the status changes to **COND BUSY**. In this status conditioning can be interrupted with **[Hold]** and continued with **[Cont]**. If an error occurs during conditioning then neither the Error track nor the Exit track will be carried out.
- **Conditioning requirement fulfilled**
  If the conditioning requirement has been fulfilled the status changes to **COND READY** and the method then starts automatically.

5 - Start method

At the start of the method the following checks and actions are triggered:

- **Assign determination ID**
  An unambiguous determination ID is assigned for the determination.
- **Reserve device (module)**
  The devices (or their functional units) used by the device-dependent commands contained in the method are reserved for the duration of the determination, i.e. they cannot be used in other workplaces nor can they be operated manually.
- **Increment sample number**
  The **Sample number** is increased by **+1**.
- **Increment statistics counter**
  If statistics has been switched on in both the **START** command and on the tab **Determination series** then the statistics counter will be increased by **+1**. If a new method is loaded or if the statistics counter agrees with the set counter then the current statistical data will first be deleted and the statistics counter reset to **0**.

6 - Main run

When processing the loaded method the following actions can be carried out:

- **Process series start track**
  At the start of the first determination in a series the Series start track is started. If during the run of this track **[Stop]** is pressed then the Exit track will start; if an error occurs the Error track starts.
- **Process main track**
  After the start of the Main track the status changes to **BUSY**. The commands of the main track and the other tracks that it calls up are processed in sequence. If the main track calls up tracks that are not free then a pause will be made until these tracks can be started.
- **Interrupt and continue run**
  A running determination can be interrupted at any time with **[Hold]** and then continued with **[Cont]**. All the active tracks will be stopped and continued together.
- **Interrupt and continue series**
  A running series can be interrupted at any time with **[Pause]**. The determination that is running in the series will be completed, but no new determination will be started. With **[Cont]** the next determination in the interrupted sample series will be started.
- **Cancel sequence**
  A running determination can be canceled at any time with **[Stop]**. An Exit track may be carried out; the determination will be terminated.
- **Cancel by error**
  If when a determination is being carried out an error occurs that causes the cancellation of the determination then an Error track may be carried out; the determination will be terminated.
- **Process exit track**
  When the main track and all the other tracks that is has called up have been completed then an Exit track may be carried out; the determination will be terminated.
- **Process series end track**
  At the end of the last determination in a series the Series end track will start. If when this track is being processed **[Stop]** is pressed then the

determination will be terminated, if an error occurs then the Error track starts.

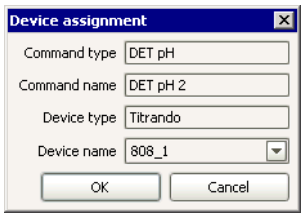
7 - Post-conditioning (only for methods with conditioning)

In methods that contain commands with switched-on conditioning and in which the option **Automatic conditioning** is switched on in the **START** command then for all these commands post-conditioning will be started automatically with the loaded method immediately after the end of the track that contains the conditioning command. After the start of post-conditioning the status changes to **COND BUSY**. In this status the conditioning can be stopped with **[Stop]** or interrupted with **[Hold]** and continued with **[Cont]**. If an error occurs during conditioning then neither the Error track nor the Exit track will be carried out.

- **Conditioning between two determinations**
  Conditioning will continue to run until the new method is loaded for the next determination.
- **Conditioning at the end of the last determination**
  After the Series end track has been carried out conditioning will continue to take place until it is terminated with **[Stop]**.

Device assignment

If at the Start test it is discovered that no device has been assigned for a device-specific command then the window **Device assignment** appears for assigning the device:



Command type
Shows the command type.

Command name
Shows the command name.

Device type
Shows the device type selected in the command.

Device name
Device name
Selection of a device from the device table. Only those devices being able to execute the command are selectable.

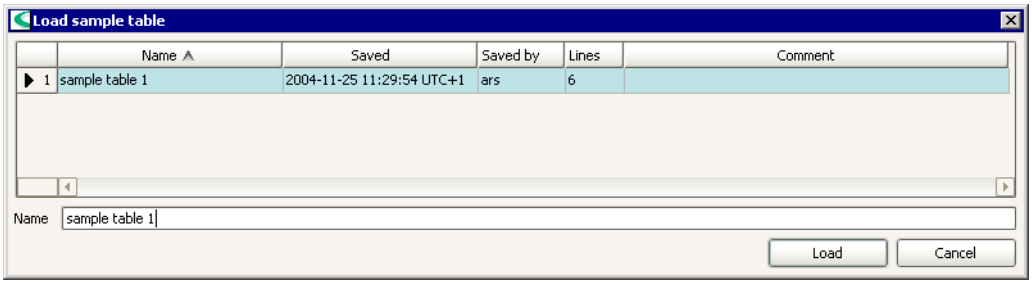
Working sample table

Load new and empty sample table

With the menu item **Sample table, New** on the tab **Determination series** a new and empty sample table loaded as a working sample table, i.e. all existing sample data lines are deleted.

Load sample table

With the menu item **Sample table, Load...** on the tab **Determination series** the window **Load sample table** opens in which one of the globally available sample tables can be selected and loaded as working sample table.



List of sample tables

The list of sample tables contains information about all the saved sample tables. The tables cannot be edited. With a click on the column title (column **Name**, **Saved**, **Saved by**, **Lines**, **Comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of sample table.

Saved
Date and time at which 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
Comments about the sample table that have been entered on the tab **Comment**.

Load sample table

Name

50 characters

Name of the sample table that is to be opened. If one of the sample tables in the table is selected then the name will be entered automatically in this field. It can also be entered manually.

Load

Data of the selected sample table is loaded into the working sample table. Additionally, all properties of the sample table are taken over except for the settings for **Import from file** and **Import format** for the working sample table.

Edit working sample table

The table contains the sample data lines already saved in the sample table as well as a line for entering new data which contains an asterisk instead of the line number. The table cannot be directly edited or sorted.

For the meaning of the columns please refer to Edit sample data.

The lines in the working sample data table can have different background colors:

Light gray background
Processed lines. Data in these lines can no longer be altered. These lines only appear when on the tab **Process** in the properties of the determination series the option **Delete processed lines** is switched off.

Dark gray background
Selected processed line.

Light orange background
Currently running line.

Dark orange background
Selected currently running line. If sample data is only altered after the start of the determination (in the status **BUSY**) then this is regarded as being a live modification.

White background
Lines that have not yet been processed. These lines can be edited.

Turquoise background
Selected line that has not yet been processed.

Loaded
Shows the sample table whose data has been loaded into the working sample table with **Sample table, Load...**. If no sample table has been loaded or if all the lines have been deleted then this field will be empty. If data in a loaded sample table is later altered or if new lines are added then in addition to the name **(modified)** will be shown.

Window menus

The menu **Edit** below the working sample table contains the following menu items:

Edit line
Opens the window **Edit line** in which the sample data of the selected line can be edited.

Insert new line
Inserts a new empty line above the selected line. This automatically opens the window **Edit line** in which the sample data for the new line can be edited.

Cut lines
Transfers the selected lines to the clipboard.

Copy lines
Copies the selected lines to the clipboard.

Paste lines
Inserts lines from the clipboard above the selected line.

Delete lines
Deletes the selected lines.

Increment
With the cursor, that has the form ✜ , it is possible to select a column section in the table that is to be automatically incremented. This means that in the selected cells of a column (**Sample position**, **ID1...ID8**), starting from the first selected cell, the number at the end of the expression will be automatically increased by 1. This functions with both pure numbers and text expressions at whose end a number is to be found (e.g. **ABC10** → **ABC11** → **ABC12** ...).

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** 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.

The menu **Sample table** beneath the sample table contains the following menu items:

New

Loads a new and empty sample table.

Load...

Loads a saved sample table into die working sample table. The window **Load sample table** opens where the sample table can be selected.

Save as...

Opens the window **Save sample table** where the current sample table can be save under a new name.

Run test...

Execute the Run test for the number of lines defined under **Autostart** in the working sample table.

Print (PDF)...

Opens the window **Print sample table (PDF)** in which the output format can be defined. The sample table is then produced as a PDF file.

Properties...

Opens the window **Properties - Determination series** in which the properties for the selected sample table can be set.

Import data...

Opens the window **Select files to import** for the import of external data.

Reset

Reset all precessed sample data lines to the status "not processed".

Move lines by drag & drop

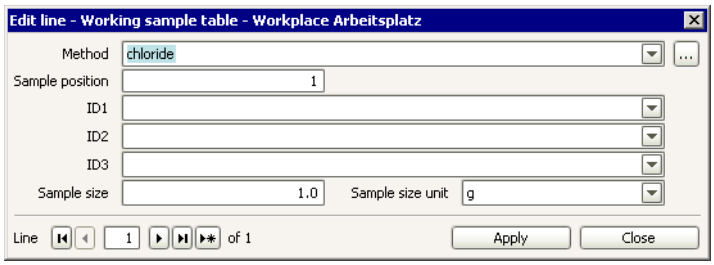
The lines selected in the working sample table can be moved by drag&drop into an opened sample table.

Copy lines by drag & drop

The lines selected in the working sample table can be copied with the **Ctrl key** pressed down by drag&drop into an opened sample table.

Edit sample data

With the menu item **Edit, Edit line** on the tab **Determination series** the dialog window **Edit line** opens.



The fields in this dialog window have the same color as the lines in the working sample table:

Light gray background
Processed lines. Data in these lines can no longer be altered.

Orange background
Currently running line. If sample data is only altered after the start of the determination (in the status **BUSY**) then this is regarded as being a live modification.

White background
Lines that have not yet been processed. These lines can be edited.

> ***Note***
> *In these fields of this dialog window generally no formula can be entered.*

Method
50 characters, method selection
Entry or selection of the method from the current method group with which the determination is to be carried out.

Open the window Open method for the extended method selection, if several method groups exist. If in this window a method from a different group to the current method group is selected then from now on this group will be the current method group for the quick selection of methods in the **Method** field.

Sample position
[1] ... 999
Position of the sample on the rack. This number is used to move to the sample position with the command **MOVE**. For this **Target** = **sample position** must be set.

ID1 ... ID8
100 characters, selection from text templates
Sample identifications ID1...ID8. In this field any text can be entered, a check of the type and limits is only made at the start of the determination. For sample identifications of the **Date/Time** type the input must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If Text templates have been defined for sample identification then they can be selected.

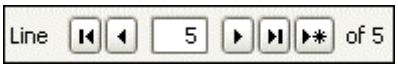
Sample size
[1.0], numerical with max. 10 numbers
Sample size (weight). In this field only numbers, decimal point, **+**, –, **E** and **e** can be entered. A check of the limits is only made at the start of the determination.

> ***Note***
> *If a value is entered or imported into this field then in addition the time of data input and the data source (**manual**, **'Name of balance'**, **'Name of barcode reader'** or **'Name of import file'**) will be automatically saved together with the determination and shown in the subwindow **Information** as **Input date** and **Data source**.*
>
> *If a negative value is entered in this field (e.g. during data import from a balance during back-weighing), then it will also be calculated as negative in the Formula editor.*

Sample size unit
16 characters, [g], mg, µg, mL, µL, pieces
Sample size unit (weight). Any text can be entered in this field.

> ***Note***
> *If data of the current sample data line for the running determination is being modified this is regarded as being a live modification. If the option **Comment on modification of sample data** is switched on in the Security settings then before saving the window **Modification comment sample data** opens.*

Navigation



Shows the currently selected line in the sample table with the following functions:

Jumps to first line in the sample table.

Jumps to previous line in the sample table.

Possibility of entering the required line number, which will be moved to directly when [Enter] is pressed.

Jumps to next line in the sample table. If the end of the table has been reached then a new line will be generated automatically and also jumped to. This increases the line number by **+1**.

Jumps to last line in the sample table.

Jumps to a new empty line. This increases the line number by **+1**.

Functions

Applies the entered sample data in the corresponding line in 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 with the [Enter] key. However, with [Enter] the next line will also be jumped to automatically.

Close

Closes the input window. The current sample data will not be entered in the sample table (this must first be triggered with **[Apply]**).

Import sample data

With the menu item **Sample table, Import data...** on the tab **Determination series** the dialog window **Select files to import** opens, in which the file from which the sample data is to be imported must be selected.

File name

File name

Entry or selection of the file from which data is to be imported.

File type

[*.csv]

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

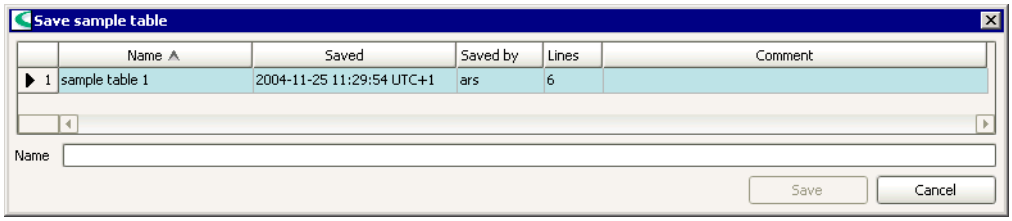
Open

The sample data from the selected file is inserted at the end of the sample table. For each line data for the number of data fields defined on the tab **Display** is expected in the run listed there.

> ***Note***
> *Irrespective of the number of data fields defined on the tab **Display**, all sample data in the format **Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit** have to be defined in the import file for each line.*

Save sample table

With the menu item **Sample table, Save as...** on the tab **Determination series** the window **Save sample table** opens in which a name for the working sample table to be saved can be entered or selected.



List of sample tables

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

Name

Name of sample table.

Saved

Date and time at which 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

Comments about the sample table that have been entered on the tab **Comment**.

Save sample table

Name

50 characters
Entry of the name under which the working sample table is to be saved.

> ***Note***
> *The name of the sample table must be unique in the whole client/server system.*

Save

Save the sample table under the required name.

Run test

On the tab **Single determination** with the ✔ or menu item **Tools, Run test** the Start test for the method defined under **Method** can be carried out. A requirement is that the workplace is in the **READY** status.

Method
Shows the method for the single determination.

Status display
One of the following status displays appears beneath the line number:

Run test running...
This display appears when the test sequence is running. A progress bar also appears; the test can be canceled with ✖ beside the bar.

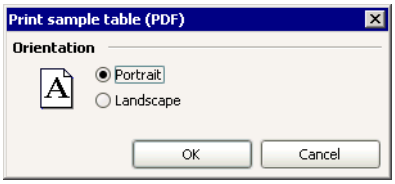
Run test error
This display appears when an error occurs during the run test. In a determination series the user can determine to which line the error message produced by the error and shown in the normal message window belongs by using the line number.

Run test stopped manually
This display appears when the run test is canceled manually by the user.

Run test finished without errors
This display appears at the end of an error-free run test.

Print sample table (PDF)

With the menu item **Sample table, Print (PDF)...** on the tab **Determination series** the window **Print sample table (PDF)** opens, in which the output format for the PDF output can be selected.



Orientation

Portrait
[on], off
Output in portrait format.

Landscape
[on], off
Output in landscape format.

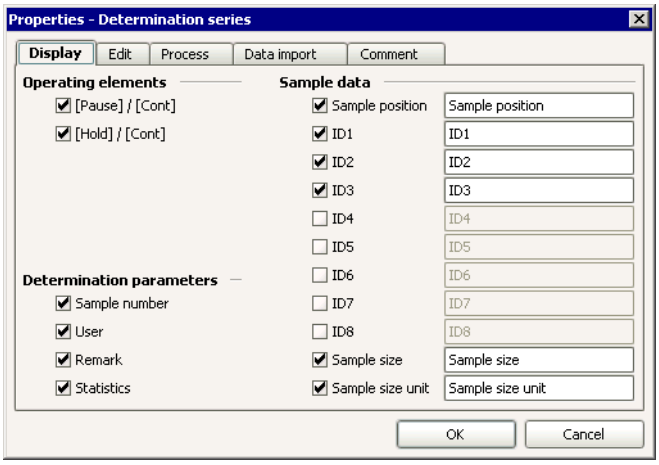
Properties

The properties for the tab **Determination series** are set on the following 5 tabs:

- **Display**
  Definition of the columns to be shown in the working sample table.
- **Edit**
  Options for editing the working sample table on the tab **Determination series** and in the dialog window **Edit line**.
- **Process**
  Options for processing the working sample table on the tab **Determination series**.
- **Data import**
  Switching the import of external data on and off for working sample table fields.
- **Comment**
  Entry of a comment about the working sample table.

Display

Defines the operating elements and columns to be shown on the tab **Determination series**.



Operating elements

[Pause] / [Cont]
[on], off
Switches the display of the operating buttons **[Pause]** and **[Cont]** on and off.

[Hold] / [Cont]
[on], off
Switches the display of the operating buttons **[Hold]** and **[Cont]** on and off.

Determination parameters

Sample number
[on], off
Switches the display of the field **Sample number** on and off.

User
[on], off
Switches the display of the field **User** on and off.

Remark
[on], off
Switches the display of the field **Remark** on and off.

Statistics
[on], off
Switches the display of the statistics fields on and off.

Sample data

Sample position

[on], off
[Sample position], 50 characters
Switches the display of the column **Sample position** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

ID1 ... ID3

[on], off
[ID1...3], 50 characters
Switches the display of the columns **ID1...ID3** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

ID4 ... ID8

on, [off]
[ID4...8], 50 characters
Switches the display of the columns **ID4...ID8** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

Sample size

[on], off
[Sample size], 50 characters
Switches the display of the column **Sample size** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

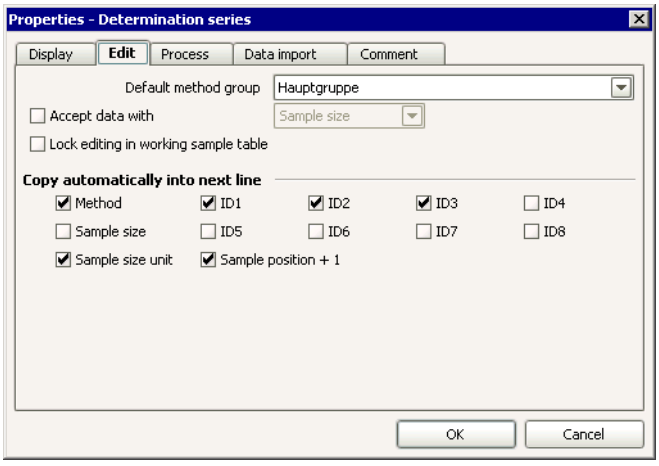
Sample size unit

[on], off
[Sample size unit], 50 characters
Switches the display of the column **Sample size unit** in the sample table on and off. It is also possible to rename the title for this column in the working sample table.

> ***Note***
> *The names defined in the **START** command under **Method variables** are always used for the determination data.*

Edit

Options for editing the working sample table on the tab **Determination series** and in the dialog window **Edit line**.



Default method group

[Main group], Method groups
Slection of the standard method group for the selection of methods in the working sample table.

Accept data with

on, [off]

ID1 ... ID8, [Sample size],Sample size unit, Sample position

Selection of the data field that must be filled during automatic data import via balance, barcode reader or file so that the data in the line will be entered in the sample data silo and a switch will be made to the next line. If the particular column is empty then further imported data will be written into the same line. This means that it is e.g. possible to first enter sample identification via a barcode reader into a line and then to accept the sample size from a balance in the same line.

> ***Note***
> *For manual data input this option is irrelevant.*

Lock editing in working sample table

on, [off]

If this option is switched on then editing lines in the sample table loaded in the working sample table is disabled.

Copy automatically into next line

Method

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

ID1 ... ID3

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

ID4 ... ID8

on, [off]

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

Sample size

on, [off]

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

Sample size unit

[on], off

If this option is switched on then the contents of this field will be filled automatically with the contents of the previous line when a new sample data line is created.

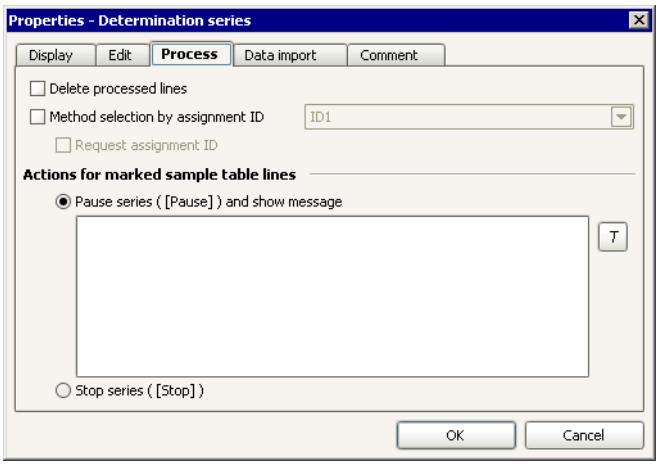
Sample position + 1

[on], off

If this option is switched on then the contents of this field will be automatically increased by **+1** when a new sample data line is created.

Process

Options for processing the working sample table on the tab **Determination series**.



Delete processed lines
on, [off]
If this option is switched on then lines in the working sample table that have been fully processed will be automatically deleted.

Method selection by assignment ID
on, [off]
[ID1] ... ID8
If this option is switched on then the selected sample identification for the method selection in the working sample table will be used. This identification contains the descriptive **Assignment ID** that can no longer be edited. If this ID agrees with one of the assignment IDs in the Sample assignment table then the corresponding method will be entered in the field **Method** from this table.

Request assignment ID
on, [off]
If this option is switched on then the **Assignment ID** will be requested directly after the start of the determination in the dialog window **Sample assignment** (*see Workplace - Tools - Sample assignment table*).

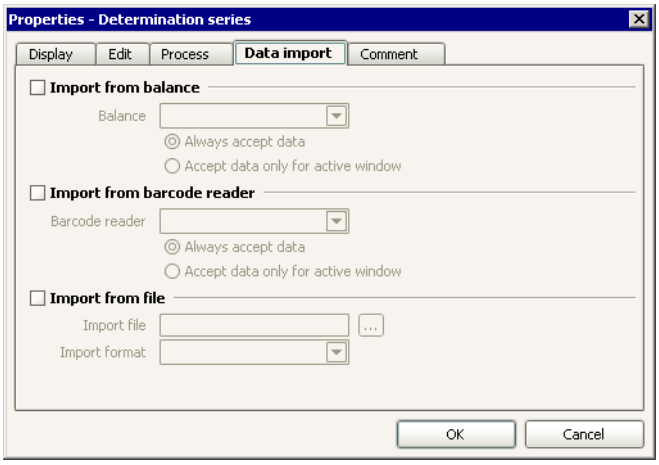
Action for marked sample table lines

Pause series ([Pause]) and show message
[on], off
1000 characters
If this option has been selected then the series will be interrupted before the start of the marked line (corresponds to **[Pause]**). At the same time a message appears containing the text defined in the message field.
With or a double-click on the text field the Text editor starts with which the message can be entered and edited. Within the text field the Formula editor can also be called up.

Stop series ([Stop])
[on], off
If this option is selected then the series will be stopped before the start of the marked line (corresponds to **[Stop]**).

Data import

Switches the import of external data on and off for working sample table fields.



Import from balance

on, [off]
If this option is switched on then external data from the selected balance will be imported into the working sample table. Data can be imported into the fields **ID1...ID4**, **Sample size** and **Sample size unit**.

> ***Note***
> *In order to be able to import sample identifications from the balance the data export must be set accordingly on the balance (use names **ID1**, **ID2**, **ID3**, **ID4**).*

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

Always accept data
[on], off
If this option is selected then the data transmitted from the balance will be imported into the working sample table for which this balance has been defined as the data source.

Accept data only for active window
on, [off]
If this option is selected then the data transmitted from the balance will only be imported into the working sample table of the workplace which has the focus.

Import from barcode reader

on, [off]
If this option is selected then external data from the selected barcode reader will be imported in the working sample table. The field into which the data is to be imported is defined in the device properties of the Barcode reader.

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

Always accept data
[on], off
If this option is selected then the data transmitted from the barcode reader will be imported into the working sample table for which this barcode reader has been defined as the data source.

Accept data only for active window

on, [off]

If this option is selected then the data transmitted from the barcode reader will only be imported into the working sample table of the workplace which has the focus.

Import from file

on, [off]

If this option is selected then external data will be imported from a file (e.g. via LIMS) into the working sample table. A check will be made that the given import file exists when loading a saved sample table into the working sample table as well as at regular intervals (every 10 s) when the sample table is open (but not when the dialog window **Edit line** is open). If the import file is present then the data from this file will be inserted automatically at the end of the working sample table. The import file is deleted after each import.

> ***Note***
> *Irrespective of the number of data fields defined on the tab* ***Display****, all sample data in the format* ***Method name;Sample position;ID1;ID2;ID3;ID4;ID5;ID6;ID7;ID8;Sample size;Sample size unit*** *have to be defined in the import file for each line.*

Import file

File name

Entry or selection the file from which the import is to take place.

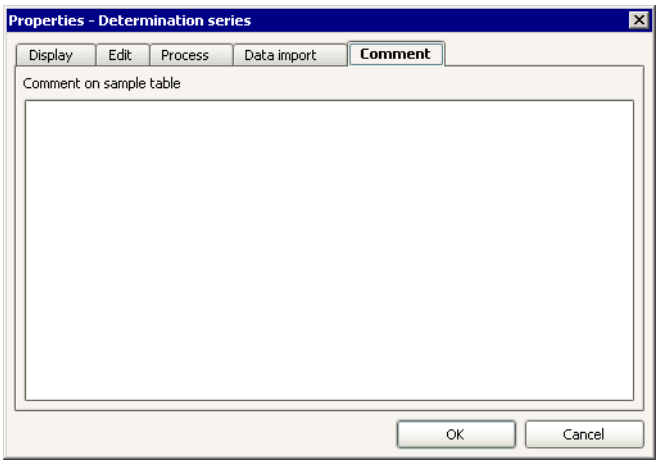
Import format

[*.csv]

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

Comment

Entry of a comment about the working sample table.



Comment on sample table

1000 characters

Entry of a comment about the working sample table.

3.6 Subwindow Method

3.6.1 General

Subwindow Method

The subwindow **Method** shows the method loaded in the window **Run** on the tab **Single determination** or **Determination series** with its tracks and commands; the presentation is identical to that in the Method editor. The subwindow can be switched on in the program part **Workplace** in the definition of the Layout and then becomes visible. It can be enlarged and diminished as required; it can also be maximized.

Presentation of the active tracks and commands

Active tracks (tracks with the status **BUSY**) are shown with a **light red** background, active commands (commands with the status **BUSY**) are marked with a **red** frame. If automatic conditioning is switched on then commands involved with conditioning will be indicated by an **orange** frame.

3.6.2 Zoom for method window

The standard way of showing the method in the method window is with all tracks being shown completely. With the context-sensitive menu item **Zoom** the following zoom steps can be selected for showing the method:

200%
Enlarges the view to 200%.

150 %
Enlarges the view to 150%.

100 %
Sets the view to 100%.

75%
Diminishes the view to 75%.

50%
Diminishes the view to 50%.

25%
Diminishes the view to 25%.

Fit to width
Adapts the view to the window width.

Fit to height
Adapts the view to the window height.

[Fit in window]
Adapts the view to the window width and height.

3.6.3 Live modifications

With a double-click on a command in the method window or with the context-sensitive menu item **Properties** the properties window of the corresponding command opens in which all the parameters are shown, but only the predefined live parameters can be altered. This parameter window additionally contains the button **[Apply]** with which the altered live parameters can be adopted even when the parameter window is open. Live parameters can be altered both in the **BUSY** status and in the **READY** status. If the option **Comment on modification of method** is

switched on in the Security settings then before the altered data is accepted the window **Modification comment method** opens.

The altered parameters apply until either the method is changed, the user logs out or the program is closed. In such cases a message appears asking whether the method alterations are to be saved. With **[Yes]** a new method version will be generated, with **[No]** the old method version will be retained.

If live parameters are altered then these alterations will be documented in both the determination and the Audit Trail. In the parameter report for the determination all parameters that have been altered are indicated by asterisk (*****) and saved at the end of the determination. If parameters of commands that have already been processed are altered then these alterations will only become effective for the next determination; however, they will nevertheless be indicated in the method report for the finished determination as "live modification". As soon as the method has been properly saved the markings will disappear.

Methods with modified live parameters can also be altered manually at any time in the status **READY** with **File, Method, Save** or **File, Method, Save as...** and then saved.

Note
Methods that have been signed at Level 2 and are therefore blocked cannot have their live parameters edited.
Fields whose contents are defined by a formula cannot be altered 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.*

3.6.4 Quit command

If a workplace is in the **BUSY** status then the context-sensitive menu item **Quit** can be used to stop the execution of an active command immediately and to jump directly to the next command. This only applies to commands with live display. This cancellation is documented in the determination (under Messages) and in the Audit Trail. The data and variables generated by the canceled command up to this point will be saved.

3.7 Subwindow Live display

3.7.1 General

Subwindow Live display

In the two subwindows **Live display 1** and **Live display 2** the live curves, measured values and messages about the method started on the tab **Single determination** or **Determination series** are shown. The subwindows can be switched on in the program part **Workplace** in the definition of the Layout and become visible. They can be enlarged and diminished 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 under Properties.

Tabs

The subwindows **Live display 1** and **Live display 2** consist of the following tabs:

- **Track**
  A tab marked with the name of the track is shown for each track.
- **Application note**
  Shows the application note defined in the **START** command.

3.7.2 Tracks

For each track of the loaded method a tab will be shown in the subwindow **Live display** that is labeled with the name of the track. On these tabs the live display components defined under Properties (curve, measured value, message) will be shown for the currently active command. The tabs must be changed manually, i.e. no automatic switch is made if a different track is called up. This means that it is possible to show two active tracks simultaneously in two live windows located side by side.

At the start of the determination the contents of the track tabs are deleted. Then the messages, curves and measured value displays generated by the active command appear on the tabs. The title of the tab is shown in red for the active track. In addition the command type and command name of the active command are shown in the window title of the subwindow **Live display**.

If all tracks are halted with **[HOLD]** or if individual tracks are halted with a **SEND** command then **Track halted...** will appear in these tracks.

When the track has finished then **Track finished** will appear in all tracks with the exception of the main track. Depending on the sequence the following will be shown in the main track when the determination has been completed:

Run: Regular without remarks
The determination has been terminated automatically after it has proceeded regularly and without comments.

Run: Regular with remarks
The determination has been terminated automatically after it has proceeded regularly, but with comments (see Information window in Database).

Run: Abort
The determination or the conditioning was stopped manually with **[Stop]**, by stop criteria or by a **SEND** command.

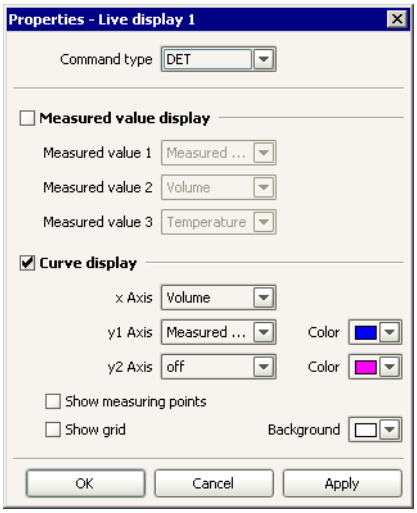
Run: Abort by error
The determination or the conditioning was stopped automatically because of an error or not even started because of an error in the Start test.

3.7.3 Application note

On the tab **Application note** the Application note for the loaded method defined in the **START** command is shown. This tab opens as standard in the subwindow **Live display** when the method is loaded.

3.7.4 Properties

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 #** opens.



Select the command type

Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS
Selection of the command type for which the properties are to be defined in the live display. The curve properties defined per command type are then saved per live display window and per client.

Measured value display

on, [off]
If this option is enabled then the required measured values will be shown in the subwindow **Live display**.

Measured value 1...3

[off], Measured value, Time, Temperature, Volume (for DET)
[off], Measured value, Time, Temperature, Volume (for MET)
[off], Measured value, Time, Temperature, Volume, dV/dt (for SET)
[off], Measured value, Time, Temperature, Volume, dV/dt (for KFT)
[off], Measured value, Time, Water, Drift, Charge, Ugen, Igen (for KFC)
[off], Measured value, Time, Temperature, Volume, dV/dt (for STAT)
[off], Measured value, Time, Temperature, dMV/dt (for MEAS)
[off], Measured value, Time, Flow (for MEAS T/Flow)
[off], Measured value, Time, Temperature, Volume, dV/dt (for DOS)
Selection of the measured value for the measured value display.

Curve display

[on], off
If this option is enabled then the required curves will be shown in the sub-window **Live display**.

x Axis
[Volume], Measured value, Time, Temperature, ERC, Calculated 1...3, External 1...3 (for DET)
[Volume], Measured value, Time, Temperature, dMW, Calculated 1...3, External 1...3 (for MET)
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for SET)
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for KFT)
[Time], Measured value, Water, Drift, Charge, Ugen, Igen, Calculated 1...3, External 1...3 (for KFC)
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for STAT)
[Time], Measured value, Temperature, dMV/dt, Calculated 1...3, External 1...3 (for MEAS)
[Time], Measured value, Flow, Calculated 1...3, External 1...3 (for MEAS T/Flow
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for DOS)
Selection of the quantity to be shown on the x-axis.

y1 Axis
[Measured value], Volume, Time, Temperature, ERC, Calculated 1...3, External 1...3 (for DET)
[Measured value], Volume, Time, Temperature, dMW, Calculated 1...3, External 1...3 (for MET)
[Volume], Measured value, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for SET)
[Volume], Measured value, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for KFT)
[Water], Measured value, Time, Drift, Charge, Ugen, Igen, Calculated 1...3, External 1...3 (for KFC)
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for STAT)
[Measured value], Time, Temperature, dMV/dt, Calculated 1...3, External 1...3 (for MEAS)
[Measured value], Time, Flow, Calculated 1...3, External 1...3 (for MEAS T/Flow)
[Time], Measured value, Temperature, Volume, dV/dt, Calculated 1...3, External 1...3 (for DOS)
Selects the quantity to be shown on the y1-axis (left-hand y-axis).

Color
Color selection, [blue]
Selection of the color for the curve of the quantity to be shown on the y1-axis.

y2 Axis
[off], Measured value, Volume, Time, Temperature, ERC, Calculated 1...3, External 1...3 (for DET)
[off], Measured value, Volume, Time, Temperature, dMW, Calculated 1...3, External 1...3 (for MET)
[off], Measured value, Volume, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for SET)
[off], Measured value, Volume, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for KFT)
[off], Measured value, Time, Water, Drift, Charge, Ugen, Igen, Calculated 1...3, External 1...3 (for KFC)
[off], Measured value, Volume, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for STAT)

[off], Measured value, Time, Temperature, dMV/dt, Calculated 1...3, External 1...3 (for MEAS)

[off], Measured value, Time, Flow, Calculated 1...3, External 1...3 (for MEAS T/Flow)

[off], Measured value, Volume, Temperature, Time, dV/dt, Calculated 1...3, External 1...3 (for DOS)

Selection of the quantity to be shown on the y2-axis (right-hand y-axis).

Color

Color selection, [magenta]

Selection of the color for the curve of the quantity to be shown on the y2-axis.

Show measuring points

on, [off]

If this option is enabled then in addition to the curve the individual measuring points will be shown in the form of crosses.

Show grid

on, [off]

If this option is enabled then a grid will be shown.

Background

Color selection, [white]

Selection of the color for the curve background.

3.8 Subwindow Report

3.8.1 General

Subwindow Report

In the subwindow **Report** the reports of determinations are shown. The subwindow can be switched on in the program part **Workplace** in the definition of the Layout and so made visible. It can be enlarged and diminished as required; it can also be maximized.

Tabs

The subwindow **Report** consists of the following 3 tabs:

- **Latest report**
  Shows the latest report to have been generated by a **REPORT** command.
- **Selected report**
  Shows the report selected in the Report overview.
- **Report overview**
  Overview of the reports saved in the workplace.

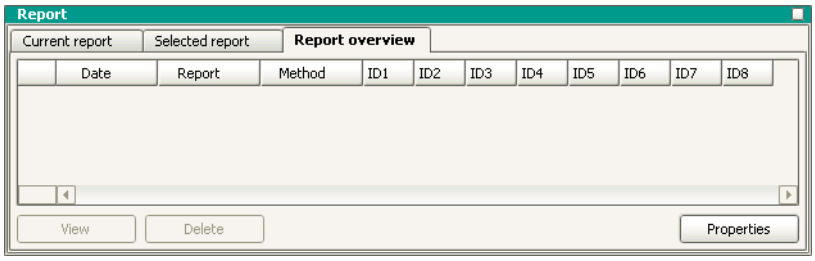
3.8.2 Latest report

On the tab **Latest report** the latest report to be generated in the method run by a **REPORT** command is always shown automatically. The contents and format of the report are determined by the Report template defined in the **REPORT** command.

3.8.3 Selected report

On the tab **Selected report** the report selected in the Report overview is shown. The contents and format of the report are determined by the Report template defined in the **REPORT** command.

3.8.4 Report overview



On the tab **Report overview** all the reports saved in the currently selected workplace are shown in a table in which the lines are arranged in increasing chronological order. When a new report is received the table is updated automatically. The table contains the following columns that can be enlarged, diminished and moved with the mouse:

Date

Time at which the report was generated with date, time and time zone (UTC ± ##).

Report

Command name of the **REPORT** command used to generate the report.

Method

Method name.

ID1...ID8

Sample identifications **ID1...ID8**.

View

Shows the selected report (or the first of the selected reports) on the tab **Selected report** which opens automatically.

Delete

Deletes the selected reports in the report overview.

Properties

Opens the dialog window **Properties - Report overview**.

Maximum number of reports

1 ... [20] ... 100

Maximum number of reports that can be saved in the report overview table. If this number is exceeded than the oldest report will be deleted automatically.

Chapter 4 Database

4.1 General

4.1.1 General

Definition

A **Database** in *tiamo* is the program part in which the determinations stored in databases can be displayed, managed, evaluated, re-processed and printed out. The **Databases** also include the **determination databases** which, in contrast to the Configuration database, can be generated by the user and contain the determination data. The determination data include the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

Organization

In the **Local server systems** (*tiamo light*, *tiamo full)* the databases are stored on the disk drives managed by the computer and are only available for the users logged in to this computer who have the appropriate rights of access.

In the **Client-server system** (*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 rights of access can use these databases.

4.1.2 Desktop

Database symbol

By clicking on the database symbol in the vertical strip at the left-hand margin the program part **Database** opens; at the same time the database symbol is shown in color. In the left-hand top corner of the symbol is a black field, in which the number of databases that are currently open can be seen (see Database selection).

Tools

The desktop of the program part **Database** includes the following tools:

- Database-specific menu bar.
- Database-specific toolbar.
- Main window, in which up to 5 subwindows can be shown.

4.1.3 Menu bar

The menu bar in the program part **Database** includes the following main menu items:

- **File**
  Open and close databases, database manager, print.
- **Edit**
  Copy.
- **View**
  Change layout, load views, save views, edit properties of subwindow.
- **Determinations**
  Search, filter, sign, delete determinations; overlay curves, calibration curves, reprocessing.
- **Tools**
  Manual control, report templates, other templates.
- **Help**
  Open *tiamo* Help, show info about *tiamo*.

Menu File

Open...
Open database.

Close all
Close all open databases.

Close
Close database.

Database manager...
Manage determination databases.

Print/Determination overview...
PDF file output of the determination overview.

Print/Report...
PDF file output of the report.

Logout...
Logout user.

Exit
End program.

Menu Edit

Copy
Copy the lines selected in the determination overview into the clip-board.

Select all
Select all lines in the current set of determinations in the determination overview.

Menu View

Update
Update determination overview.

Change layout...
Alter layout of loaded database view.

Load view...
Load a saved database view.

Save view...
Save the current database view.

Tile horizontally
Show two database windows next to each other.

Tile vertically
Show two database windows one below the other.

Unsplit
Unsplit the database window.

Properties/Column display
Define column display for the determination overview table.

Properties/Properties Curves 1...5
Sets properties for the subwindow **Curves 1...5**.

Properties/Properties Results
Sets properties for the subwindow **Results**.

Toolbar
Switches toolbar display on/off.

Menu Determinations

Comment...
Enter comment for selected determination.

Search...
Open the window **Search** for searching for determinations.

Filter/Last filter
Use last quick or special filter again.

Filter/Quick filter
Use quick filter with the content of the selected table cell.

Filter/Special filter...
Open the window **Special filter** for the definition of user-specific filters.

Filter/All statistic records
Show all statistically linked data sets for the focused determination.

Filter/Remove filter
Remove current filter.

Sign/Signature 1...
Sign selected determinations on level 1.

Sign/Signature 2...
Sign selected determinations on level 2.

Sign/Show signatures...
Show all signatures for the focused determination.

Sign/Delete signatures 2...
Delete signatures level 2 of the focused determination.

Export

Export selected determinations.

Import...
Import selected determinations.

Show method...
Show the method used for the focused determination.

Show history...
Show all versions of the focused determination in the determination overview.

Make current
Make the old version selected in the history view the current version again.

Show calibration curve...
Show calibration or standard addition curve for the focused determination.

Control chart...
Show control chart and statistical evaluation for the selected determinations.

Overlay curves...
Overlay curves of the selected determinations.

Reprocess...
Reprocess selected determinations.

Delete
Delete selected determinations.

Menu Tools

Manual control
Open the dialog window for the manual control of the devices.

Report templates/New/Form report
Open the window **Report template** with an empty form report.

Report templates/New/Tabular report
Open the window **Report template** with an empty tabular report.

Report templates/Open...
Open report template.

Report templates/Manager...
Manage report templates.

Templates/Control chart templates...
Manage templates for control charts.

Templates/Curve overlay templates...
Manage templates vor curve overlay.

Templates/Export templates...
Manage export templates.

Menu Help

tiamo Help
Open *tiamo* Help.

Info
Display information about the program and the installation.

4.1.4 Toolbar

Open...
Open database.

Close
Close database.

Database manager...
Manage determination databases.

Logout...
Logout user.

Copy
Copy the lines selected in the determination overview into the clipboard.

Update
Update determination overview.

Change layout...
Alter layout of loaded database view.

Load view...
Load a saved database view.

Save view...
Save the current database view.

Manual control
Open the dialog window for the manual control of the devices.

Tile horizontally
Show two database windows next to each other.

Tile vertically
Show two database windows one below the other.

Unsplit
Unsplit the database window.

Comment...
Enter comment for selected determination.

Search...
Open the window **Search** for searching for determinations.

Filter/Last filter
Use last quick or special filter again.

Filter/Quick filter
Use quick filter with the content of the selected table cell.

Filter/Special filter...
Open the window **Special filter** for the definition of user-specific filters.

Filter/All statistic records
Show all statistically linked data sets for the focused determination.

Filter/Remove filter
Remove current filter.

Sign/Signature 1...
Sign selected determinations on level 1.

Sign/Signature 2...
Sign selected determinations on level 2.

Show method...
Show the method used for the focused determination.

Show history...
Show all versions of the focused determination in the determination overview.

Make current
Make the old version selected in the history view the current version again.

Show calibration curve...
Show calibration curve for the focused determination.

Control chart...
Show control chart and statistical evaluation for the selected determinations.

Overlay curves...
Overlay curves of the selected determinations.

Reprocess...
Reprocess selected determinations.

Delete
Delete selected determinations.

Report templates/Open...
Open report template.

tiamo Help
Open *tiamo* Help.

4.1.5 Subwindows

Selection

In the main window the following 6 subwindows can be shown:

- **Determination overview**
  Overview of the determinations stored in the database. This subwindow is always shown.
- **Information**
  Shows the information about the focused determination.
- **Results**
  Shows the results for the focused determination.
- **Curves 1...5**
  Shows the curves for the focused determination.

Presentation

The subwindows can be enlarged and diminished as required by dragging the separating bar between the windows.

With a click on the button ☐ at the top right the subwindow can be maximized, so that only 1 subwindow can be seen in the main window. With a further click on the button ☐ in the maximized subwindow the original view showing all subwindows appears again.

4.1.6 Functions

In the program part **Database** the following functions can be carried out:

Views

- Define the layout of the database view
- Load database view
- Save database view
- Rename database view
- Delete database view

Manage databases

- Create new database
- Rename database
- Edit database properties
- Backup database
- Restore database
- Delete database

Determinations

- Function overview

Templates

- Manage report templates
- Manage templates for control charts
- Manage templates for curve overlay
- Manage export templates

4.1.7 Database views

Definition

The **Database view** is the contents and layout of the main window in the program part **Database**. The database view includes the following:

- Number, arrangement, sequence and size of the Subwindows.
- Presentation within the individual subwindows, i.e. column sequence, column width, sorting and filters.

Functions

The following functions are possible for database views:

- **Change layout**
  Define the number, arrangement and sequence of the Subwindows for the current database view.
- **Save view**
  Save the current database view.
- **Load view**
  Load a saved database view.
- **Rename view**
  Rename a saved database view.
- **Delete view**
  Delete a saved database view.

Save automatically

If under the options on the tab **Save** the item **Database settings** is switched on under **Save on closing** then the current database view will be saved automatically when *tiamo* is closed.

Load automatically

The standard situation is that the database view saved when *tiamo* was closed will be automatically loaded when *tiamo* is opened again. Alternatively a Default database view can be defined for each group of users that will be loaded automatically the first time that the program part **Database** is opened.

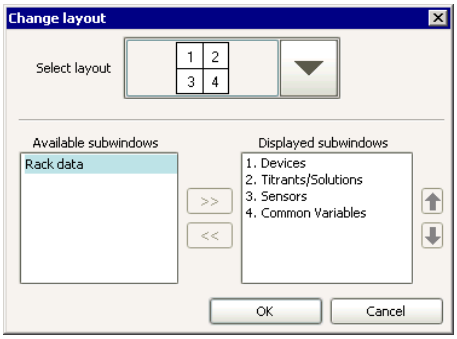
> ***Note***
> *At the first program start of all a database view opens containing the 4 subwindows **Determination overview**, **Curve 1**, **Information** and **Results** as standard.*

Export/Import

Database views can also be exported and imported. This means that views can be exchanged between different client/server systems.

Change layout

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



Select layout

Selection of possible combinations

Selection of a graphic symbol for the number and arrangement of the subwindows.

Available subwindows

Selection of subwindows

Displays the subwindows that are still available for showing in the view.

Displayed subwindows

Subwindows

Displays the subwindows shown in the view.

Adds the selected subwindow to the view.

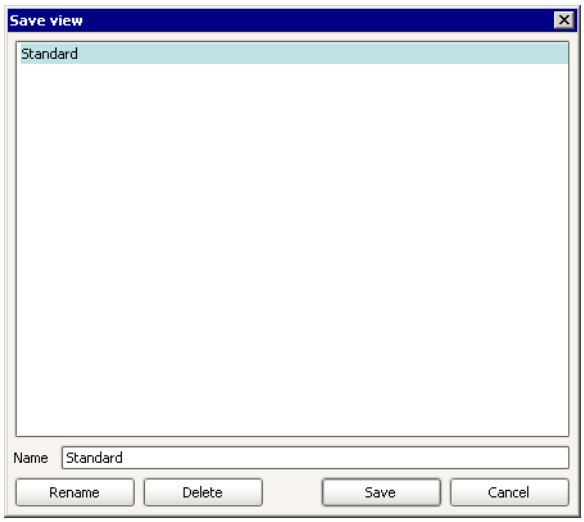
Removes the selected subwindow from the view.

Moves the selected subwindow upward (changes the sequence).

Moves the selected subwindow downward (changes the sequence).

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 selected view.

Delete

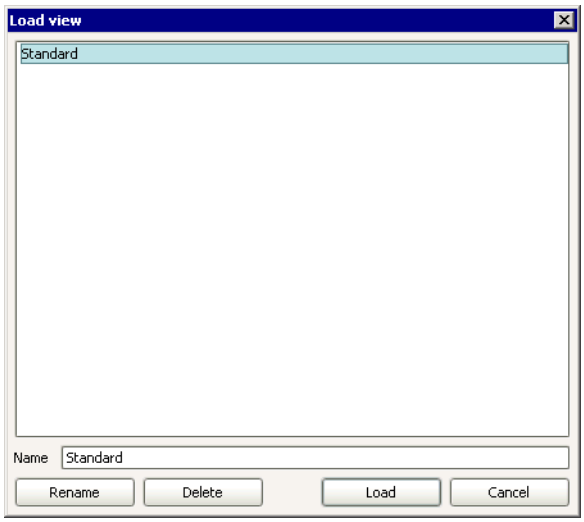
Delete selected view.

Save

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

Load view

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



Name

Name of view to be loaded.

Rename

Rename selected view .

Delete

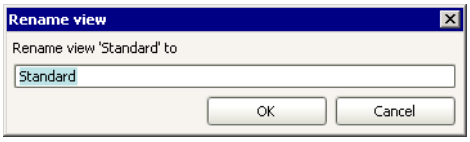
Delete selected view.

Load

Load selected view.

Rename view

In order to rename a view either the dialog window **Load view** or **Save view** must be open and the button Rename pressed. The window **Rename view** then opens.



Rename view to
50 characters, ['Old name']
Enter a new name for the view.

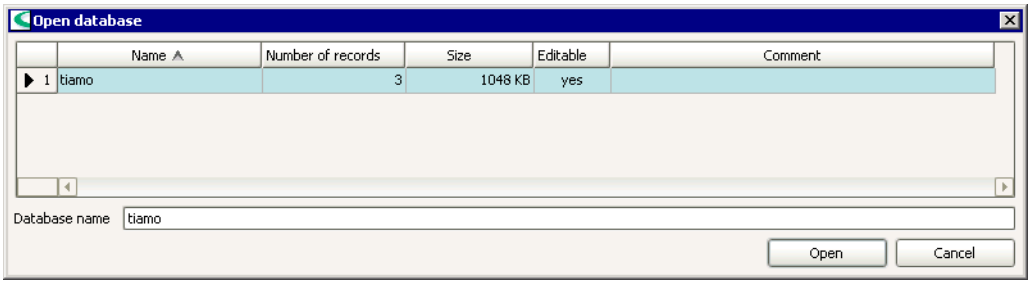
Delete view

In order to delete a view either the dialog window **Load view** or **Save view** must be opened and the Delete button pressed. The deletion process must then be confirmed.

4.2 Open/display database

4.2.1 Open database

With the symbol or the menu item **File, Open...** the window **Open database** opens in which one of the databases available on the server (or local server) can be selected for opening.



Database table

The database table contains information about all determination databases. The table cannot be edited. With a click on the column title (column **Name**, **Number of records**, **Size**, **Last backup**, **Next backup**, **Note**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of database.

Number of records
Shows the number of data records in the database.

Size
Shows the size of the database in KB.

Editable
Shows whether the database is editable or not for the logged in user.

Comment
Shows comments about the database.

Open database

Database name
50 characters
Name of the database to be opened. If one of the databases in the table is selected then the database name will automatically be entered in the field. It can also be entered manually.

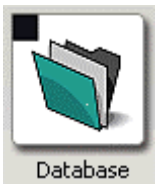
Open

Opens the selected database and shows its data records in the Determination overview. The database name is shown in the title line of the program, the number of open databases in the top left corner of the database symbol.

> ***Note***
> *A maximum of 4 databases can be open, but only 2 can be shown simultaneously. Databases that are open when the program is exited will be opened automatically the next time that the program is started.*

4.2.2 Select database in database symbol

The number of databases that are open is shown in the top left corner of the database symbol. If 2 or more databases are open then the two databases that are to be shown in the main window beside each other or one below the other can be selected by using the database symbol.



No database is open. **No loaded database** is shown in the main window.

One database is open and is shown in the main window.

Two databases are open. Normally only one database is shown in the main window, but two databases can also be shown beside each other or one below the other.

A click with the left or right mouse key on the database symbol opens a menu in which the names of all open databases are shown. The databases shown in the main window are indicated by a tick. By clicking on the required database this will be shown in the main window instead of the previously selected database.

4.2.3 Show single database

The last database to have been opened is shown alone in the main window as standard. However, if the display of 2 databases has been switched on then a switch back to showing a single database can be made with the symbol or the menu item **View, Unsplit**.

4.2.4 Show databases beside each other

With the symbol or the menu item **View, Tile horizontally** two databases are shown beside each other in the main window.

4.2.5 Show databases one below the other

With the symbol or the menu item **View, Tile vertically** two databases are shown one below the other in the main window.

4.2.6 Close database

Close individual database

With the symbol or the menu item **File, Close** the focused database is closed.

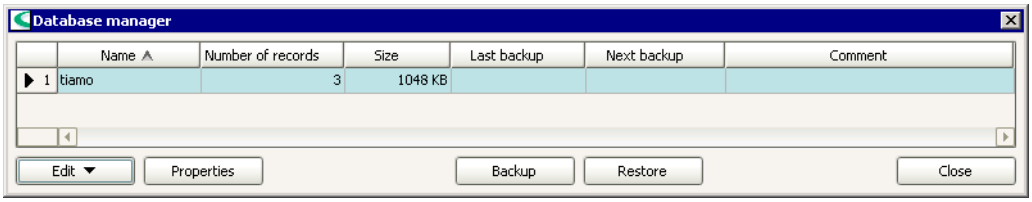
Close all databases

With the menu item **File, Close all** all the open databases are closed.

4.3 Manage databases

4.3.1 Database manager

With the symbol or the menu item **File, Database manager...** the window **Database manager** opens in which a user with the appropriate access rights can manage databases.



Database table

The database table contains information about all determination databases. The table cannot be edited. With a click on the column title (column **Name**, **Number of records**, **Size**, **Last backup**, **Next backup**, **Cment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of database.

Number of records
Number of data records in the database.

Size
Shows the size of the database in KB.

Last backup
Shows the date and time of last database backup.

Next backup
Shows the date and time of next database backup.

Comment
Shows comments about the database.

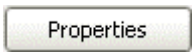
Window menus and functions

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

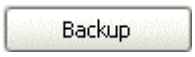
New...
Creates a new database.

Delete
Deletes the selected database.

Rename...
Renames the selected database.



Opens the window **Properties - database** for editing the database selected in the table.



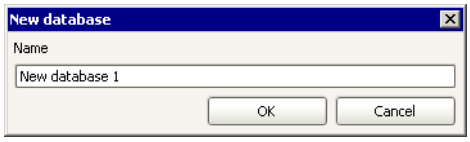
Opens the window **Backup database** for backing up the database selected in the table.

Opens the window **Restore database** for restoring backed up databases.

Closes the window **Database manager**.

4.3.2 Create new database

With the menu item **Edit, New...** in the dialog window **Database administration** the window **New database** opens in which a name must be entered for the new database.



Name

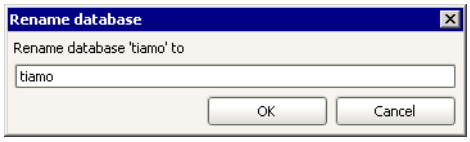
50 characters, [New database #]
Name of new database.

> ***Note***
> *The database name must be unique in the whole client/server system.*

With **[OK]** the window **Properties - database** opens for editing the database properties.

4.3.3 Rename database

With the menu item **Edit, Rename...** in the window **Database manager** the window **Rename database** opens for renaming the selected database.



Rename database 'Name' to

50 characters
Entry of the new database name.

> ***Note***
> *The database name must be unique in the whole client/server system.*

4.3.4 Delete database

With the menu item **Edit, Delete** in the window **Database administration** the selected database is deleted.

> ***Note***
> *Databases that are open cannot be deleted.*

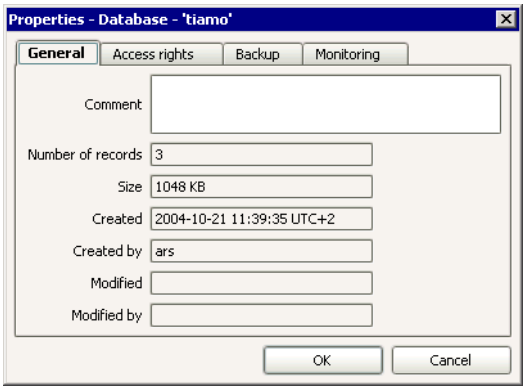
4.3.5 Database properties

The properties for a database are set on the following 4 tabs:

- **General**
  General information about the database.
- **Access rights**
  Rights of access for database user groups.
- **Backup**
  Definition of backup monitoring and automatic backup.
- **Monitoring**
  Definition of database monitoring.

General

General information about database.



Comment
250 characters
Freely definable comments about database.

Number of records
Shows the number of data records in the database.

Size
Shows the size of the database in KB.

Created
Shows the date and time at which the database was created.

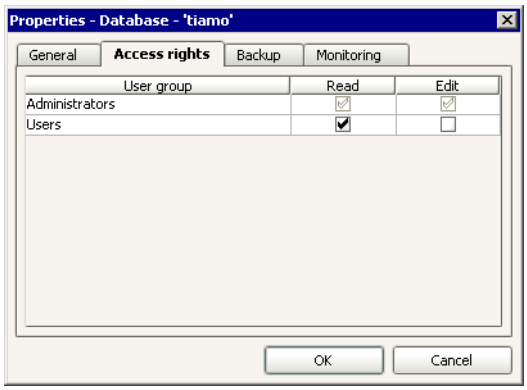
Created by
Shows the user (short name) who created the database.

Modified
Shows the date and time at which the database properties were last altered.

Modified by
Shows the user (short name) who carried out the alterations.

Access rights

Rights of access for database user groups.



User group

Shows the User group defined under User administration.

Read

[on], off

Switches the rights for opening the database on/off. The database can only be shown; it cannot be edited (no records deleted, no Reprocessing).

Edit

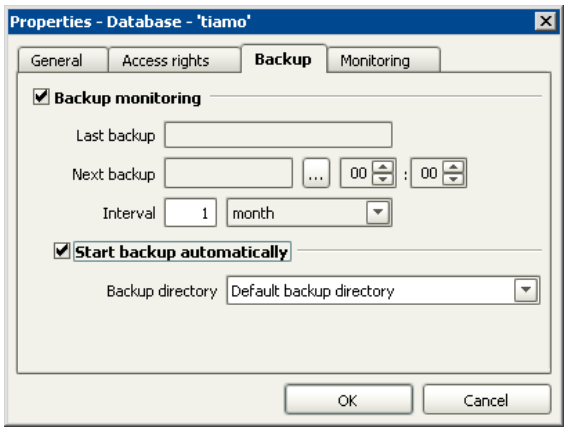
on, [off]

Switches the rights for editing the database on/off. Records can be edited and deleted.

> ***Note***
> *If the rights for editing are switched on then the rights for reading will also be switched on automatically. If the rights for reading are switched off then the rights for editing will also be switched off automatically.*

Backup

Definition of backup monitoring and automatic backup.



Backup monitoring

on, [off]

Switches backup monitoring on/off for the selected database. If the option is switched on then the field **Next backup** in the Database table will be shown in **red** when the backup period has expired.

Last backup

Shows the date and time of last database backup.

Next backup

Date selection, [Last backup + 1 month]

Date on which the next backup must be carried out. This date can be selected after pressing in the dialog window **Select date**.

Interval

[1] ... 999; days, weeks, [months], years

Interval for backup monitoring. After each automatically or manually triggered backup the interval entered here will be automatically added to **Last backup** and the field **Next backup** adapted automatically.

Start backup automatically

on, [off]

Automatically starts the backup for the database in the defined **Backup directory**.

Backup directory

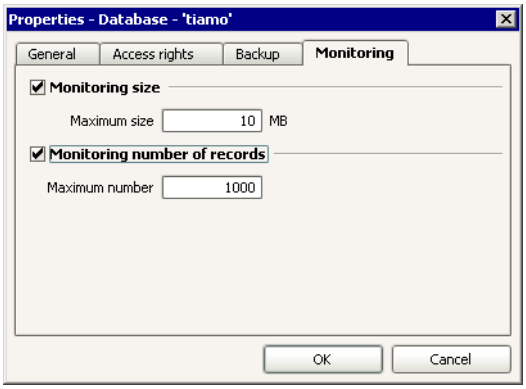
Select backup directory, [Default backup directory]

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

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

Monitoring

Defines database monitoring.



Monitoring size

on, [off]

Switches size monitoring on/off for the selected database. If this option is switched on then the field **Size** in the Database table will be shown in **red** when the limit has been exceeded. A corresponding massage also appears when the database is opened.

Maximum size

1 ... [10] ... 2147483647 MB

Maximum permitted database size in MB.

Monitoring number of records

on, [off]

Switches monitoring the number of data records on/off for the selected database. If this option is switched on then the field **Number** in the Database

table will be shown in **red** when the limit has been exceeded. A corresponding massage also appears when the database is opened.

Default: off

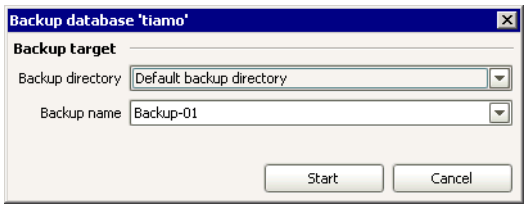
Maximum number

1 ... [1000] ... 2147483647

Maximum permitted number of data records for database.

4.3.6 Manual database backup

With **[Backup]** in the window **Database manager** the dialog window **Backup database** opens:



Backup target

Backup directory

Select backup directory, [Default backup directory]

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

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

Backup name

50 characters, [Backup-##]

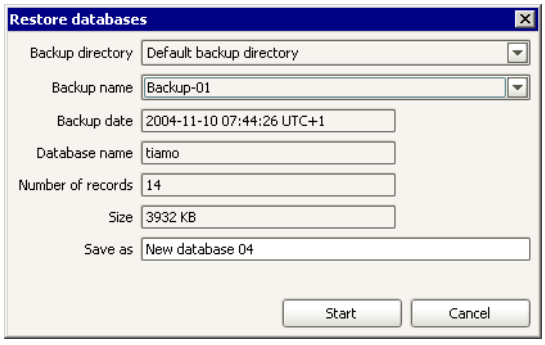
Selection of an existing name for the backup file or entry of a new name. If an existing backup file is selected it will be overwritten.

> ***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 on restoring.*

Starts manual database backup.

4.3.7 Restore database

With **[Restore]** in the window **Database manager** the dialog window **Restore databases** opens:



Backup directory

Select backup directory, [Default backup directory]

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

Backup name

Select backup files

Selection of a backup file.

Backup date

Shows the time at which the database was backed up.

Database name

Shows the name of the database.

Number of records

Shows the number of data records on the database.

Size

Shows the size of the database in KB.

Save as

50 characters, [New database ##]

Name under which the database is to be restored.

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 Report templates

4.4.1 Create new report template

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.

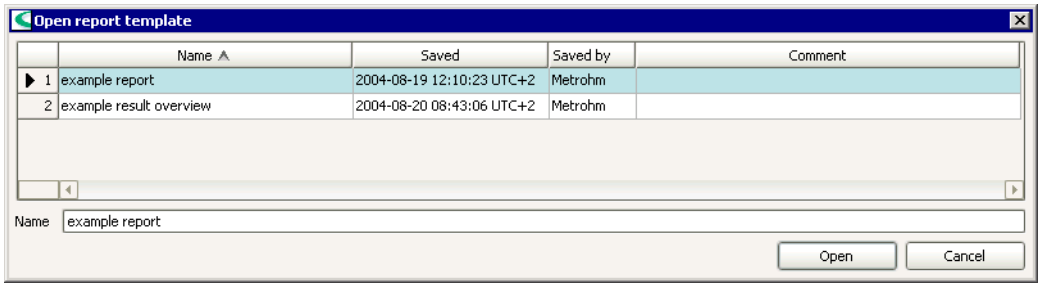
New tabular report

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 record such a report section will be filled with data and positioned row by row on the page. In this way tabular reports can be created from several determinations.

4.4.2 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**, **Note**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of report template.

Saved
Date and time at which the report template was saved.

Saved by
Short name of the user who saved the report template.

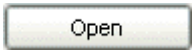
Comment
Remarks about the report template.

Open report template

Name

50 characters

Name of the report template to be opened. If a report template is selected in the table the name will be entered automatically in this field. It can also be entered manually.



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

4.4.3 Edit report templates

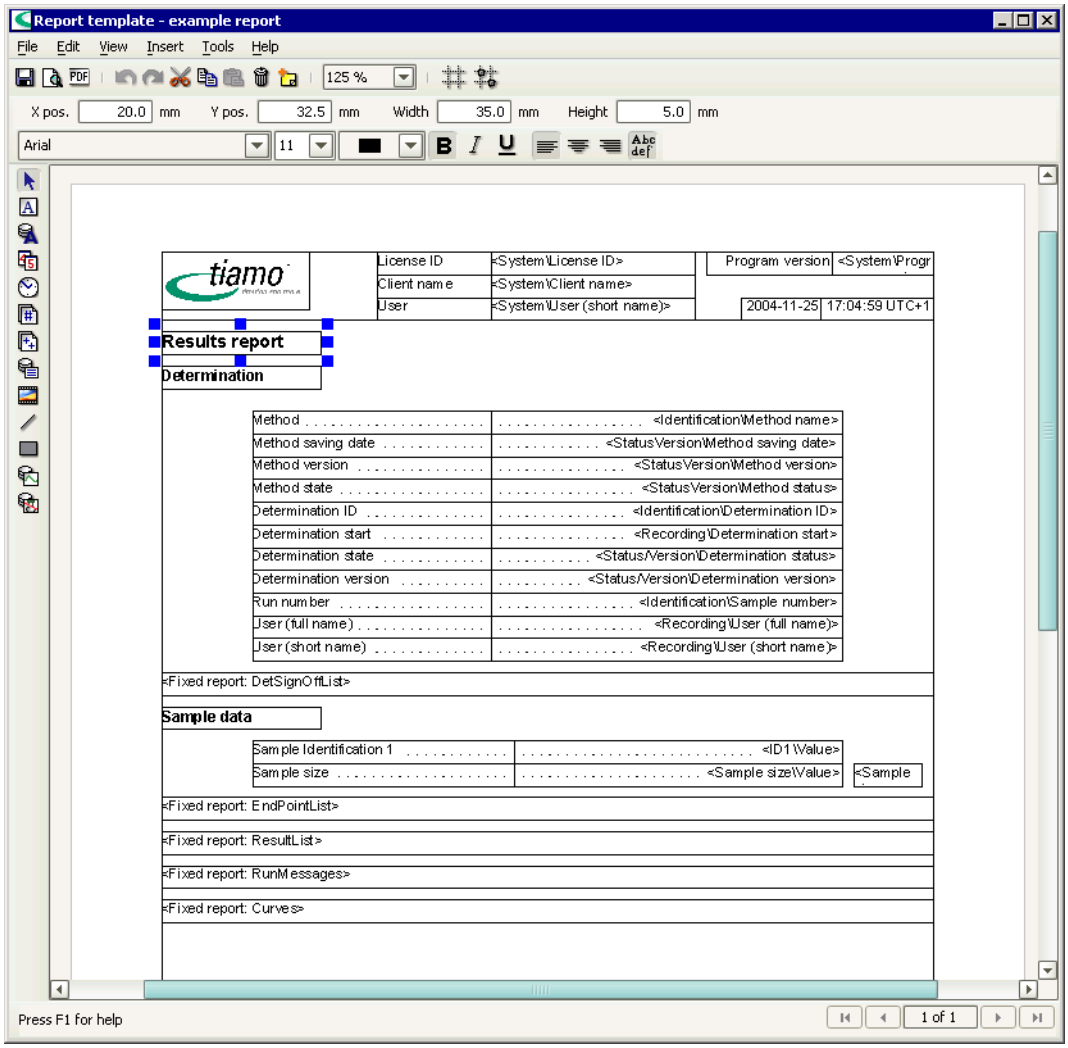
General

Which determination data and which other items (e.g. text fields, images, graphical elements) are to be shown 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 with the **REPORT** command 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 covers the whole area between the header and footer. This means that at least one page is always produced per determination.
- **Tabular report**
  In a tabular report the report section can be set with the mouse. For each data record one such report section will be filled with data and placed on the page row by row. This means that tabular reports can be produced from several determinations.

Desktop



Items

The desktop of the program window **Report template** has the following items:

- Menu bar
- General toolbar
- Module-specific toolbar
- Module bar
- Main window with header, report section and footer

Menu bar

The menu bar in the program window **Report template** has the following main menu items:

- **File**
  Save report template, create page, 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 *tiamo* Help.

Menu File

Save
Save an opened report template.

Save under
Save an opened report template under a new name.

Page setup...
Set up the layout for the report template.

Page preview
Page preview of the report template with the data of the selected determination.

Print (PDF)...
Shows the report template with the data of the selected determination as a PDF-file.

Close
Closes the program window **Report template**.

Menu Edit

Undo
Undo the last action.

Redo
Restore the undone action.

Cut
Cut out the marked items and copy them to the clipboard.

Copy
Copy out the marked items to the clipboard.

Paste
Insert out the marked items from the clipboard.

Delete
Delete the marked items.

Comment
Enter remarks about the report template.

Menu View

Update
Updates the view.

First page
Shows the first page of the report template.

Previous page
Shows the previous page of the report template.

Next page
Shows the next page of the report template.

Last page
Shows the last page of the report template.

Menu Insert

Page before
Inserts a new page in front of the shown page.

Page after
Inserts a new page after the shown page.

Menu Tools

Options...
Sets options for the report template.

Menu Help

tiamo help
Open *tiamo* Help .

General toolbar

Save
Save an opened report template.

Page preview
Page preview of the report template with the data of the selected determination.

Print (PDF)...
Shows the report template as a PDF-file with the data of the selected determination.

Undo
Undo the last action.

Redo
Restore the undone action.

Cut
Cut the marked items and copy them to the clipboard.

Copy
Copy the selected items to the clipboard.

Paste
Insert the marked items from the clipboard.

Delete
Delete the marked items.

Enter comment

Zoom report template
Select the zoom step.

Grid
Switch the grid display on and off.

Align to grid
Switch alignment to grid on and off.

Module-specific toolbar

Depending on the module selected in the report template, other symbols and input fields are shown below the General symbol bar, with which the properties of these modules can be directly edited (for details please refer to Modules).

Module bar

Select modules
If this option is switched on then modules in the report template can be selected, diminished/enlarged and moved.

Text field
If this option is switched on then text fields can be inserted in the report template.

Data field
If this option is switched on then data fields can be inserted in the report template.

Date field
If this option is switched on then date fields can be inserted in the report template in which the actual date is entered.

Time field
If this option is switched on then time fields can be inserted in the report template in which the actual time is entered.

Page number
If this option is switched on then fields can be inserted in the report template in which the page number is entered.

Number of pages
If this option is switched on then fields can be inserted in the report template in which the number of pages is entered.

Fixed report
If this option is switched on then fixed reports can be inserted in the report template.

Image
If this option is switched on then images can be inserted in the report template.

Line
If this option is switched on then lines can be inserted in the report template.

Rectangle
If this option is switched on then rectangles can be inserted in the report template.

Curve
If this option is switched on then curves can be inserted in the report template.

Calibration curve
If this option is switched on then calibration curves can be inserted in the report template.

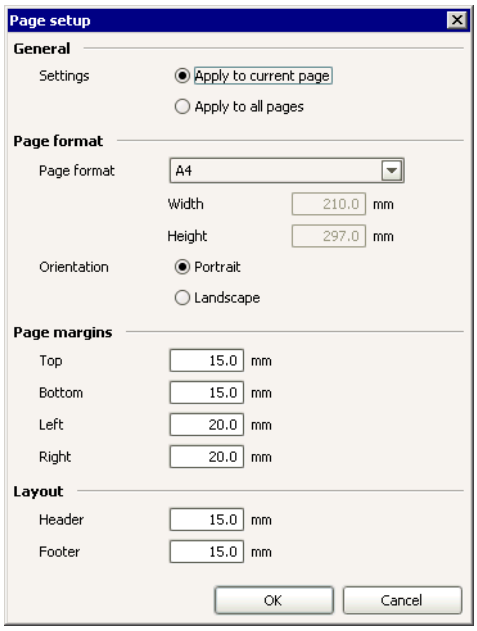
Functions

In the program window **Report template** the following functions can be executed:

- Create page
- Define sections in main window
- Insert report pages
- Insert modules
- Edit modules
- Zoom
- Show page view
- Enter note about report template
- Define options for report template
- Save report template

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 (for form report only)

Settings

[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

[A4], Letter, Legal, User-defined
Selection of the page format. With **User-defined** the width and height of the paper can be defined.

Width

0.0 ... [210.0] ... 499.0 mm
Width of the page format. This parameter can only be edited for **Page format** = **User-defined**.

Height
0.0 ... [297.0] ... 499.0 mm
Height of the page format. This parameter can only be edited for **Page format** = **User-defined**.

Orientation
[Portrait], Landscape
Selection of the page format.

Page margins

Top
0.0 ... [15.0] ... 499.0 mm
Upper page margin.

Bottom
0.0 ... [15.0] ... 499.0 mm
Lower page margin.

Left
0.0 ... [20.0] ... 499.0 mm
Left-hand page margin.

Right
0.0 ... [20.0] ... 499.0 mm
Right-hand page margin.

Layout

Header
0.0 ... [15.0] ... 499.0 mm
Height of header.

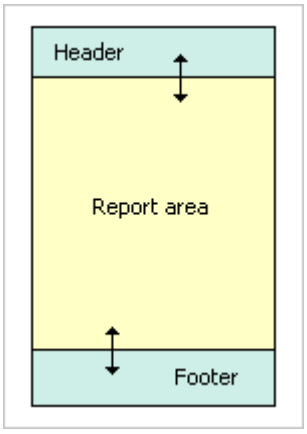
Footer
0.0 ... [15.0] ... 499.0 mm
Height of footer.

Determination height
0.0 ... [25.0] ... 499.0 mm (for tabular report only)
Height of the section for a single determination on a tabular report.

Define sections

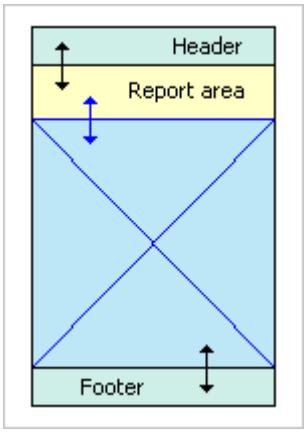
Define sections for form report

The header and footer sections and therefore the report section itself can be enlarged and diminished with the left-hand mouse key.



Define sections for tabular report

The header, footer and report sections can be enlarged and diminished with the left-hand mouse key.



Insert pages

Insert 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.

Navigate

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.

> ***Note***
> *It is not possible to insert pages in templates for tabular reports.*

Insert modules

In order to be able to insert a module in a report template the corresponding symbol on the Module bar must be selected and then placed on the report template by creating a field with the left-hand mouse key. 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, 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, Image, Line, Rectangle, Curve, Calibration curve
- **Footer**
  Text field, Date field, Time field, Page number, Number of pages, Image, Line, Rectangle

Edit modules

Switch on 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

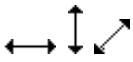
Single modules are selected with a click of the left-hand mouse key. This automatically shows the corresponding properties of the module below the symbol bar.

Select several modules

Several modules are selected by drawing a frame around the required modules with the left-hand mouse key.

Moving, diminishing, enlarging modules

When this cursor symbol appears then the selected modules can be moved about on the report template with the left-hand mouse key pressed down.



When one of these cursor symbols appears then the selected modules can be diminished and enlarged respectively on the report template with the left-hand mouse key pressed down.

Cutting, copying, pasting, deleting modules

Cut out the selected modules and copy them to the clipboard.

Copy the selected modules to the clipboard.

Insert 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 symbol bar.

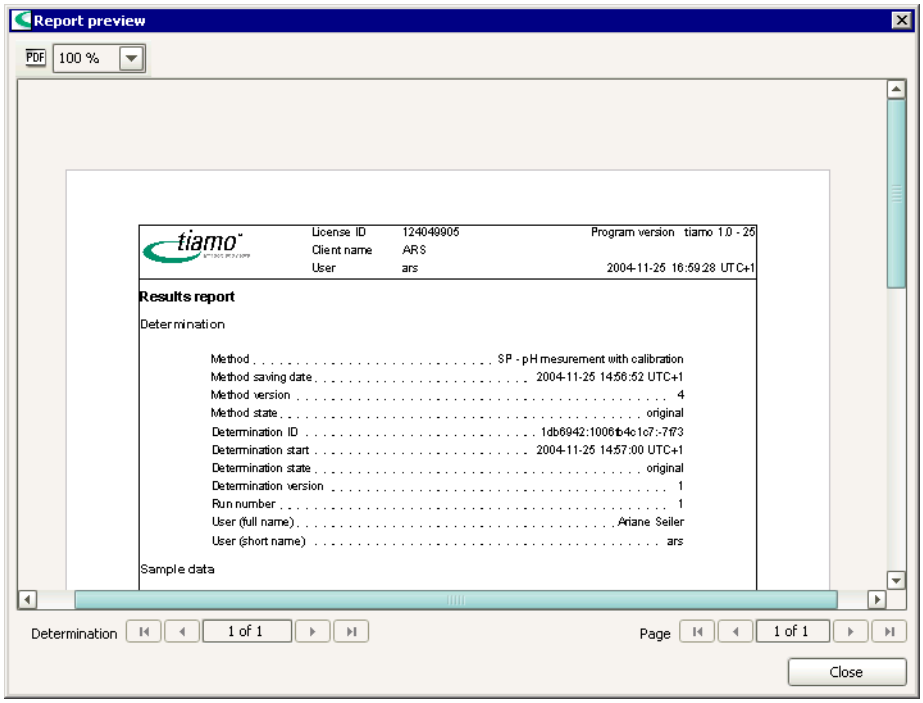
Zoom for report templates

With the symbol

on the toolbar the required zoom step for showing the report template can be selected in steps of 25% from 25% to 400%.

Page 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 shown 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.

Select 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.

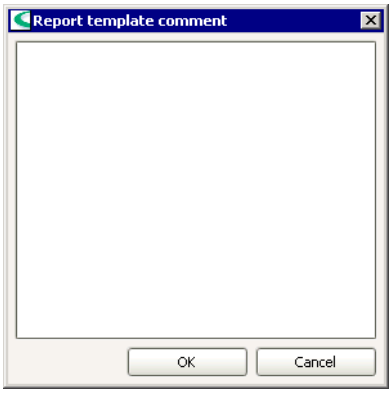
Jumps to previous determination.

Jumps to next determination.

Jumps to last determination.

Comment

With the symbol or the menu item **Edit, Note** in the program window **Report template** the window **Note about report template** opens in which remarks about the opened report template can be entered.



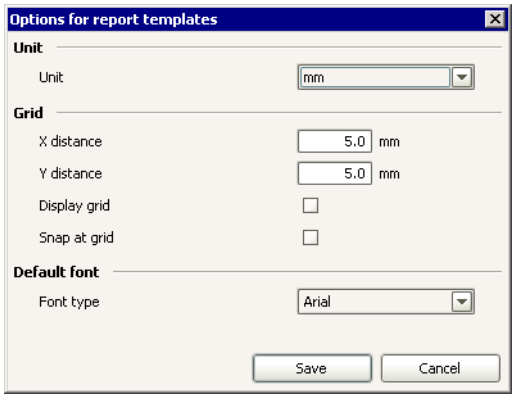
Comment

1000 characters

Entry of remarks about the report template that are shown in the List of report templates.

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

[mm], cm, inch
Selection of the size unit for the report template.

Grid

X distance

1.0 ... [5.0] ... 100.0 mm
Grid distance in X-direction.

Y distance

1.0 ... [5.0] ... 100.0 mm
Grid distance in Y-direction.

Display grid

on, [off]
Switch the grid display on the report template on/off.

Snap at grid

on, [off]
Switch snaping at grid on the report template on/off.

Default font

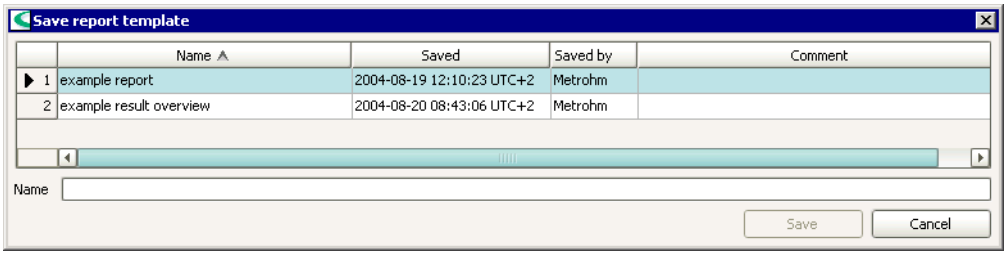
Font type

[Arial], Windows fonts
Selection of the default font for the report templates.

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 list cannot be edited. With a click on the column title (column **Name**, **Saved**, **Saved by**, **Note**) the list can be sorted according to the selected column in increasing or decreasing sequence.

Name
Name of report template.

Saved
Date and time at which the report template was saved.

Saved by
Short name of the user who saved the report template.

Comment
Remarks about the report template.

Save report template

Name

50 characters
Name under which the report template is to be saved.

> ***Note***
> *The name of the report template must be unique throughout the whole client/server system.*

Save

Save the report template under the required name.

Modules

Text field

Text fields are used for showing any texts in the report.

Insert

In order to insert a text 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.
0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.
0.0000 ... (max. page height) mm
y-position within the permitted section.

Width
0.0000 ... (max. page width) mm
Width of text field.

Height
0.0000 ... (max. page height) mm
Height of text field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Switches line break on/off for multi-line text fields.

Fills the field with dots.

Text

Entry of text for the text field.

Data field

Data fields are used for showing determination data in a report.

Insert

In order to insert a data 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.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of data field.

Height

0.0000 ... (max. page height) mm
Height of data field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Switches line break on/off for multi-line data fields.

Fills the field with dots.

Prefix

50 characters
Text placed in front of the data field contents.

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

50 characters
Text placed after the data field contents.

Preview

Shows a formatted example of text.

Date field

Date fields are used for showing the current date in a report.

Insert

In order to insert a date 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.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y Pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of date field.

Height

0.0000 ... (max. page height) mm
Height of date field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Fills the field with dots.

Prefix
50 characters
Text placed in front of the date field contents.

Suffix
50 characters
Text placed after the date field contents.

Preview
Shows the formatted date.

Time field

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.
0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.
0.0000 ... (max. page height) mm
y-position within the permitted section.

Width
0.0000 ... (max. page width) mm
Width of time field.

Height
0.0000 ... (max. page height) mm
Height of time field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Fills the field with dots.

Prefix

50 characters
Text to be placed in front of the contents of the time field.

Suffix

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

Preview
Shows the formatted time.

Page number

The actual page number in the report is shown in a page number field.

Insert

In order to insert a page number field in a report template the corresponding symbol must be selected on the Module bar and then placed on the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of the page number field.

Height

0.0000 ... (max. page height) mm
Height of the page number field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Fills the field with dots.

Prefix
50 characters
Text to be placed in front of the page number field.

Suffix
50 characters
Text to be placed after the page number field.

Preview
Shows the formatted page number.

Number of pages

This field shows the total number of pages in the report.

Insert

In order to insert a field with the number of pages 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 in the header or footer with the left-hand mouse key.

Properties

X pos.
0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.
0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of the field.

Height

0.0000 ... (max. page height) mm
Height of the field.

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.

Justified left.

Centered.

Justified right.

Fills the field with dots.

Prefix

50 characters
Text placed in front of the field contents.

Suffix

50 characters
Text placed after the field contents.

Preview

Shows the formatted number of pages.

Fixed report

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-hand mouse key.

Properties

X pos.

Shows the predefined x-position for the fixed report.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

Shows the predefined width of the fixed report.

Height

0.0000 ... (max. page height) mm
Height of fixed report.

Fixed report

[Calculations], Calibration data, Curves, Measuring point list, Messages, Method parameters, Monitoring report, Raw data (end points), Results list, Signature list determinations, Signature list methods, Standard addition, Statistical data (full), Statistical data (short), Titration and measurement parameters, Used common variables, Used devices, Used sensors, Variables
Selection of a predefined fixed report.

Command name

[not defined], 50 characters (only for **Fixed report** = **Measuring point list**)
Name of the command for which a curve is to be shown. With **not defined** the lists for all curves present in the determination will be produced as default.

Image

An image field is used for including any external graphics on the report template.

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.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of image field.

Height

0.0000 ... (max. page height) mm
Height of image field.

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.

[original]
Original size.

proportional
Proportional enlargement or diminishment.

non-proportional
Non-proportional enlargement or diminishment.

Line

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.
0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.
0.0000 ... (max. page height) mm
y-position within the permitted section.

Length
0.0 ... (max. page width) mm
Length of the line.

Angle
0.000 ... 360.000 °
Angle of the line.

Thickness
0.1 ... [0.5] ... 10.0 mm
Thickness of the line.

Selection of the line color.

Selection of the type of line.

Rectangle

Any rectangle can be inserted in the report template.

Insert

In order to insert a rectangle 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.
0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.
0.0000 ... (max. page height) mm
y-position within the permitted section.

Width
0.0000 ... (max. page width) mm
Width of the rectangle.

Height

0.0000 ... (max. page height) mm
Height of the rectangle.

Thickness

0.1 ... [0.5] ... 10.0 mm
Thickness of the line for the rectangle.

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.

Curve field

Curve fields are used for showing determination curves in the report.

Insert

In order to insert a curve 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

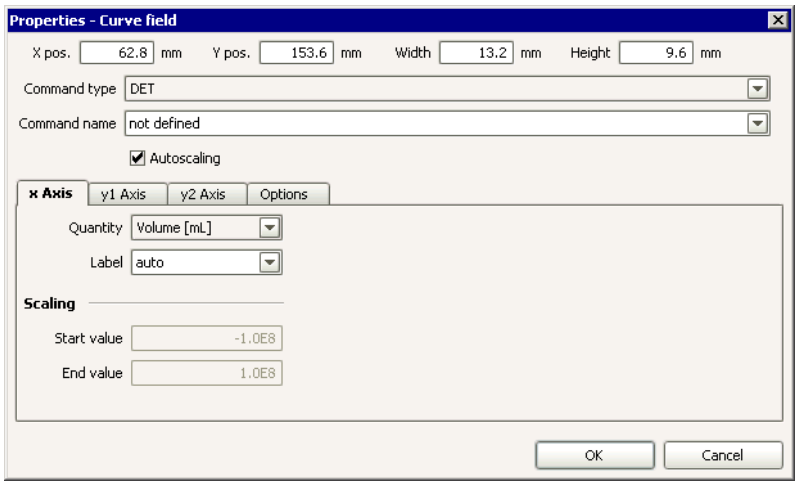
The properties for the curve field can be set on the following 4 tabs:

- **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 the graphical display of the curve.

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.

Curve field - x axis

Parameters for the graphical display of the curve on the x axis.



X pos.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of curve field.

Height

0.0000 ... (max. page height) mm
Height of curve field.

Command type

[DET], MET, SET, KFT, KFC, MEAS, MEAS T/Flow
Selection of the type of command for which a curve is to be shown.

Command name

[not defined], 50 characters
Name of the command for which a curve is to be shown. 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**).*

Autoscaling

[on], off
If this option is enabled then all the axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection
Selection of the quantity to be shown on the x axis.

Label

50 characters, [auto]
Freely definable axis labeling for the x axis. With **auto** the name from the **Quantity** will be used.

Scaling

Start value

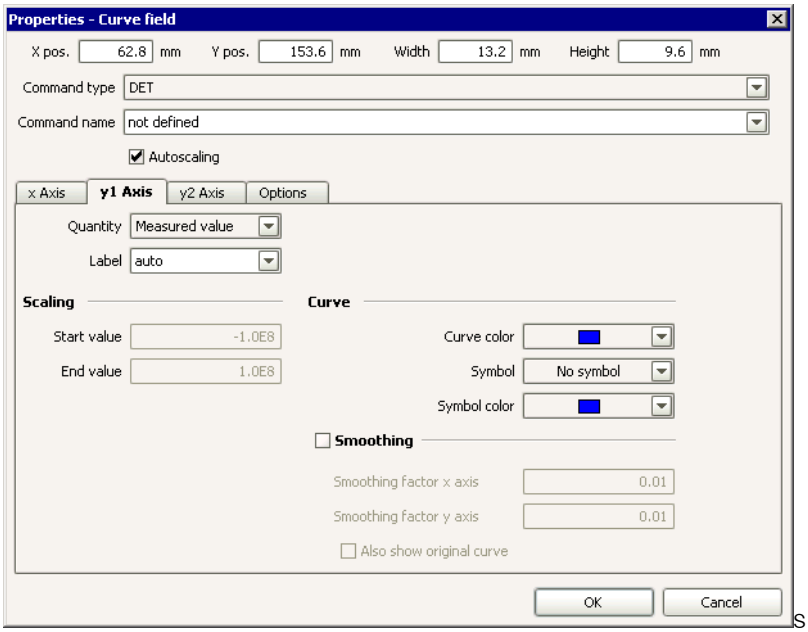
1 E-8 ... [0.0] ... 1 E+8
Initial value for scaling the x axis.

End value

1 E-8 ... [1000.0] ... 1 E+8
Final value for scaling the x axis.

Curve field - y1 axis

Parameters for the graphical display of the curve on the y1 axis (left y axis).



X pos.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of curve field.

Height

0.0000 ... (max. page height) mm
Height of curve field.

Command type

[DET], MET, SET, KFT, KFC, MEAS, MEAS T/Flow
Selection of the type of command for which a curve is to be shown.

Command name

[not defined], 50 characters
Name of the command for which a curve is to be shown. With **not defined** the first curve 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**).*

Autoscaling

[on], off

If this option is enabled then all the axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the y1 axis.

Label

50 characters, [auto]

Freely definable axis labeling for the y1 axis. With **auto** the name from the **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the y1-axis.

End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the y1-axis.

Curve

Curve color

Color selection, [blue]

Selection of the color for the curve line.

Symbol

Symbol selection, [no symbol]

Selection of the symbol for showing the measured values. With **no symbol** the measuring points will not be shown.

Symbol color

Color selection, [blue]

Selection of the color for the measuring point symbol.

Smoothing

on, [off]

Switches smoothing on/off for the curve.

Smoothing factor x axis

[0.01] ... 1000

Factor for smoothing on the x-axis.

Smoothing factor y axis

[0.01] ... 1000

Factor for smoothing on the y-axis.

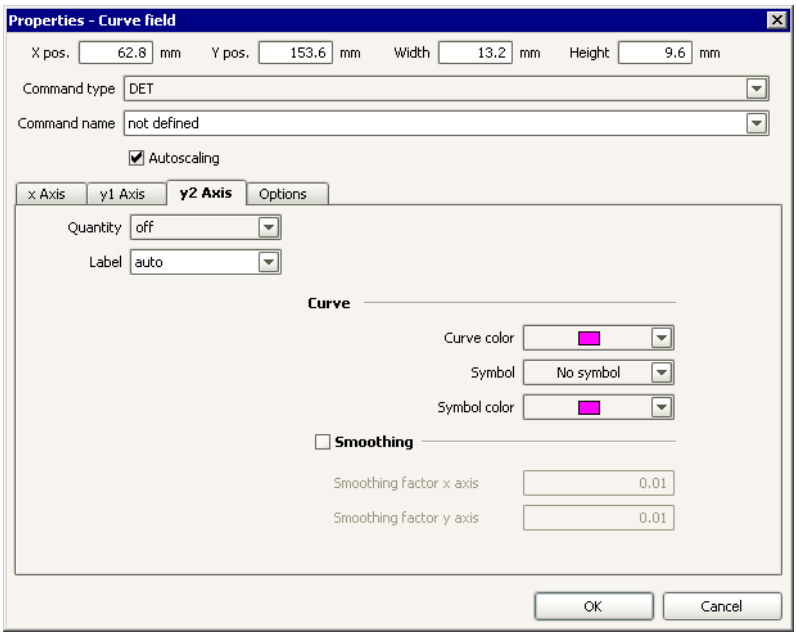
Display original curve as well

on, [off]

If this option is enabled then in addition to the smoothed curve the original curve will also be shown (dotted, same color).

Curve field - y2 axis

Parameters for the graphical display of the curve on the y2 axis (right-hand y axis).



X pos.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of curve field.

Height

0.0000 ... (max. page height) mm
Height of curve field.

Coomand type

[DET], MET, SET, KFT, KFC, MEAS, MEAS T/Flow
Selection of the type of command for which a curve is to be shown.

Command name

[not defined], 50 characters
Name of the command for which a curve is to be shown. With **not defined** the first curve 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**).*

Autoscaling

[on], off
If this option is enabled then all the axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection
Selection of the quantity to be shown on the y2 axis.

Labeling

50 characters, [auto]
Freely definable axis labeling for the y2 axis. With **auto** the name from the **Quantity** will be used.

Curve

Curve color

Color selection, [pink]
Selection of the color for the curve line.

Symbol

Symbol selection, [no symbol]
Selection of the symbol for showing the measured values. With **no symbol** the measuring points will not be shown.

Symbol color

Color selection, [pink]
Selection of the color for the measuring point symbol.

Smoothing

on, [off]
Switches smoothing on/off for the curve.

Smoothing factor x axis

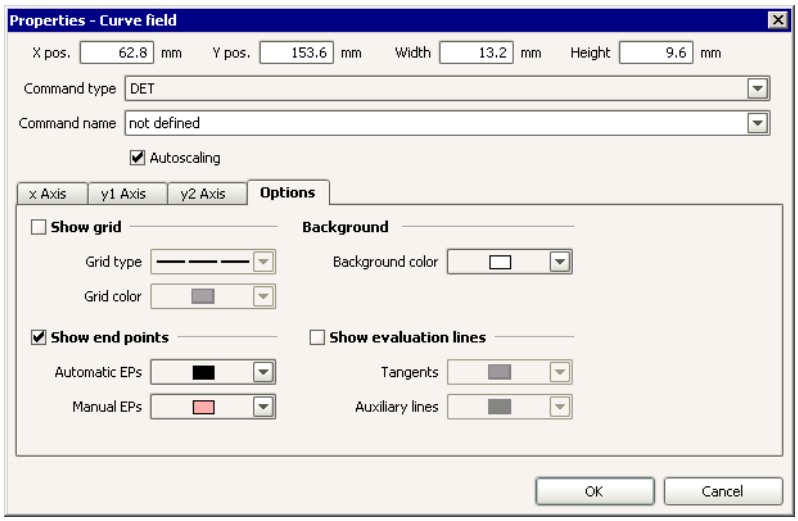
[0.01] ... 1000
Factor for smoothing on the x axis.

Smoothing factor for y axis

[0.01] ... 1000
Factor for smoothing on the y axis.

Curve field - options

Options for the graphical display of the curves.



X pos.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of curve field.

Height

0.0000 ... (max. page height) mm
Height of curve field.

Command type

[DET], MET, SET, KFT, KFC, MEAS, MEAS T/Flow

Shows the command type for which a curve is to be produced.

Command name

[not defined], 50 characters

Name of the command for which the curve is to be produced. With **not defined** the first curve 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**).*

Autoscaling

[on], off

If this option is enabled then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Show grid

on, [off]

If this option is enabled then a grid will be shown against the background.

Grid type

Select type of line

Selection of the grid line type.

Grid color

Color selection, [dark gray]

Selection of the color for the grid lines.

Background

Background color

Color selection, [white]

Selection of the color for the curve background.

Show end points

[on], off

If this option is enabled then the endpoints found will be shown on the curve with the symbol ♦ and labeled with **EP#** (potentiometric endpoints), **BP#** (break point) or **FP#** (fixed endpoint).

Automatic EPs

Color selection, [black]

Selection of the color for automatically set endpoints.

Manual EPs

Color selection, [light red]

Selection of the color for manually set endpoints.

Show evaluation lines

on, [off]

If this option is enabled then the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Color selection, [green]

Selection of the color for tangents and evaluation lines.

Auxiliary lines

Color selection, [blue]

Selection of the color for the auxiliary lines.

Calibration curve field

Calibration curve fields are used for showing calibration or standard addition curves in the report.

Insert

In order to insert a calibration curve 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.

0.0000 ... (max. page width) mm
x-position within the permitted section.

Y pos.

0.0000 ... (max. page height) mm
y-position within the permitted section.

Width

0.0000 ... (max. page width) mm
Width of calibration curve field.

Height

0.0000 ... (max. page height) mm
Height of calibration curve field.

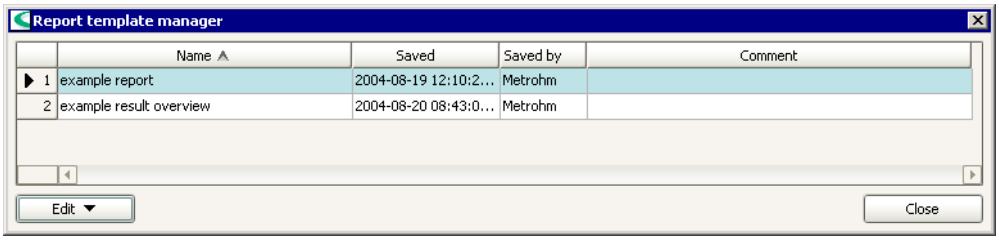
Command name

[not defined], 50 characters
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.

4.4.4 Manage report templates

Manage report templates

With the menu item **Tools, Report templates, Mangers...** the window **Report template manager** opens.



List of report templates

The list of sample tables 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 at which the report template was saved.

Saved by
Short name of the user who saved the report template.

Comment
Remarks about the report template.

Window menus

The menu **Edit** below the list of report templates contains the following menu items:

Rename...
Renames the selected report template.

Copy
Copies the selected report template(s).

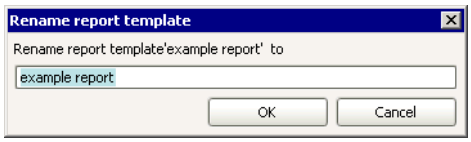
Delete...
Deletes the selected report template(s).

Export...
Exports the selected report template(s).

Import...
Imports report template(s).

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 50 characters

Entry of the new name for the report template.

> ***Note***
> *The name of the report template must be unique throughout the whole client/server system.*

Copy report templates

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'**.

Delete report templates

With the menu item **Edit, Delete...** in the window **Report template manager** the selected report templates are deleted.

Export report templates

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 dialog window **Select folder for export** opens in which the folder for the export must be selected.

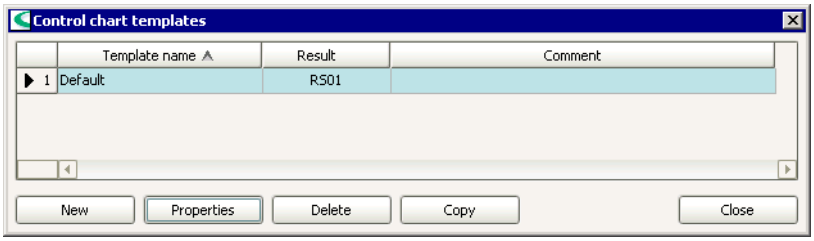
Import report template

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 sample tables are then imported.

4.5 Templates for control chart

4.5.1 Manage control chart templates

With the menu item **Tools, Templates, Control chart templates** the dialog window **Control chart manager** opens in which the globally available templates for control charts can be managed.



Template table

The table with the defined templates cannot be edited. With a click on the column title it can be sorted according to the selected column in increasing or decreasing sequence.

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

Generate a new template. The dialog window **Properties - control chart** opens in which the properties for the new template can be defined.

Properties

Open the dialog window **Properties - control chart** 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 export template selected in the table and saves it under the name **Copy of...**.

4.5.2 Properties

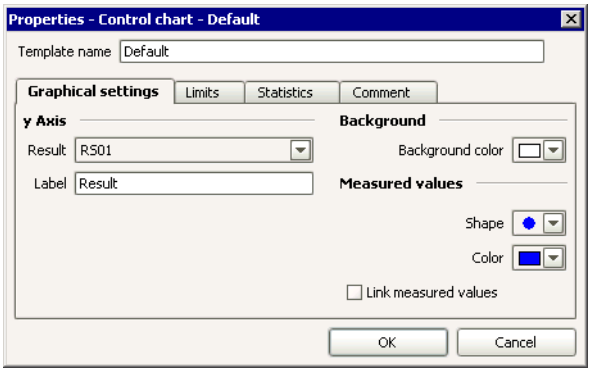
The properties of a control chart template can be set on the following 4 tabs:

- **Graphical settings**
  Parameters for the graphical display for the control chart.
- **Limits**
  Definition of warning and action limits for the control chart.

- **Statistics**
  Shows statistics data for the control chart.
- **Comment**
  Entry of comments for the template.

Graphical settings

Parameters for the graphical display of the control chart.



Template name
50 characters
Name for the control chart template which is saved in the configuration database per client.

y Axis

Result
[RS01] ... RS25
Selection of the result column whose value is to be shown on the y axis.

Label
25 characters, [Result]
Freely definable axis labeling for the y axis.

Background

Background color
Color selection, [white]
Selection of the background color for the control card.

Measured values

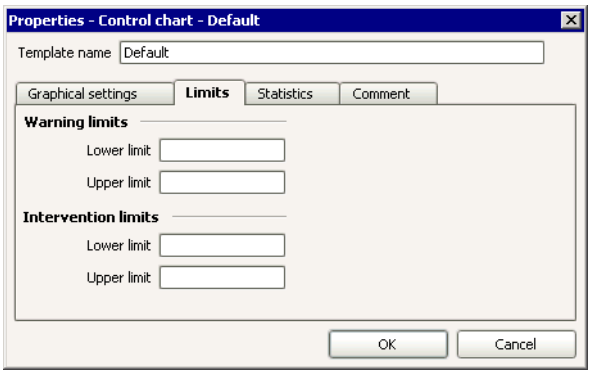
Shape
Symbol selection, [●]
Selection of the symbol for the display of the measured values.

Color
Color selection, [blue]
Selection of the color for the measuring point symbol.

Link measured values
on, [off]
If this option is switched on then the measured value points will be joined together with a line.

Limits

Definition of warning and action limits to be shown on the control chart.



Template name
50 characters
Name for the control chart template which is saved in the configuration database per client.

Warning limits

Lower limit
10 numbers
Lower warning limit.

Upper limit
10 numbers
Upper warning limit.

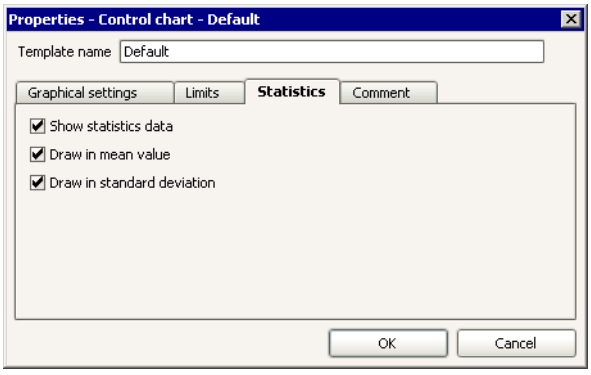
Intervention limits

Lower limit
10 numbers
Lower intervention limit.

Upper limit
10 numbers
Upper intervention limit.

Statistics

Definition of the display of statistics data on the control chart.



Template name
50 characters
Name for the control chart template which is saved in the configuration database per client.

Show statistics data

[on], off

If this option is switched on then below the graph the statistical data for **Mean value**, **Standard deviation**, **Number of measuring points** and **Minimum and maximum values** will be shown.

Draw in mean value

[on], off

If this option is switched on then the **Mean value** will be shown on the control card as a continuous line in the color of the measured value.

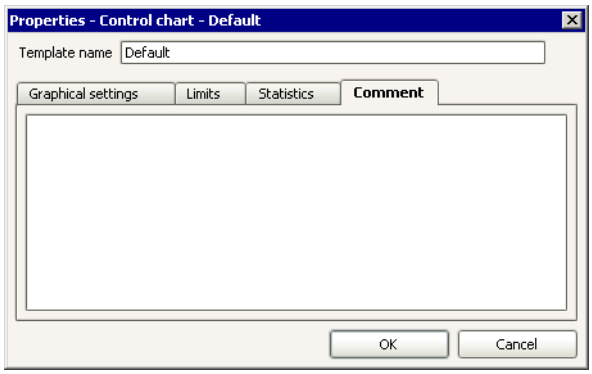
Draw in standard deviation

[on], off

If this option is switched on then the two values **Mean value + Absolute standard deviation** and **Mean value - Absolute standard deviation** will be shown on the control card as dotted lines in the color of the measured value.

Comment

Entry of comments for the control chart template.



Template name

50 characters

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

Comment

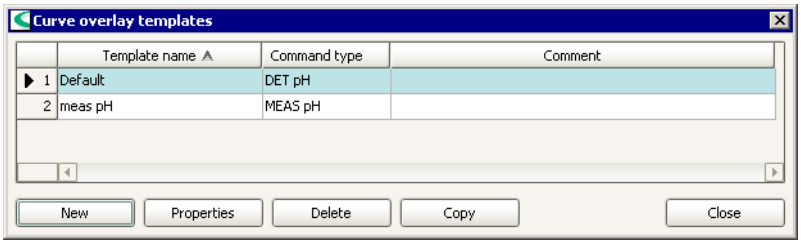
1000 characters

Comment for control chart template.

4.6 Templates for curve overlay

4.6.1 Manage curve overlay templates

With the menu item **Tools, Templates, Curve overlay templates** the dialog window **Curve overlay manager** opens in which the globally available templates for curve overlay can be managed.



Template table

The table with the defined templates cannot be edited. With a click on the column title it can be sorted according to the selected column in increasing or decreasing sequence.

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

Generate 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 export template selected in the table and saves it under the name **Copy of...**.

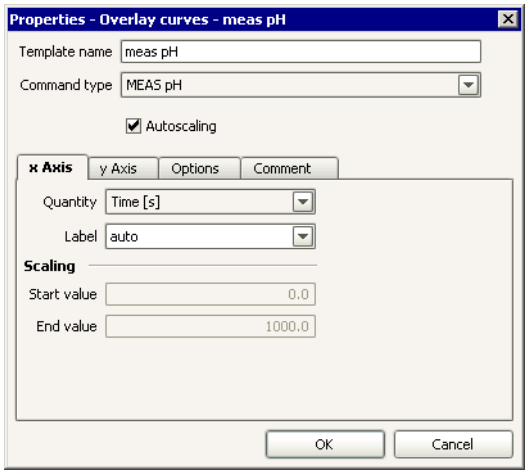
4.6.2 Properties

The properties of a template for superimposed curves can be set on the following 4 register cards:

- **x Axis**
  Parameters for the graphical presentation of the superimposed curves on the x axis.
- **y Axis**
  Parameters for the graphical presentation of the superimposed curves on the y axis.
- **Options**
  Options for the graphical presentation of the superimposed curves.
- **Comment**
  Entry of comments for the template.

x Axis

Parameters for the graphical presentation of the superimposed curves on the x axis.



Template name
50 characters
Name for the curve overlay template which is saved in the configuration database per client.

Command type
Selection of command types
Selection of the command type from which curves are to be superimposed.

Autoscaling
[on], off
If this option is switched on then the x axis in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

x Axis

Quantity
Command-dependent selection
Selects the quantity to be shown on the x axis.

Label
25 characters, [auto]
Freely definable axis labeling for the x axis. With **auto** the label from the field **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the x-axis.

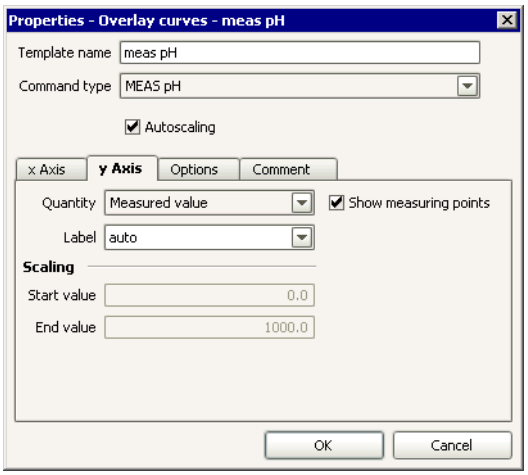
End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the x-axis.

y-axis

Parameters for the graphical presentation of the superimposed curves on the y axis.



Template name

50 characters

Name for the curve overlay template which is saved in the configuration database per client.

Command type

Selection of command types

Selection of the command type from which curves are to be superimposed.

Autoscaling

[on], off

If this option is switched on then the x axis in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

y Axis

Quantity

Command-dependent selection

Selects the quantity to be shown on the y axis.

Label

25 characters, [auto]

Freely definable axis labeling for the y axis. With **auto** the label from the field **Quantity** will be used.

Show measuring points

[on], off

If this option is switched on then the individual measuring points will be shown on the curve.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the y-axis.

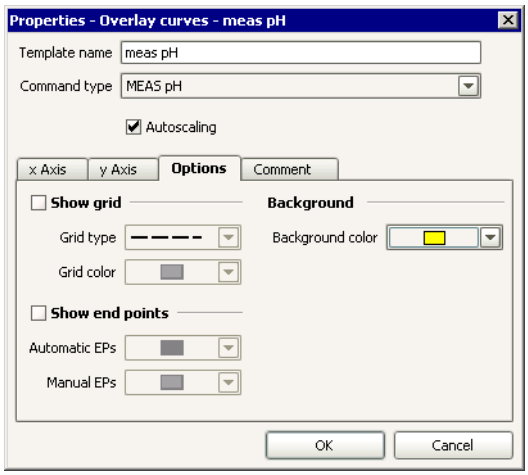
End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the y-axis.

Options

Options for the graphical display of the superimposed curves.



Template name

50 characters

Name for the curve overlay template which is saved in the configuration database per client.

Command type

Selection of command types

Selection of the command type from which curves are to be superimposed.

Autoscaling

[on], off

If this option is switched on then the x axis in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Show grid

on, [off]

If this option is switched on then a grid will be shown against the background.

Grid type

Select line type

Selects the type of grid line.

Grid color

Color selection, [gray]

Selects the color for the grid lines.

Background

Background color

Color selection, [white]

Selects the color for the curve background.

Show end points

on, [off]

If this option is switched on then the found endpoints will be shown on the curve with the symbol ♦ and labeled with **EP#** (potentiometric endpoints), **BP#** (break point) or **FP#** (fixed endpoint).

Automatic EPs

Color selection, [black]

Selects the color for automatically set endpoints.

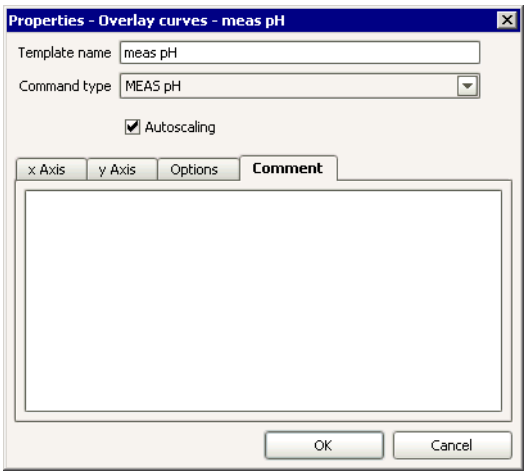
Manual EPs

Color selection, [pink]

Selects the color for manually set endpoints.

Comment

Entry of comments for the curve overlay template.



Template name

50 characters

Name for the curve overlay template which is saved in the configuration database per client.

Command type

Selection of command types

Selection of the command type from which curves are to be superimposed.

Autoscaling

[on], off

If this option is switched on then the x axis in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Comment

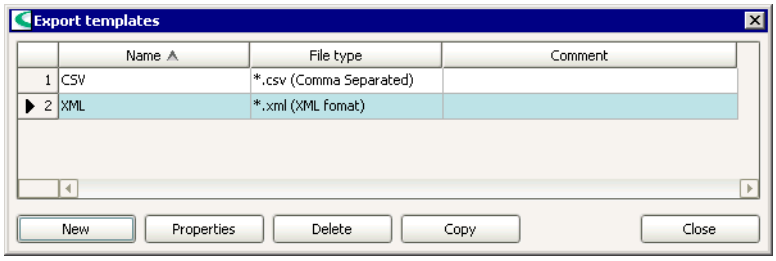
1000 characters

Comment for curve overlay chart template.

4.7 Export templates

4.7.1 Manage

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. With a click on the column title it can be sorted according to the selected column in increasing or decreasing sequence.

Name
Shows the name of the export template.

File type
Shows the file format of the export template for data export.

Comment
Shows the comments about the export template.

Functions

New

Generate a new export template. The dialog window **Export template - 'New file'** opens in which the properties for the new template can be defined.

Properties

Open the dialog window **Export template - 'Name'** in which the properties of the template selected in the table can be edited.

Delete

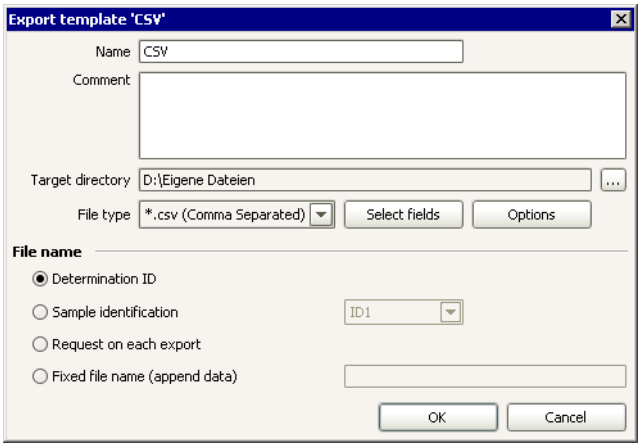
Delete the template selected in the table.

Copy

Copy the template selected in the table and saves it under the name **Copy of...**.

4.7.2 Properties

With **[Properties]** in the dialog window **Export templates** the dialog window **Export template 'Name'** opens in which the properties of the selected export template can be edited.



Name

50 characters
Name of export template.

Comment

250 characters
Freely definable comments about the export template.

Target directory

1000 characters

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

File type

Selection of the file format for data export:

[*.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 (*details see online help*).

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** all fields will always be exported.*

Options

Opens the dialog window **Options for CSV format** in which the separators can be defined.

> ***Note***
> *Options can only be set for the file type* ****.csv****.*

File name

One of the following options can be selected for the definition of the name of the export file:

Determination ID
[on], off
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
on, [off]
If this option is selected then the name of the export file will be formed from the selected sample identification **ID1...ID8**, 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.

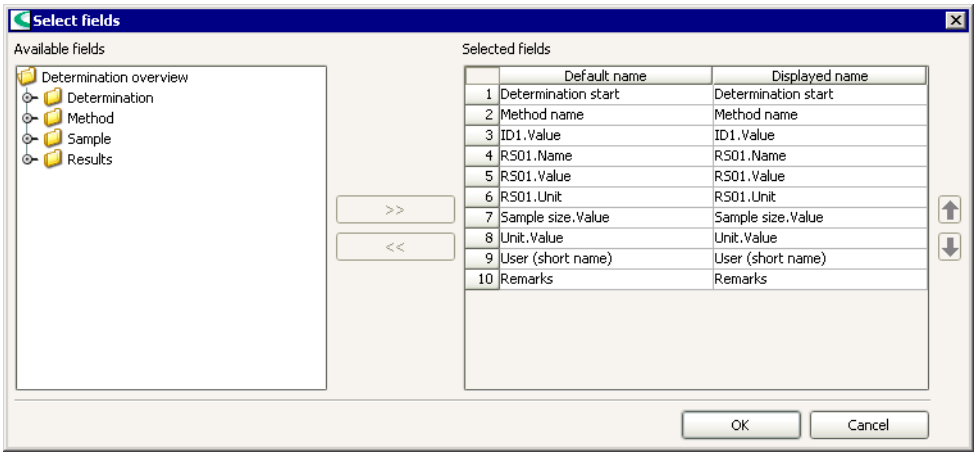
Request on each export
on, [off]
If this option is selected then the name of the export file will be requested at each export. In addition to the entered name the **Client name** and the date stamp **-YYYYMMDD-HHMMSS** will be added automatically.

Fixed file name (append data)
on, [off]
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 types* ****.csv*** *or* ****.slk****.*

Select fields

With **[Select fields]** in the Properties window for export templates the dialog window **Select fields** opens in which for the file types ***.csv** and ***.slk** the fields for data export can be selected.



Available fields

Shows all the fields that can be exported.

Selected fields

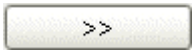
Shows all the fields that will be exported.

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.



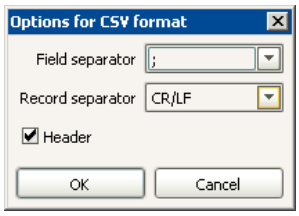
Adds the selected field.

Removes the selected field.

Alters the sequence of the exported field by moving the selected field up or down.

Options

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

[;] , **,** , **Tab**

Selection of the field separator.

Record separator

[CR/LF], CR, LF

Selection of the data record separator (**CR** = Carriage return, **LF** = Line feed).

Header

[on], off

If this option is enabled, the column headers are exported at the beginning of the export file.

4.8 Subwindow Determination overview

4.8.1 General

Overview

General

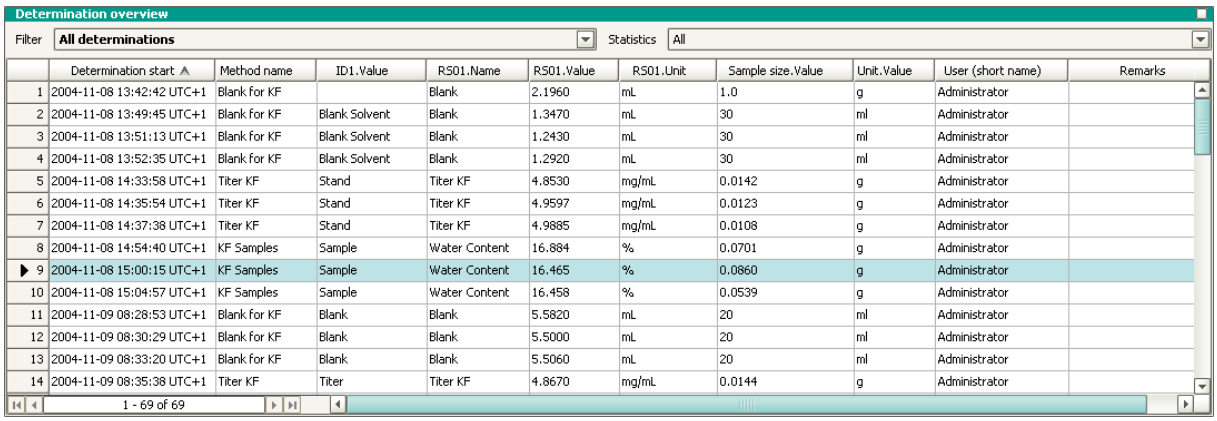
The subwindow **Determination overview** shows selected data for the determinations contained in the open database in tabular form. It is always shown in the program part **Database**, i.e. it cannot be removed from the Database view. The Subwindow can be enlarged and diminished as required; it can also be maximized.

Tools

The subwindow **Determination overview** includes the following tools:

- Determination table
- Filter selection
- Navigation bar

Determination table



	Determination start	Method name	ID1.Value	RS01.Name	RS01.Value	RS01.Unit	Sample size.Value	Unit.Value	User (short name)	Remarks
1	2004-11-08 13:42:42 UTC+1	Blank for KF		Blank	2.1960	mL	1.0	g	Administrator	
2	2004-11-08 13:49:45 UTC+1	Blank for KF	Blank Solvent	Blank	1.3470	mL	30	ml	Administrator	
3	2004-11-08 13:51:13 UTC+1	Blank for KF	Blank Solvent	Blank	1.2430	mL	30	ml	Administrator	
4	2004-11-08 13:52:35 UTC+1	Blank for KF	Blank Solvent	Blank	1.2920	mL	30	ml	Administrator	
5	2004-11-08 14:33:58 UTC+1	Titer KF	Stand	Titer KF	4.8530	mg/mL	0.0142	g	Administrator	
6	2004-11-08 14:35:54 UTC+1	Titer KF	Stand	Titer KF	4.9597	mg/mL	0.0123	g	Administrator	
7	2004-11-08 14:37:38 UTC+1	Titer KF	Stand	Titer KF	4.9885	mg/mL	0.0108	g	Administrator	
8	2004-11-08 14:54:40 UTC+1	KF Samples	Sample	Water Content	16.884	%	0.0701	g	Administrator	
▶ 9	2004-11-08 15:00:15 UTC+1	KF Samples	Sample	Water Content	16.465	%	0.0860	g	Administrator	
10	2004-11-08 15:04:57 UTC+1	KF Samples	Sample	Water Content	16.458	%	0.0539	g	Administrator	
11	2004-11-09 08:28:53 UTC+1	Blank for KF	Blank	Blank	5.5820	mL	20	ml	Administrator	
12	2004-11-09 08:30:29 UTC+1	Blank for KF	Blank	Blank	5.5000	mL	20	ml	Administrator	
13	2004-11-09 08:33:20 UTC+1	Blank for KF	Blank	Blank	5.5060	mL	20	ml	Administrator	
14	2004-11-09 08:35:38 UTC+1	Titer KF	Titer	Titer KF	4.8670	mg/mL	0.0144	g	Administrator	

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Data display

In the determination table the information about the determinations defined under Column display is shown. If the contents of a field are larger than the column width then the whole contents can be shown as a **Tooltip** by keeping the mouse cursor on the field.

If the value of a result is monitored and lies within the limits defined in the **CALC** command then it will be shown in **green**. If it is outside these limits then the value will be shown in **red**.

> ***Note***
> *In lines with red entries the background of the line number will also be shown in red.*

Updating

As long as the program part **Database** remains open alterations in the determination table, caused by running determinations or by other users (addition, editing or deletion of data records), will not be shown automatically. The table must either be

updated with Determinations, 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 increasing or decreasing sequence. The table view can be adapted with the left-hand mouse key as follows:

- **Drag the margin between the column titles**
  Sets the column width.
- **Double-click on the margin between the column titles**
  Sets the optimal column width.
- **Drag the column title**
  Moves the column to the required location.

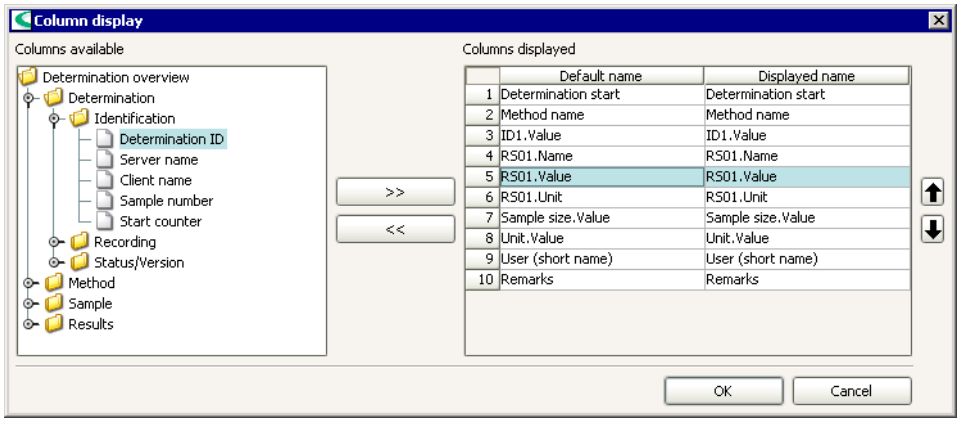
Data record selection and table navigation

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. In the table there are various ways for Data record selection.

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.

Column display

With **View, Properties, Column display** the dialog window **Column display** opens in which the columns to be shown in the Determination table can be defined.



Available columns

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

Shown 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.

Alters the sequence of the shown columns by moving the selected column upward or downward.

Filter selection

Filter

Selection of the filter according to which the Determination table is to be filtered:

All determinations
The table is shown unfiltered.

All statistical 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 Quick filter to have been defined.

Temporary filter
The table is filtered according to the last, not saved Special filter.

Filter name
The table is filtered according to the selected and saved Special filter.

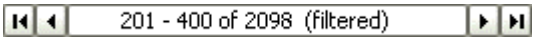
Statistics

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.

All
All determinations are shown for all statistics series.

Last
Only the last determination is shown for all statistics series.

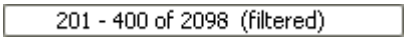
Navigation bar



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:

Jumps to the first set of determinations in the table.

Returns to the previous set of determinations in the table.



Shows 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 together with **(filtered)**.

Jumps to the next set of determinations in the table.

Jumps to the last set of determinations in the table.

Table navigation

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 record of previous set.

[Alt] [→]
Jumps to first data record 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.

Data record selection

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-hand mouse key 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-hand mouse key. 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.

4.8.2 Functions

Overview

With the determinations selected in the Determination table the following functions can be carried out:

Edit determinations

- Update determination table
- Enter determination comment
- Sign determinations
- Export determinations
- Import determinations
- Reprocess determinations
- Delete determinations

Search and filter determinations

- Search determinations
- Filter determinations

Other functions

- Show determination method
- Show determination history
- Show calibration curve
- Show control chart
- Overlay curves
- Print determination overview
- Print report

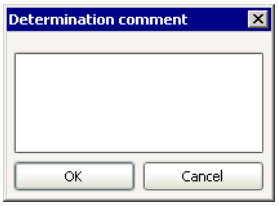
Update determination table

With the menu item **View, Update** or the symbol in the program window **Database** the determination table is updated.

> ***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.*

Determination comment

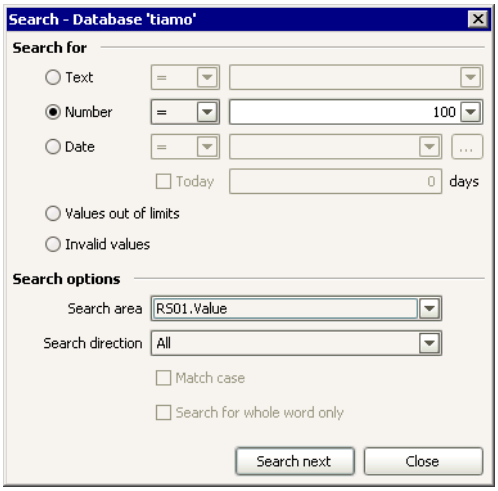
With the menu item **Determinations, Comment...** or the symbol the dialog window **Determination comment** opens in which new remarks can be entered for the selected determination or existing remarks can be edited.



Remarks entered in 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. They are also shown in an Information window.

Search determinations

With the menu item **Determinations, Search** or the symbol in the program window **Database** the dialog window **Search - Database** opens for searching for determinations.



Search for

Text

[on], off
If this option is selected then a search term can be defined that can be searched for in **Text**-type columns.

[=], <>
In the first field the comparative operator for the search term is defined.

250 characters
In the second field a text expression is defined as the search term. The last 10 search terms are saved and can be selected. The following wildcards can be used in the search term:

^?
Wildcard for any character.

^#
Wildcard for any number.

^$
Wildcard for any letter.

^*
Wildcard for any character string.

Number

on, [off]
If this option is selected then a search term can be defined and searched for in **Number**-type columns.

[=], <>, <, <=, >, >=
In the first field the comparative operator for the search term is defined.

250 characters
In the second field a numerical value is defined as the search term. The last 10 search terms are saved and can be selected.

Date

on, [off]
If this option is selected then a search term can be defined and searched for in **Date**-type columns.

[=], <>, <, <=, >, >=
In the first field the comparative operator for the search term is defined.

Date selection
In the second field a date is defined as the search term. The date can be selected by pressing in the dialog window **Select date**. The last 10 search terms are saved and can be selected.

Today

on, [off]
If this option is switched on then filtering will be carried out for the current date. In the field alongside a range in days (**-999 ... 999**) based on the current date can also be defined and searched for.

Values out of limits

on, [off]
If this option is switched on then values that are out of the defined limits will be searched for (values shown in red).

Invalid values

on, [off]
If this option is selected then a search will be made for values with the entry **Invalid**.

Search options

Search area

[All columns], 'Column name'
Selects the area in which the search is to be carried out. With **All columns** the search will be made in all columns. If a particular column is selected then the search will only be made in this column.

Search direction

[All], Up, Down
Selects the search direction. With **Down** the search will be made to the end of the database, with **Up** to its start. With **All** the search will be made down to the end of the and then from the start down to the focused data record.

Match case

on, [off]
If this option is switched on then in a search in **Text**-type columns upper/lower case letters will be differentiated.

Search for whole word only

on, [off]
If this option is switched on then in a search for text the field contents must be identical with the search term (no part-search).

Search next occurence of the search term.

Filter determinations

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

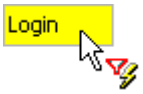
- Filter selection in filter bar
- Quick filter
- Special filter
- Last filter
- Remove filter

Last filter

With the menu item **Determinations, Filter, Last filter** or the symbol in the program part **Database** the last filter to have been used will be activated again.

Quick filter

With the menu item **Determinations, Filter, Quick filter** or the symbol in the program window **Database** a quick filtering can be carried out according to the contents of the selected table field. 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:

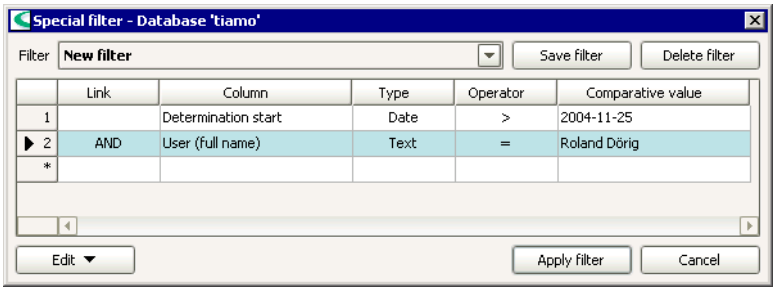


By clicking on it with the left-hand mouse key the contents of the field selected in the table will be set as the filter criterion and this filter will be applied directly to the table.

> ***Note***
> *Within the filter table the quick filter can be used again so that the number of entries can be limited step by step.*

Special filter

With the menu item **Determinations, Filter, Special filter...** or the symbol in the program window **Database** the dialog window **Special filter** opens for the definition of user-specific filters.



Filter

Filter name, [New filter]
Selects the filter to be loaded for processing. An empty table with the name **New filter** is loaded as standard.

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.

Deletes the special filter that is currently loaded.

Table view

The overview table shows all the defined filter criteria and cannot be directly edited. However, the table view can be adapted with the left-hand mouse key as follows:

- **Drag the margin between the column titles**
  Sets the column width
- **Double-click on the margin between the column titles**
  Sets the optimal column width

If the contents of a field is larger than the column width then the whole contents can be shown as a **Tooltip** by keeping the mouse cursor on the field.

For the meaning of the columns please refer to **Edit filter criterion**.

Functions

The menu **Edit** below the filter table contains the following menu items:

Edit line
Opens 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
Transfers selected lines to the clipboard.

Copy lines
Copies selected lines to the clipboard.

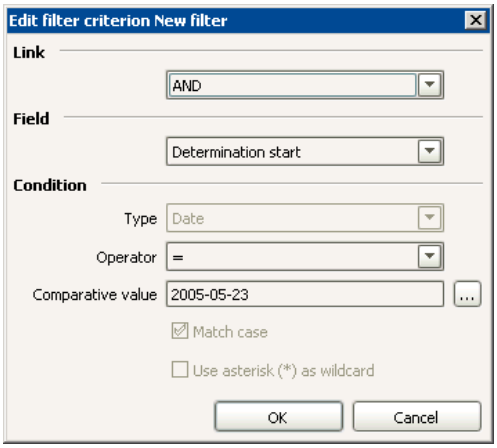
Paste lines
Inserts lines from the clipboard above the selected line.

Delete lines
Deletes selected lines.

Applies filter criteria to Determination table.

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

[AND], OR
Selection of the logic operator with the previous filter criterion.

Field

Field name
Selection of the field from the fields shown in the determination table (shown at the top) as well as all other fields available in the data record for filtering for which a criterion is to be formulated.

Condition

Type

[Text], Number, Date
Selection of the type of format for fields in which several types are possible (e.g. for **ID1.value**). For fields with a fixed type only this type will be shown.

Operator

[=], <>, empty, not empty (for **type** = **Text**)
[=], <>, <, <=, >, >=, invalid, out of limits (for **type** = **Number**)
[=], <>, <, <=, >, >=, Today (for **type** = **Date**)
Selection of the comparison operator for the filter criterion.

> ***Note***
> *If for a date field the **Operator Today** is selected then filtering will be carried out for the current date. In the field **Comparative value** a range in days (**-9999 ... 9999**) based on the current date can also be defined according to which filtering is to be carried out.*

Comparative value

250 characters, * as wildcard (for **type** = **Text**)
Any number (for **type** = **Number**)
Any date (for **type** = **Date**)
-999 ... 999 (for **type** = **Date** and **Operator** = **Today**)
Selection or entry of the comparative value for the filter criterion.

Match case

[on], off
If this option is switched on then upper/lower case will be differentiated when filtering **Text** type fields.

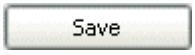
Use asterisk (*) as wildcard
on, [off]
If this option is switched on then when filtering **Text** type fields the asterisk * can be used as a wildcard for any character strings.

Save filter

With the **[Save filter]** button the dialog window **Save filter** opens for saving a Special filter.

All the saved special filters are shown in the upper field.

Filter name
50 characters
Name under which the special filter is to be saved.



Saves filter under given name.

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

All statistics records

With the menu item **Determinations, Filter, All statistical records** or the symbol in the program part **Database** all the determinations are shown that are linked statistically with the selected determination.

Remove filter

With the menu item **Determinations, Filter, Remove filter** or the symbol in the program window **Database** the last filter to have been used can be removed and all determinations shown again.

Sign determinations

Rules

In *tiamo* determination can be **electronically signed** at two levels. The following rules apply:

- **Signature levels**
  Determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.

- **Multiple signing**
  Determinations can be signed several times at each level. All the 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 when signatures already exist at Level 1.

- **Different users**
  The same user can only sign at either Level 1 or Level 2.

- **Reason and note**
  Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can be entered additionally.

- **Saved data**
  The signature date, user name, full name, reason and note are saved for each signature.

- **Deleting Level 1 signatures**
  Signatures at Level 1 are automatically deleted when a new version is generated.

- **Deleting Level 2 signatures**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.

- **Signature options**
  The options for electronic signatures are set on the tab Signatures in the dialog window **Security settings**.

Sign determinations at Level 1

With the menu item **Derminations, Sign, Signature 1...** the window **Signature Level 1** opens for signing the selected determination at Level 1. At this level determinations can be signed several times.

> ***Note***
> *Determinations that have been signed at Level 1 can be reprocessed and deleted. If the altered determination is saved as a new determination version then all existing signatures will be deleted automatically, i.e. the determination must be signed again.*

Info

In this field information about signing and deleting signatures is shown. The following messages are possible:

Signature possible
The selected determination can be signed.

Signature 1 not possible (signature 2 exists)
The selected 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 determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Password

Entry of the password.

Reason

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

Comment

1000 characters
Entry of remarks about the signature.

Sign the determination. The window remains open.

> ***Note***
> *Determinations can only be signed at Level 1 when the user belongs to a user group that has the relevant rights (see User administration/User group/Signatures).*

Sign determinations at Level 2

With the menu item **Determinations, Sign, Signature 2...** the window **Signature Level 2** opens for signing the selected determination at Level 2. At this level determinations can be signed several times.

> ***Note***
> *Determinations that have been 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 (see Delete signature 2).*

Info

In this field information about signing and deleting signatures is shown. The following messages are possible:

Signature possible
The selected determination can be signed.

Signature 2 not possible (signature 1 missing)
The selected 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 determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Password

Entry of the password.

Reason

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

Comment

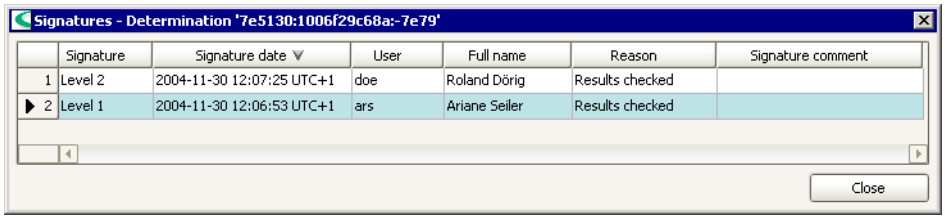
1000 characters
Entry of remarks about the signature.

Sign the determination. The window remains open.

> ***Note***
> *Determinations can only be signed at Level 2 when the user belongs to a user group that has the relevant rights (see User administration/User group/Signatures).*

Show determination signatures

With the menu item **Determinations, Sign, Show signatures...** the window **Signature - 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.

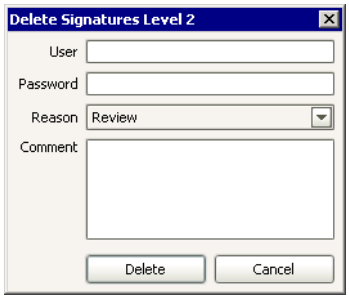
Full name
Full name of the user who signed the determination.

Reason
Reason for signature.

Signature comment
Remarks about the signature.

Delete signatures 2 for determinations

With the menu item **Determinations, Sign, Delete signatures 2...** the window **Delete Level 2 signatures** opens for deleting all signatures at Level 2 for the selected determination.



User
Entry of the user name (short name).

Password
Entry of the password.

Reason
Selection from standard texts
Selection from the Default reasons defined in the dialog window **Security settings** for the category **Signature Level 2**.

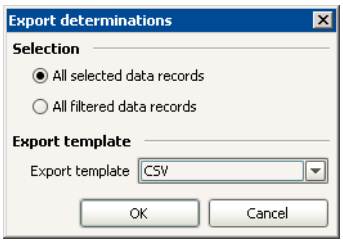
Comment
1000 characters
Entry of of remarks about the deletion of signatures 2.

Delete signatures 2.

> ***Note***
> *Signatures 2 can only be deleted when the user belongs to a user group with the relevant rights (see User administration/User group/Signatures).*

Export determinations

With the menu item **Determinations, Export...** in the program window **Database** the dialog window **Export determinations** opens.



Selection

[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

Select the export template
Selection of the Export template for data export.

Import determinations

With the menu item **Determinations, Import...** in the program window **Database** the dialog window **Import determinations** 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****.*
>
> ***Determination examples***
> *Examples of determinations which can be imported into an open database can be found in the program directory under* **...\tiamo\examples\determinations\...**.

Delete determinations

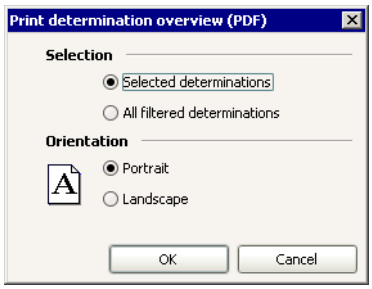
With the menu item **Determinations, Delete** the selected determinations are deleted after the confirmation request.

> ***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 option **Comment on modification of determintions** is switched on in the Security settings then the window **Modification comment determination** will appear before the modification is saved.*

Print determination overview

With the menu item **File, Print, Determination overview...** in the program window **Database** the dialog window **Print determination overview (PDF)** opens.



Selection

Selected determinations
[on], off
If this option is selected then the selected (marked) determinations in the Determination table will be shown.

All filtered determinations
on, [off]
If this option is selected then all the determinations in the Determination table that meet the filter criterion will be shown.

Orientation

Portrait
[on], off
If this option is selected then the Determination table will be shown in portrait format.

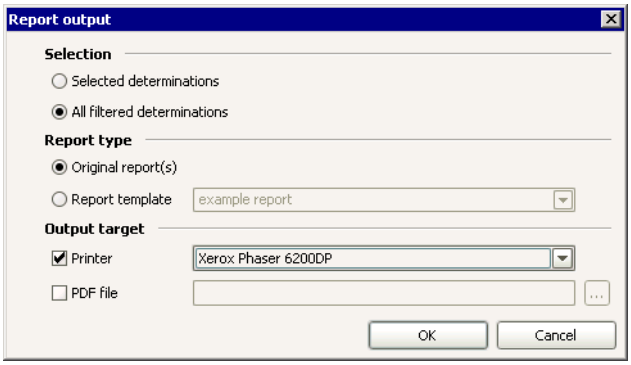
Landscape
on, [off]
If this option is selected then the Determination table will be shown in landscape format.

OK

The Determination table is shown in the required format as a PDF file and opened directly with Acrobat Reader; it can then be printed out and/or saved.

Print determination report

With the menu item **File, Print, Report** in the program window **Database** the dialog window **Report output** opens.



Selection

Selected determinations

[on], off

If this option is switched on then reports for the determinations selected (marked) in the Determination table will be produced.

All filtered determinations

on, [off]

If this option is selected then reports for all the determinations in the Determination table will be produced which meet the filter criterion.

Report type

Original report(s)

[on], off

If this option is selected then the reports produced during the determination will appear at the **Output target** defined below.

Report template

on, [off]

Select the report template

If this option is selected then reports according to the selected Report template will appear at the **Output target** defined below.

Output target

Printer

[on], off

Select the printer

If this option is switched on then the reports will be printed out on the selected printer.

PDF file

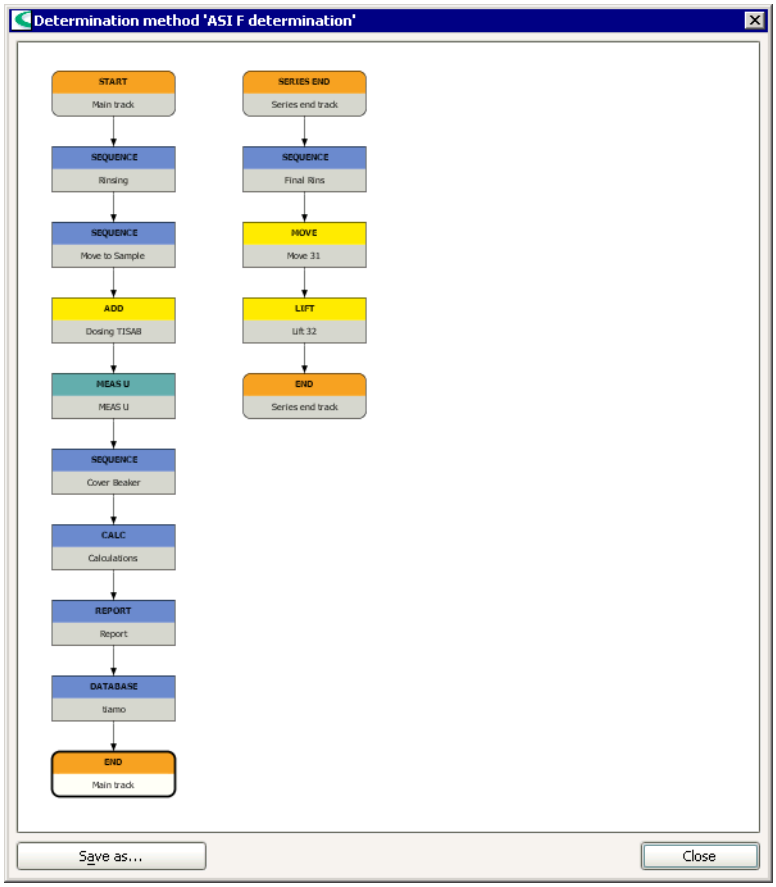
on, [off]

If this option is switched on then the reports will be produced as a PDF file 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.*

Show determination method

With the menu item **Determinations, Show method...** or the symbol the dialog window **Determination method 'Method name'** opens 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 relevant command opens in which the parameters are shown.

Zoom

The standard presentation of the determination method shows all the tracks completely. With the context-sensitive menu item **Zoom** the following zoom steps can be selected for showing the method:

200 %
Enlarges view to 200 %.

150 %
Enlarges view to 150 %.

100 %
Sets view to 100 %.

75 %
Diminishes view to 75 %.

50 %
Diminishes view to 50 %.

25 %
Diminishes view to 25%.

Fit to width
Adapts view to window width.

Fit to height
Adapts view to window height.

[Fit in window]
Adapts view to window width and height.

Save method

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.

Show determination history

Switch history view on/off

With the menu item **Determinations, Show 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 is switched off again with the menu item **Determinations, Show history...** or the symbol then the original selection of determinations in the Determination table will appear again.

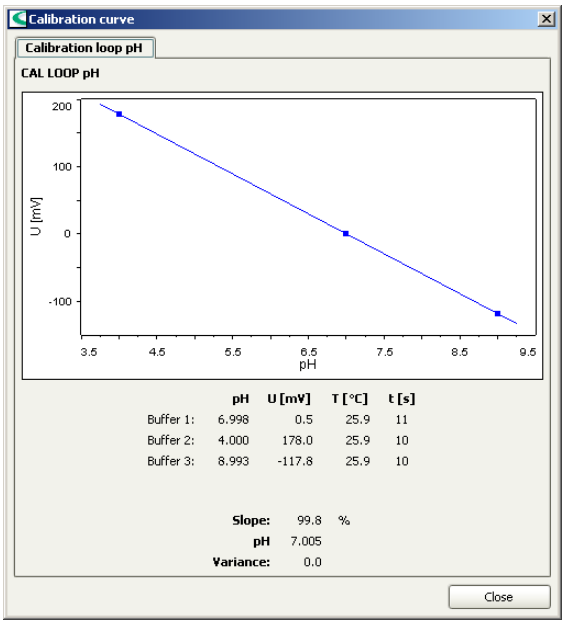
Make old version current one

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.

Show calibration curve

With the menu item **Determinations, Show calibration curve...** or the symbol calibration or standard addition curves are shown for the calibration selected in the dialog window **Calibration curve**.

Calibration curve for CAL LOOP pH



In the dialog window **Calibration curve** a tab marked with the command name and showing the calibration curve and calibration data will be shown for each **CAL LOOP pH** command. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these

measured values. Below it are listed 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** a tab marked with the command name and showing the calibration curve and calibration data will be shown for each **CAL LOOP Conc** command. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Below it are listed the individual measured values and the results for **Slope**, **E(0)**, **c(blank)** and **Variance**.

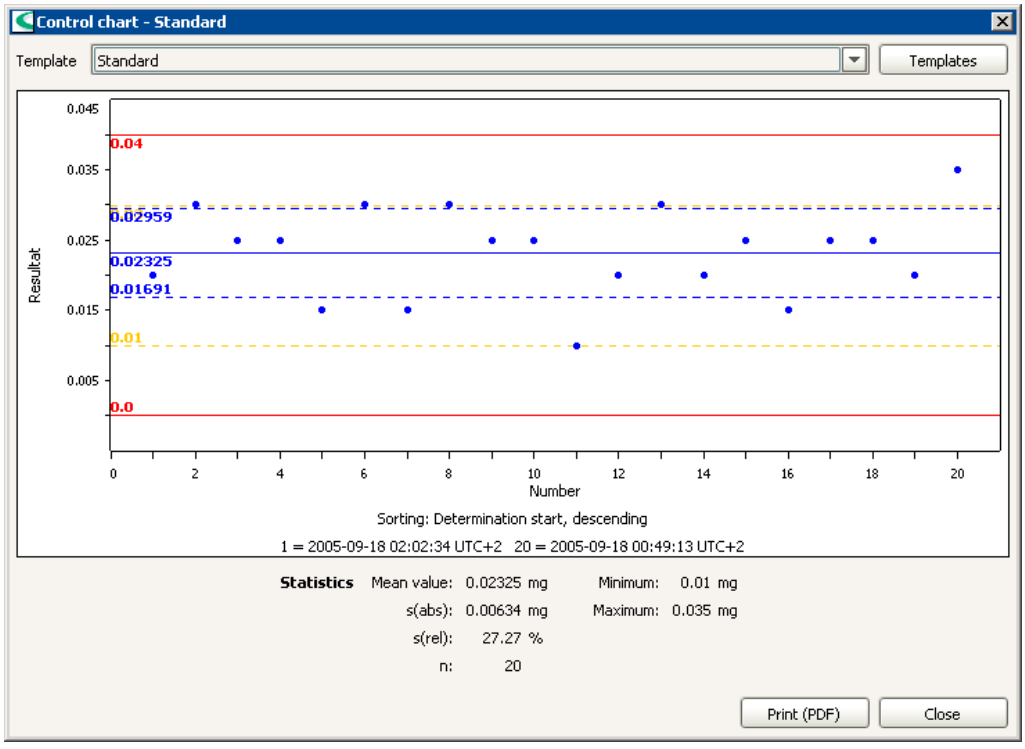
Calibration curve for STDADD

In the dialog window **Calibration curve** a tab marked with the command name and showing the standard addition curve and its evaluation data will be shown for each **STDADD** command. The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Below it are listed the individual measured values and the results for **Slope**, **E(0)**, **ion concentration** and **Variance**.

> ***Note***
> *Calibration curves cannot be printed out directly from the dialog window **Calibration curve**. Instead you should use a report with a Report template in which the fixed report **Calibration curve** is contained.*

Control chart

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



Template

[Default], 'Template name'

Selection of the saved Template for showing control charts. 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

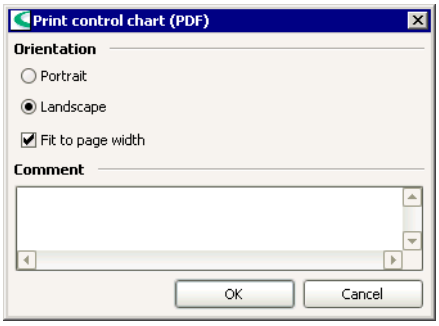
Open the dialog window **Control chart templates**.

Graphical 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 the dialog window **Print control chart (PDF)** in which the contents of the control chart can be shown as a PDF file in the required format.



Portrait

on, [off]

If this option is switched on then the control chart will be shown in portrait format.

Landscape

[on], off

If this option is switched on then the control chart will be shown in landscape format.

Fit to page width

[on], off

If this option is switched on then the printout will be adapted to the page width.

Comment

1000 characters

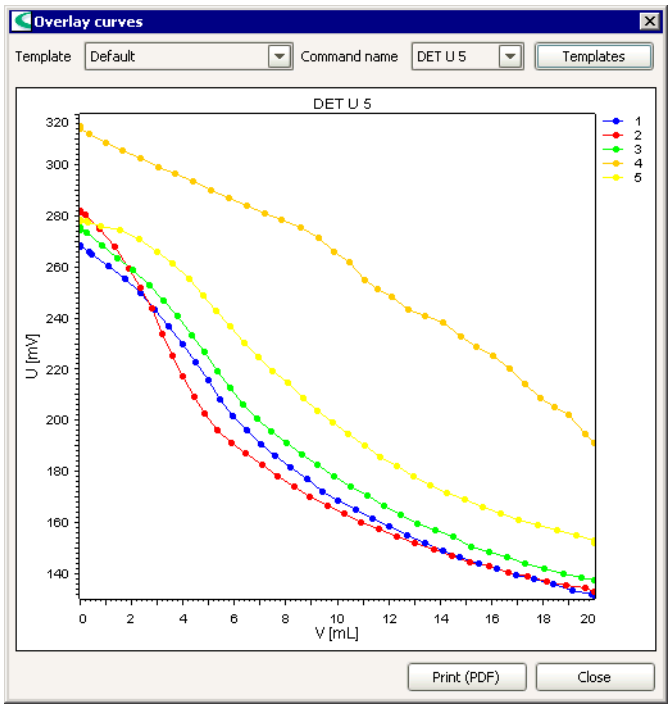
Possibility of entering remarks about the control chart which will be shown together with the control chart.

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.

Overlay curves

With the menu item **Determinations, Overlay curves...** or the symbol the dialog window **Overlay curves** opens in which overlaying curves of the selected determinations can be shown according to the loaded template.



Template

[Standard], 'Template name'

Selection of the saved Template for showing overlaying curves. 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.

> ***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 command

Selection of the name of the command whose curves are to be overlaid. This selection is only necessary if the method contains several commands of the same **Command type**.

Templates

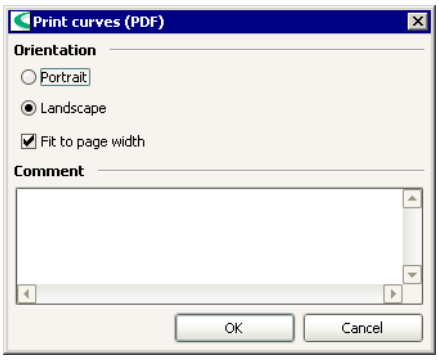
Open the dialog window **Curve overlay templates**.

Graphical 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.

Print (PDF)

Open the dialog window **Print curves (PDF)** in which the contents of the control card can be shown as a PDF file in the required format.



Portrait

on, [off]

If this option is switched on then the overlaying curves will be shown in portrait format.

Landscape

[on], off

If this option is switched on then the overlaying curves will be shown in landscape format.

Fit to page width

[on], off

If this option is switched on then the printout will be adapted to the page width.

Comment

1000 characters

Possibility of entering remarks about the overlaying curves which will be shown together with the overlaying curves.

OK

The view of the overlaying curves 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.

4.8.3 Reprocess determinations

General

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

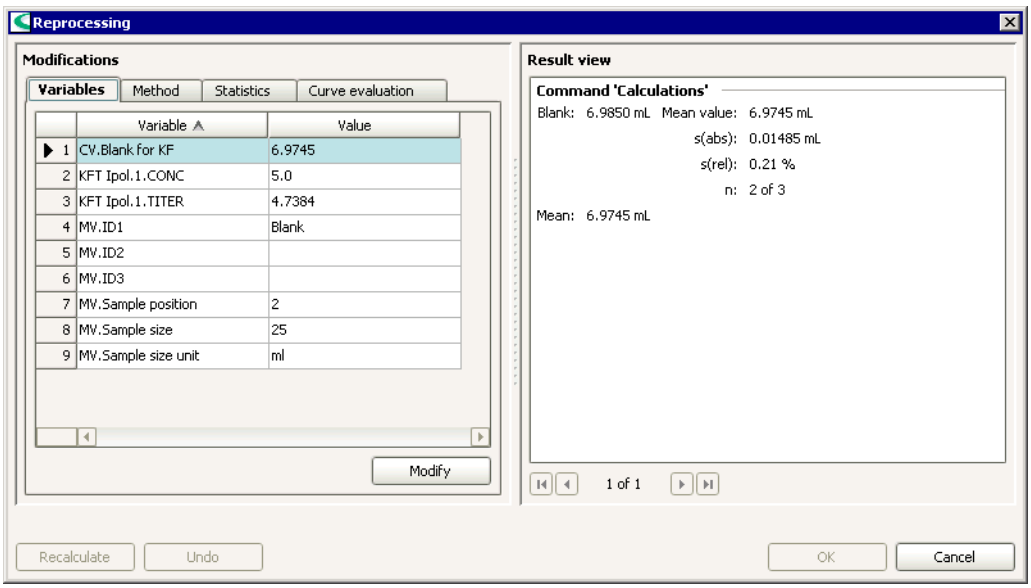
The reprocessing of determinations that have been selected in the subwindow Determination overview takes place in the independent dialog window **Reprocessing** which is opened with **Determinations, Reprocess** or the symbol . The title bar contains the usual Windows buttons for closing, diminishing, maximizing and minimizing. 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 the Windows button for closing.

> ***Note***
> *The reprocessing window cannot be closed while reprocessing is still taking place.*

Reprocessing window



Subwindows

The dialog window **Reprocessing** contains the following two subwindows that can be enlarged and diminished by dragging the separating bar between them:

- **Modifications**
  Modification of variables, methods, statistics, curve evaluation
- **Result view**
  Shows the current results

Functions

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

Recalculate

With this button the recalculation of the selected determination(s) can be triggered with the modifications to the variables, methods, statistics or

curve evaluation made in the subwindow **Modifications**. During the recalculation a progress bar appears; the recalculation can be canceled with alongside 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.

Undo

With this button all the modifications that have been made in reprocessing and that have not been saved can be rejected; the original data and results are then available again. This button is inactive until modifications have actually been made or when the recalculation has not yet been triggered.

OK

With this button 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.

Cancel

With this button the result of the reprocessing carried out since the last data saving will not be saved and the subwindow **Reprocessing** will be closed.

The same function can also be triggered with in the right top corner of the window.

Reprocessing rules

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 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).
- **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 for which the option **Return immediately** has been switched on then a warning will appear to say 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 any messages which may occur 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 switched on then reprocessing will be canceled.
- **Titration and measuring commands**
  For DET, MET, SET, KFT, KFC, MEAS, CAL MEAS only the evaluations will be recalculated with the existing data, 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 terminated.
- **Waiting and timeout periods**
  All waiting and timeout periods in commands will be set to the value **0** for the recalculation.
- **Non-executed commands**
  The commands REPORT, REQUEST, WAIT, RECEIVE, SEND, TRANSFER, STIR, SCAN, CTRL, MOVE, SWING, LIFT, PUMP, RACK, HEATER, FLOW, ADD, LQH, PREP and EMPTY will be performed but not executed.
- **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 altered in the method then their associated variables (e.g. **Titer**, **Slope**) will always (even when at the same time the corresponding variables have been altered under **Variables**) be taken from the Configuration data and updated for the recalculation.
- **Assign titer and common variables**
  If a determination without statistics is recalculated in which a titer or a common 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 or a common 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]**.

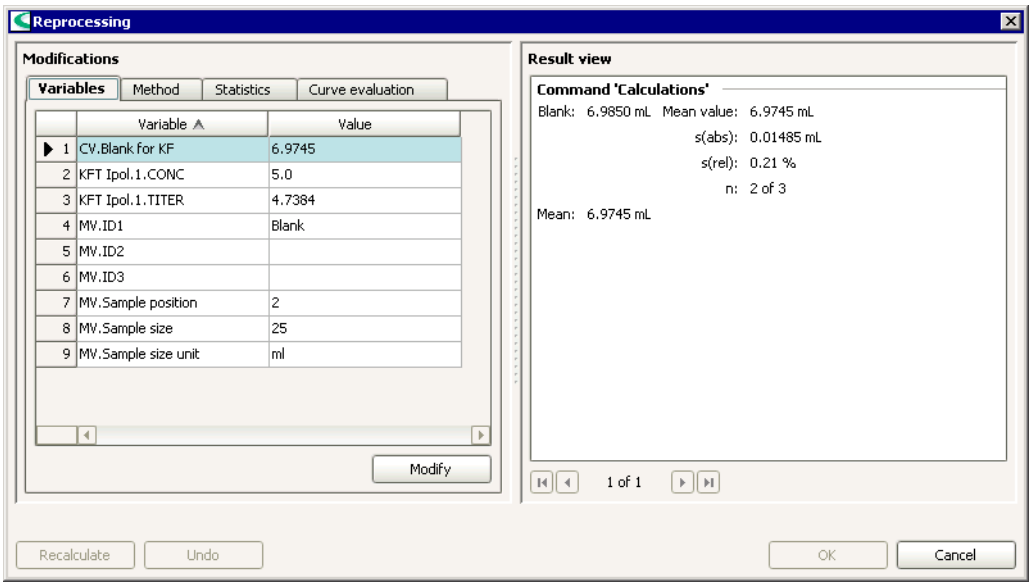
Modifications

In the subwindow **Modifications** of the dialog window **Reprocessing** modifications can be made to 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 the statistics data.
- **Curve evaluation**
  Manual modification of the curve evaluation.

Variables

The variables used in the determination can be modified here.



Variable table

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

Variable

Shows the variable name. 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

Shows the variable value.

Opens the dialog window **Modify variable** for editing the value of an existing variable:

Variable

Shows the name of the variable.

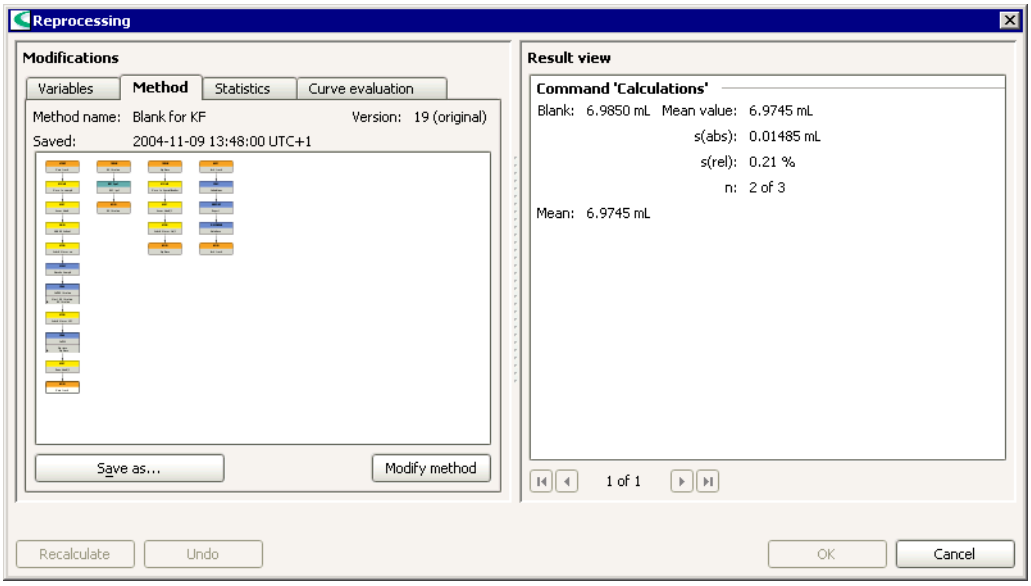
Value

-1.0E+99 ... 1.0E-99, 0, 1.0E-99 ... 1.0E+99 (for **Type** = **Number**)
100 characters (for **Type** = **Text**)
'Date' (for **Type** = **Date/Time**)
Value of the variable. For variables of the type **Date/Time** the date must be entered in the Date input window.

> ***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).*

Method

The method used for the focused determination is shown here with its tracks and commands. A precondition is that the method is identical for all the determinations that have been selected. 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 with the determination data when the recalculated determination is saved.

Saved:
Shows the date and time at which the method version was saved.

Modify method

Opens the Method editor in the separate 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 here. If the dialog window is closed with **[OK]** then the method will be checked. The modified method then appears on the register card **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]**.

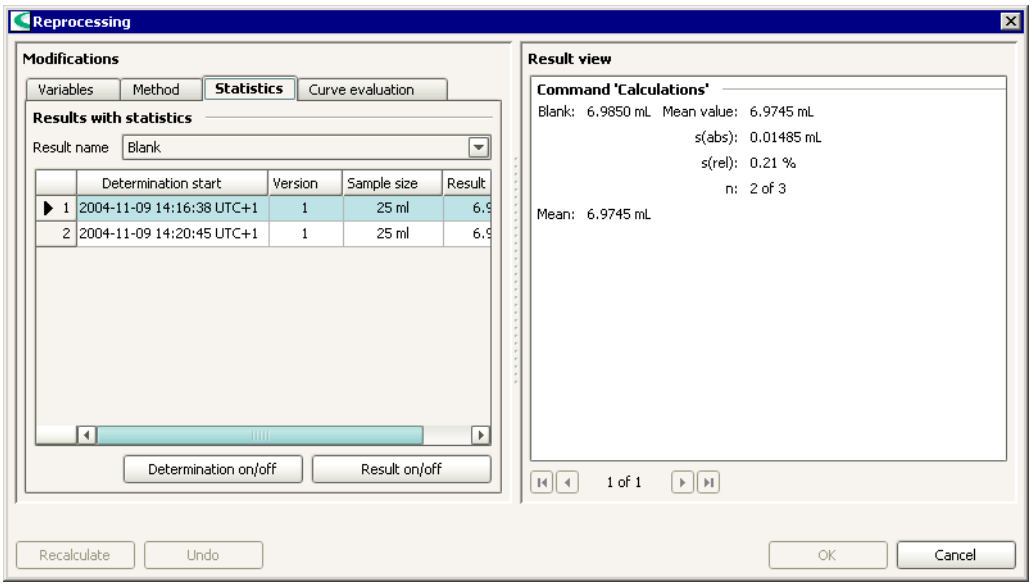
Save as...

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 will be generated with the number **1**.

Statistics

Individual results for the statistical calculation can subsequently be switched on and off here.



> ***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.*

Results with statistics

Result name

Result name

Selection of the statistically evaluated result by using the result name for which the individual results of all determinations are shown.

Table of individual results

For the result selected above the following data for the individual determination 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 statistical data (mean value, standard deviations, etc.) for the selected determination are listed in the subwindow **Result view**.

Determination on/off

With this button all the individual results for the selected determination can be switched on and off for the statistical calculations. If the determination is switched off then an asterisk (*) appears behind all the result values in the table and the line is shown as inactive (gray); if it is switched on again then

the asterisks will disappear. Updating the statistics data always only takes place with **[Recalculate]**.

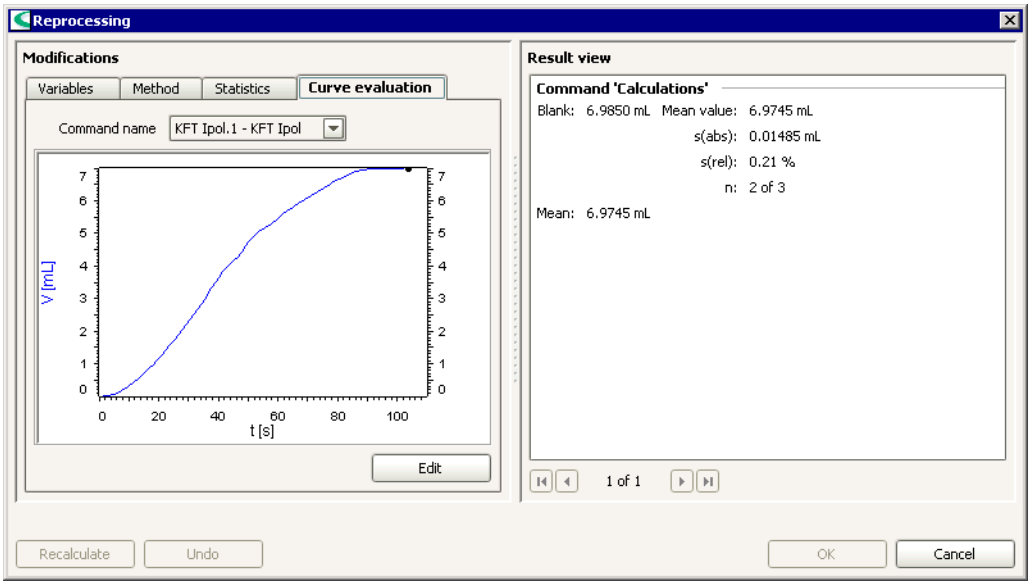
Result on/off

With this button all the individual results selected in the table for statistical calculations can be switched on and off. If the result is switched off then an asterisk (*) appears behind the result value in the table; if it is switched on again then the asterisk will disappear. Updating the statistics data always only takes place with **[Recalculate]**.

Note
If the results of a determination are switched off then when this determination is recalculated the statistics for these results will be switched off, 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.

Curve evaluation

Curves that can be evaluated manually can be shown here.



Note
*The tab **Curve evaluation** is only shown when a single determination that contains curves that can be evaluated has been selected.*

Command name

Command name

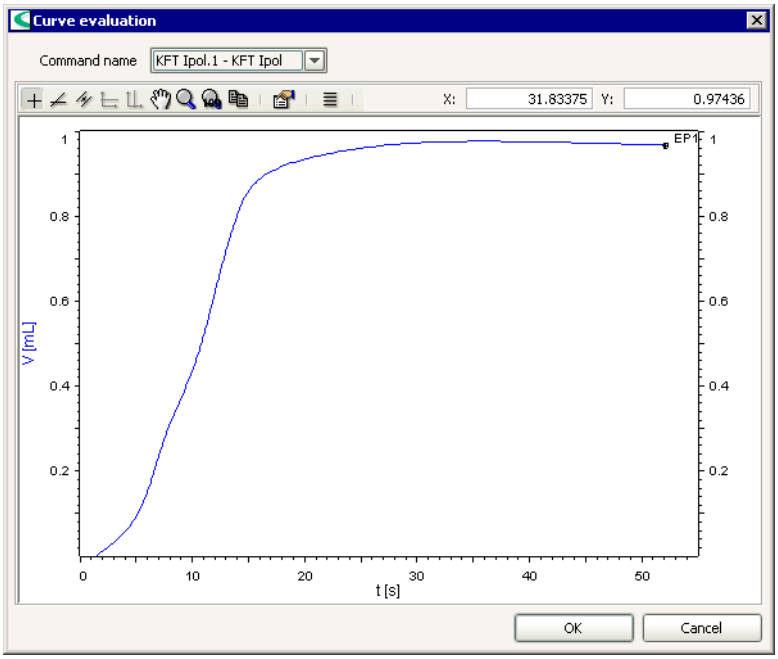
Selection of the measuring command (**command name.index - command type**) for which the curve is to be shown for reprocessing.

Edit

Opens the window **Curve evaluation** for manually reprocessing the curve evaluation.

Edit curve ebvaluation

The evaluation of the selected curve can be edited manually here.



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 crosswire and numerically above the curve. A new end point can be set by clicking with the left-hand mouse key. 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 with the left-hand mouse key. The mouse is then used to select a second point to which the second tangent is to be applied. The tangent is set with a click with the left hand mouse key and at the same time a new end point is set at the point where the 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-hand mouse key and at the same time a new end point is set at the intersection of the middle lines of the two tangents with the curve.

> ***Note***
> *If new end points are set manually or by intersection or tangent evaluation or if existing end points are deleted then the end points will always be renumbered from left to right. In principle during recalculation the automatic evaluations will no longer be used for curves, i.e. the end points 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 with the left-hand mouse key. This function is only active when the option **Show evaluation lines** is switched on.

Set vertical auxiliary lines

By moving the mouse a vertical auxiliary line is drawn in the graph; this can be set by clicking with the left-hand mouse key. This function is only active when the option **Show evaluation lines** is switched on.

Delete endpoints and auxiliary lines

With the context-sensitive menu item **EP#** the selected end point can be deleted, with **###.###** the selected auxiliary line can be deleted.

Zoom

By drawing out a rectangle with the left-hand mouse key the selected area can be zoomed.

Reset zoom

The graph will be reset to the zoom step 100%.

Copy to clipboard

The contents of the curve window is copied to the clipboard.

Define properties for graph display

The Properties window opens for the curve display. The curve properties defined for each command type are saved for the reprocessing window per client.

Show EP list

Opens the dialog window **End points** in which all the end points of the selected curve are shown in a table. If an end point is added to or deleted from the curve then the table will be updated automatically.

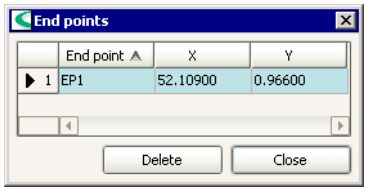
Show coordinates

The current coordinates of the cursor are shown in the coordinate display:

X:
X-coordinate.

Y:
Y-coordinate.

End point list



In the dialog window **End points** the end points of the selected curve are shown in tabular form. If an end point is added to or deleted from the curve then the table will be updated automatically.

End point

Name of the end point with number. The following names are possible:

EP#

End point that has been determined automatically by potentiometric evaluation or set manually by using the intersection or tangent method.

BP#

End point that has been determined by automatic break point evaluation.

FP#

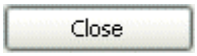
End point that has been determined by automatic fixed point evaluation.

X (mL)

Volume value in mL for end point.

Y (pH)

Measured value (pH) for end point.



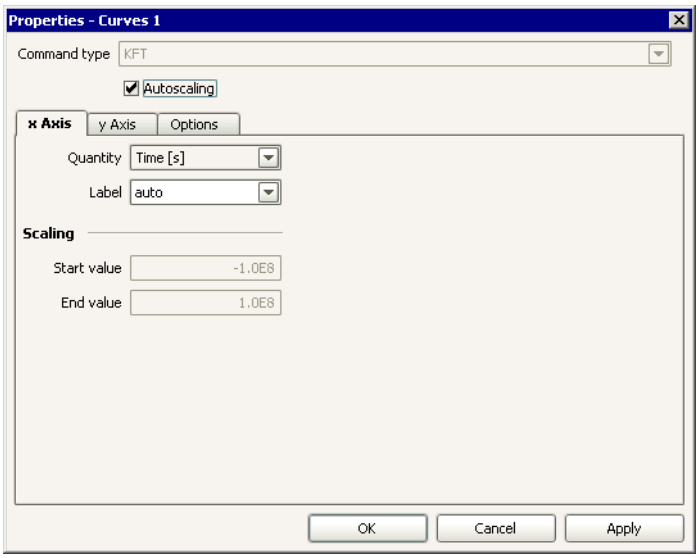
Deletes the selected end point from the table.

Properties

The properties of the curve display in the curve evaluation window can be set on the following 3 tabs:

- **x Axis**
  Parameters for the graphical display of the curve on the x axis.
- **y Axis**
  Parameters for the graphical display of the curve on the y axis.
- **Options**
  Options for the graphical display of the curve.

x axis



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Shows the type of command for which the curve properties can be defined. The curve properties defined by command type for the reprocessing window are saved per client.

Autoscaling

[on], off

If this option is switched on then all the axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the x axis.

Label

50 characters, [auto]

Freely definable axis labeling for the x axis. With **auto** the name from the field **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

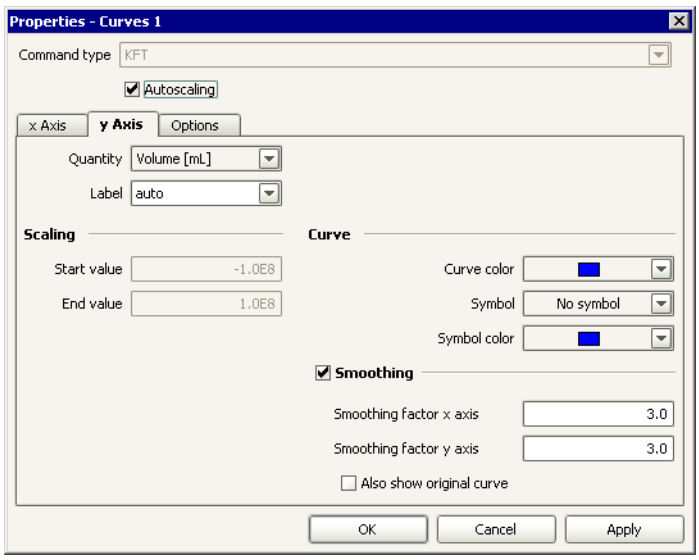
Initial value for scaling the x-axis.

End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the y-axis.

y axis



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Shows the type of command for which the curve properties can be defined. The curve properties defined by command type for the reprocessing window are saved per client.

Autoscaling

[on], off

If this option is switched on then all the axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the y axis.

Label

50 characters, [auto]

Freely definable axis labeling for the y axis. With **auto** the name from the field **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the y-axis.

End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the y-axis.

Curve

Curve color

Color selection, [pink]

Selection of the color for the curve line.

Symbol

Symbol selection, [off]

Selection of the symbol for the display of the measured values. With **off** the measuring points are not shown.

Symbol color

Color selection, [pink]

Selection of the color for the measuring point symbol.

Smoothing

[on], off

Switches curve smoothing on and off. The smoothed curve will be shown as dotted line.

Smoothing factor x axis

[0.01] ... 1000

Factor for smoothing on the x axis.

Smoothing factor y axis

[0.01] ... 1000

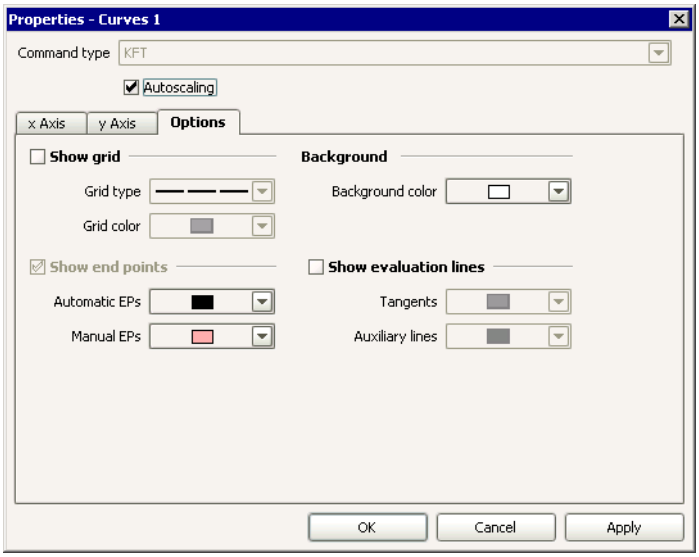
Factor for smoothing on the y axis.

Also show original curve

on, [off]

If this option is switched on then in addition to the smoothed curve the original curve will also be shown (dotted, same color).

Options



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Shows the type of command for which the curve properties can be defined. The curve properties defined by command type for the reprocessing window are saved per client.

Autoscaling

[on], off

If this option is switched on then all the axes in the curve window will be scaled automatically.

Show grid

on, [off]

If this option is enabled then a grid will be shown against the background.

Grid type

Select line type

Selection of the type of grid line.

Grid color

Color selection, [dark gray]

Selection of the color for the grid lines.

Background

Background color

Color selection, [white]

Selection of the color for the curve background.

Show end points

on, [off]

If this option is enabled then the end points found will be shown on the curve by the symbol ♦ and labeled with **EP#** (potentiometric end point), **BP#** (break point), **FP#** (Fixed end point), **HP** (HNP), **MI** (minimum value) or **MA** (maximum value).

Automatic EPs

Color selection, [black]

Selection of the color for automatically set end points.

Manual EPs

Color selection, [light red]

Selection of the color for manually set end points.

Show evaluation lines

on, [off]

If this option is enabled then the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Color selection, [green]

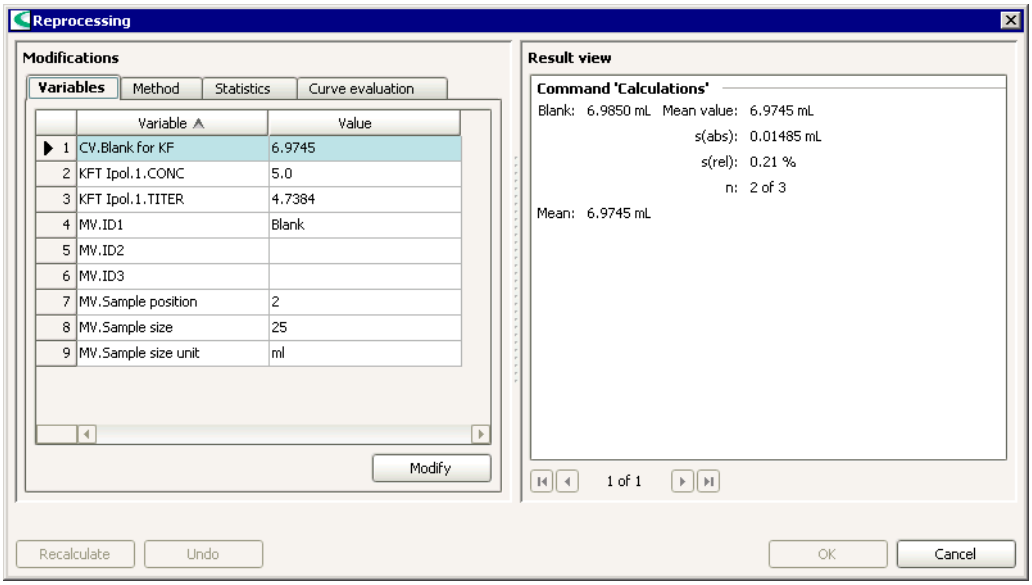
Selection of the color for the tangents and auxiliary lines.

Auxiliary lines

Color selection, [blue]

Selection of the color for the auxiliary lines.

Result view



In the subwindow **Result view** of the dialog window **Reprocessing** the calculated results and the variables used for them in the **CALC** commands will be shown and updated at each recalculation.

For each **CALC** command the following items are shown:

Title
Name of the **CALC** 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:

Jumps to first determination.

Jumps to previous determination.

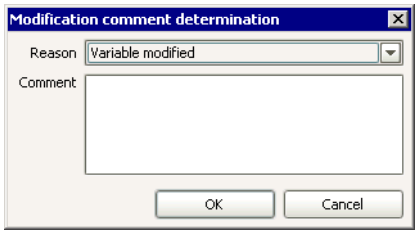
Jumps to next determination.

Jumps to last determination.

> ***Note***
> *If a result value is monitored and if it lies inside the limits defined in the **CALC** command then the text will be shown in **green**, if it is outside the limits the value will be shown in **red**.*

Modification comment for determinations

If the option **Comment on modification of determinations** is switched on in the Security settings then before the altered sample data is accepted the window **Modification comment determination** first appears in which a reason must be selected and a comment about the alteration must be entered.



Reason

Selection from default reasons

Selection from the Default reasons defined for the category **Modifications of determinations** in the **Security settings** dialog window.

Comment

1000 characters

Entry of remarks about the alteration to the determination.

4.9 Subwindow Information

4.9.1 Overview

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 diminished as required; it can also be maximized.

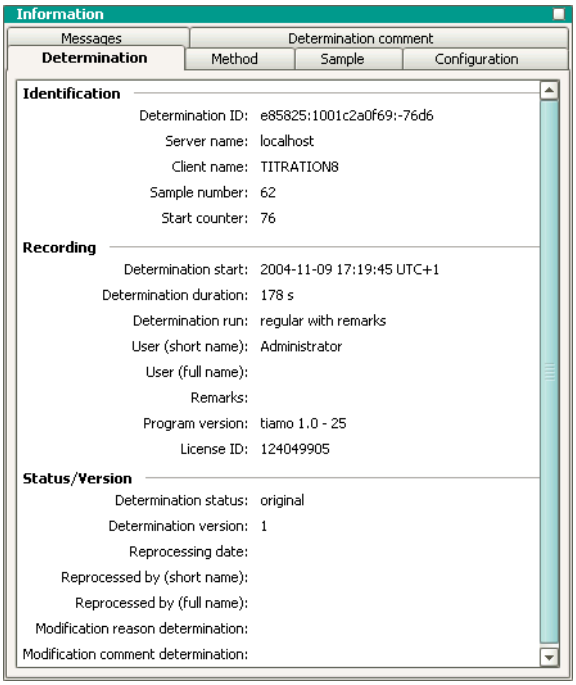
Tabs

Information about the determination is shown on the following 6 tabs:

- **Determination**
  Shows general information about the 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 comments about the determination.

4.9.2 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:
Name of the server to which the client was connected when the determination was recorded.

Client name:
Name of the client with which the determination was recorded.

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:

regular without remarks
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.

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

abort by error
The determination was automatically cancelled due to an error.

User (short name):
Short name of user logged in at start of determination.

User (full name):
Full name of user logged in at start of determination.

Remarks:
Shows the **Remarks** about the determination entered in the run window.

Program version
Shows the program version and build number of *tiamo*.

License ID
Shows the license root number.

Status/Version

Information about the determination version.

Determination status:

original
Determination data unaltered.

modified
Determination data altered.

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 at which 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 alteration 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 alteration of determination data, **New generated version for statistics** will be displayed here.

Modification reason determination:
Reason for altering the determination.

Modification comment determination:
User comment about the determination alteration.

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.

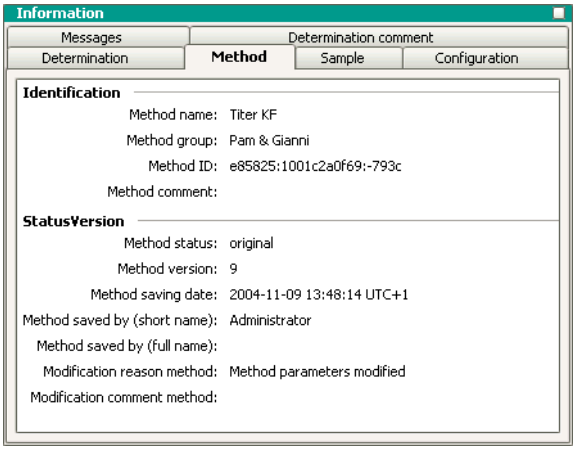
Signed by (full name):
Full name of user who signed the determination.

Signature reason:
Reason selected by user for signature.

Signature comment:
User comments about signing the determination.

4.9.3 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 for **START** command).

Status/Version

Information about method version.

Method status:

original
Determination method unaltered.

modified
Determination method altered by Reprocessing.

Method version:
Version of the method.

Method saving date:
Date and time at which 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 altering the method.

Modification comment method:
User comment about the method alteration.

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 user who signed the method.

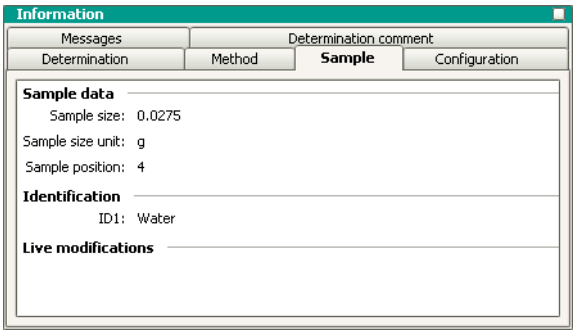
Signed by (full name):
Full name of user who signed the method.

Signature reason:
Reason selected by user for signature.

Signature comment:
User comments about signing the method.

4.9.4 Sample

Shows general information about the sample used.



Sample data

Information about the sample.

Sample size:
Value for the sample size.

Sample size unit:
Sample size unit.

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***
> *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 on the sample rack.

Identification

Information about the sample identifications.

ID1...ID8:
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 ... ID8, 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 modifications

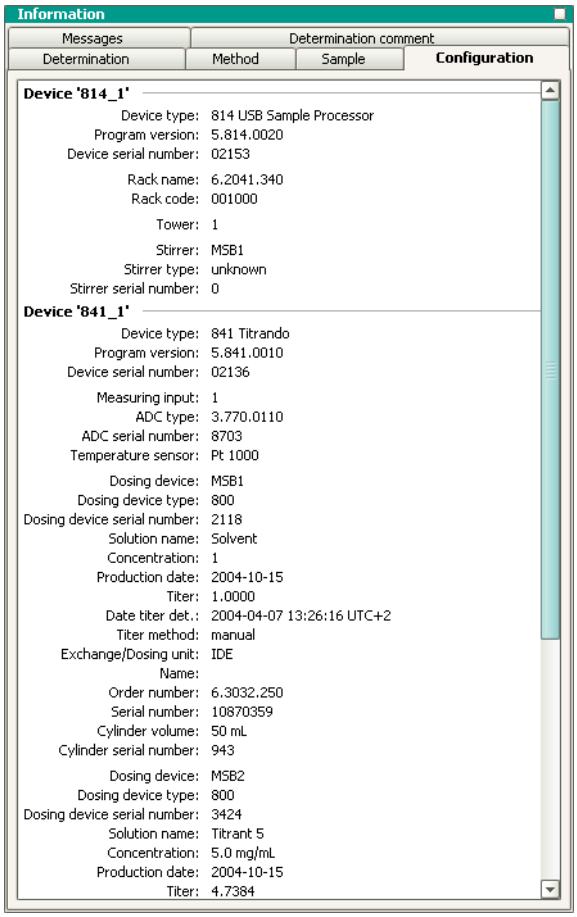
Information about the last live modifications of the sample data.

Modification reason sample data:
Reason for altering the sample data.

Modification comment sample data:
User comment about the sample data alteration.

4.9.5 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 device.

Rack name:
Name of the rack on the sample changer.

Rack code:
Rack code of the rack on the sample changer.

Tower:
Number of the tower on which a Swing Head is used.

Swing Head type:
Type of Swing Head attached to tower.

Swing Head serial number:
Serial number of Swing Head attached to tower.

Measuring input:
Number of the measuring input.

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:
Type of dosing device.

Dosing device serial number:
Serial number of dosing device.

Solution name:
Name of the solution.

Concentration:
Concentration value and units of the solution.

Production date:
Date on which the solution was produced.

Titer:
Titer value and units of the solution.

Date titer det.:
Date on which titer was determined.

Titer method:
Method with which the titer was determined.

Exchange/Dosing unit:
Type of exchange or dosing unit.

Name:
Name 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.

Sensor 'Sensor name'

Information about the sensor used.

Sensor type:
Type of sensor.

Ion:
Ion and valency for ISE electrodes.

Order number:
Order number of sensor.

Sensor serial number:
Serial number of sensor.

Device:
Name of device to which sensor is connected.

Measuring input:
Number of the measuring input to which the sensor is connected.

Common variable 'Name'

Information about the common variable used.

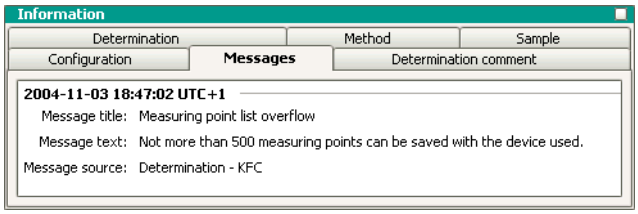
Value:
Value and unit of the common variable.

Assignment date:
Date and time of last value assignment.

Assignment method:
Method with which the value was assigned.

4.9.6 Messages

Shows messages generated during the determination sequence.



'Time'

Shows the time at which the message was generated in the sequence (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.

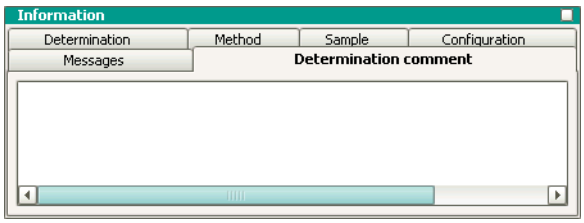
Message source:
Shows from where the message comes:

Program
Message that cannot be assigned to a particular command.

Track 'Track name' - Command 'Command name'
Message produced by a command during the sequence.

4.9.7 Determination comment

Shows the comment about the determination.



Determination comment:
Shows the Comment entered for the determination.

4.10 Subwindow Results

4.10.1 Overview

General

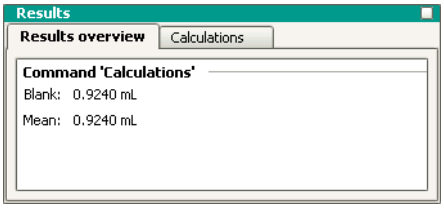
In the subwindow **Results** the results calculated in the calculation commands and the variables used for their calculation are shown for the determination focused in the Determination table. The subwindow can be switched on in the program part **Database** in the definition of the Layout and thus made visible. It can be enlarged and diminished 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.
- **'Command name'**
  Shows the results for a single calculation command. A tab with the corresponding command name is provided for each calculation command.

4.10.2 Results overview



Shows the results overview for all calculation commands.

Command 'Command name'

Name of the **CALC** command for which the results are shown.

> ***Note***
> *Only the last results to have been calculated will be shown. For example, if there are several commands that produce a result with the same name, then the corresponding result data will only be shown 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 if it lies within the limits defined in the **CALC** command then the text will be shown in **green**; if it is outside the limits it will be shown in **red**.*

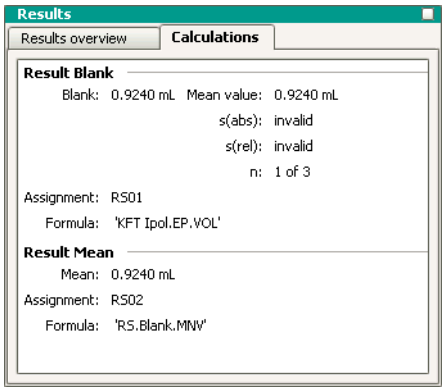
Mean value:
Shows the mean value for statistically evaluated results.

s(abs):
Shows the absolute standard deviation for statistically evaluated results.

s(rel):
Shows the relative standard deviation for statistically evaluated results.

n:
Shows the number of measurements for statistically evaluated results.

4.10.3 Command name



Show the results for a single calculation command. The command name is shown as the title of the tab. The sequence of the shown results corresponds to that defined in the calculation command.

Result 'Result name'

Name of the result in the **CALC** command for which the information is to be shown.

> ***Note***
> *Only the last results to have been calculated will be shown. For example, if there are several commands that produce a result with the same name, then the corresponding result data will only be shown 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 if it lies within the limits defined in the **CALC** command then the text will be shown in **green**; if it is outside the limits it will be shown in **red**.*

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.

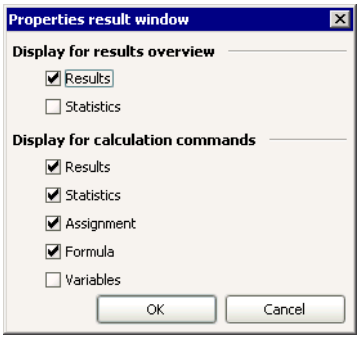
n:
Shows the number of measurements for statistically evaluated results.

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':
Shows the variables used for the formula.

4.10.4 Properties



Selection of the items to be shown in the results window.

Display for results overview

efines the items to be shown on the tab **Results overview**.

Results
[on], off
Shows all results.

Statistics
on, [off]
Shows the statistics results.

Display for calculation commands

Defines the items to be shown on the tab **Calculation command**.

Results
[on], off
Shows the results defined in the calculation command.

Statistics
[on], off
Shows the statistics results.

Assignment
[on], off
Shows the assignment.

Formula
[on], off
Shows the calculation formula.

Variables
on, [off]
Shows the variables used in the formula.

4.11 Subwindow Curves

4.11.1 General

Subwindow Curves

The subwindows **Curves 1...5** are subwindows in the program part **Database**, in which the measuring points generated by the measure 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 **Workplace** during the definition of the Layout and thus made visible. They can be enlarged and diminished as required; they can also be maximized.

Tabs

In the curve window a tab with the corresponding command name is provided for each measure command; their sequence is determined by the method.

> ***Note***
> *If a measure command is carried out several times (e.g. in loops) then the corresponding index will also appear in addition to the command name(e.g. **Chloride{1}**).*

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.

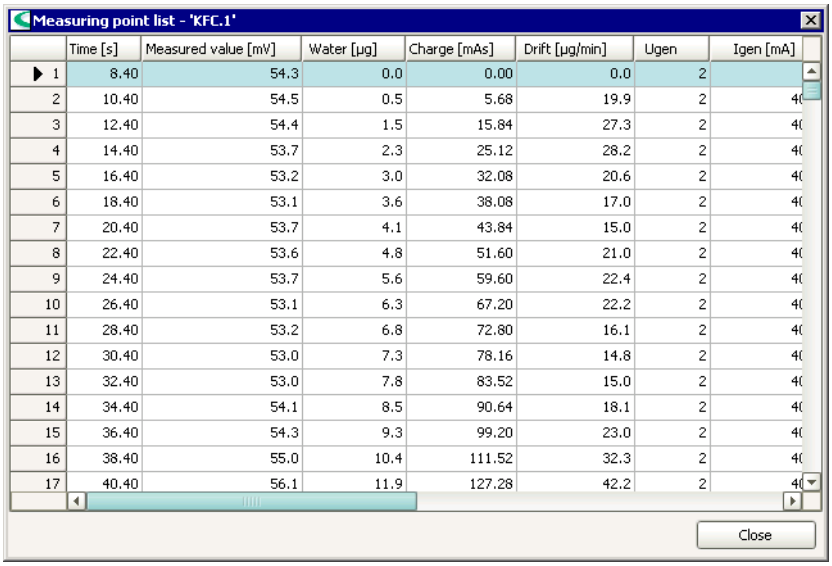
Curves can be **zoomed** as often as required by spanning a section of the curve display with the left-hand mouse key pressed down. Zooming can be undone with a double-click on the section of the graph or with the context-sensitive menu command **Show all**.

> ***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 measuring point list

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.

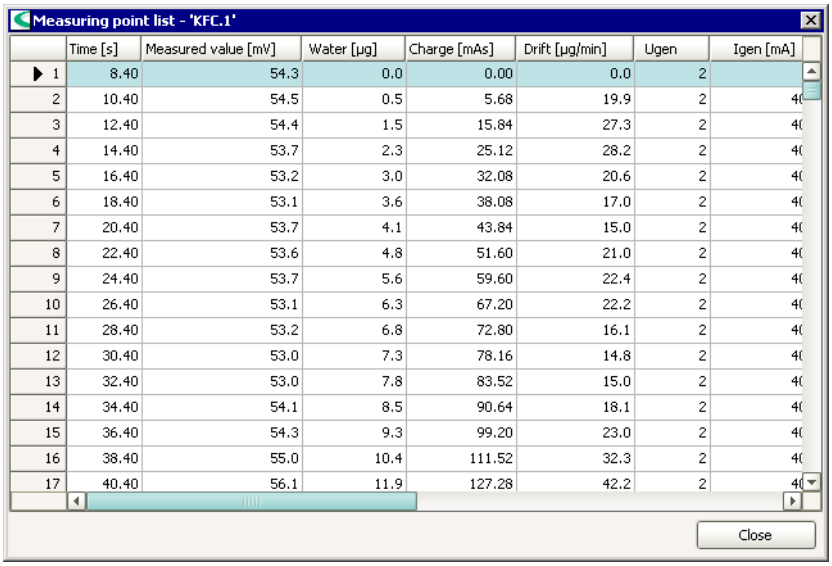


	Time [s]	Measured value [mV]	Water [µg]	Charge [mAs]	Drift [µg/min]	Ugen	Igen [mA]
1	8.40	54.3	0.0	0.00	0.0	2	
2	10.40	54.5	0.5	5.68	19.9	2	4(
3	12.40	54.4	1.5	15.84	27.3	2	4(
4	14.40	53.7	2.3	25.12	28.2	2	4(
5	16.40	53.2	3.0	32.08	20.6	2	4(
6	18.40	53.1	3.6	38.08	17.0	2	4(
7	20.40	53.7	4.1	43.84	15.0	2	4(
8	22.40	53.6	4.8	51.60	21.0	2	4(
9	24.40	53.7	5.6	59.60	22.4	2	4(
10	26.40	53.1	6.3	67.20	22.2	2	4(
11	28.40	53.2	6.8	72.80	16.1	2	4(
12	30.40	53.0	7.3	78.16	14.8	2	4(
13	32.40	53.0	7.8	83.52	15.0	2	4(
14	34.40	54.1	8.5	90.64	18.1	2	4(
15	36.40	54.3	9.3	99.20	23.0	2	4(
16	38.40	55.0	10.4	111.52	32.3	2	4(
17	40.40	56.1	11.9	127.28	42.2	2	4(

The display of the measuring points in the table can be defined per window and per command type in Properties.

4.11.2 Measuring point list

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.



	Time [s]	Measured value [mV]	Water [µg]	Charge [mAs]	Drift [µg/min]	Ugen	Igen [mA]
1	8.40	54.3	0.0	0.00	0.0	2	
2	10.40	54.5	0.5	5.68	19.9	2	4(
3	12.40	54.4	1.5	15.84	27.3	2	4(
4	14.40	53.7	2.3	25.12	28.2	2	4(
5	16.40	53.2	3.0	32.08	20.6	2	4(
6	18.40	53.1	3.6	38.08	17.0	2	4(
7	20.40	53.7	4.1	43.84	15.0	2	4(
8	22.40	53.6	4.8	51.60	21.0	2	4(
9	24.40	53.7	5.6	59.60	22.4	2	4(
10	26.40	53.1	6.3	67.20	22.2	2	4(
11	28.40	53.2	6.8	72.80	16.1	2	4(
12	30.40	53.0	7.3	78.16	14.8	2	4(
13	32.40	53.0	7.8	83.52	15.0	2	4(
14	34.40	54.1	8.5	90.64	18.1	2	4(
15	36.40	54.3	9.3	99.20	23.0	2	4(
16	38.40	55.0	10.4	111.52	32.3	2	4(
17	40.40	56.1	11.9	127.28	42.2	2	4(

The display of the measuring points in the table can be defined per window and per command type in Properties.

The column **Monitoring** is displayed for **STAT** and **DOS** by default and can contain the following entries:

_Meas.v.
Measured value lower limit exceeded.

¯Meas.v.
Measured value upper limit exceeded.

_Dos.r.
Dosing rate lower limit exceeded.

¯Dos.r.
Dosing rate upper limit exceeded.

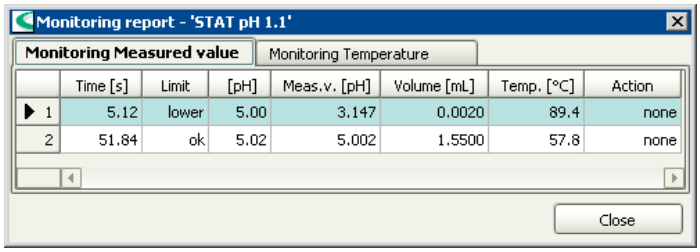
_Temp.
Temperature upper limit exceeded.

¯Temp.
Temperature lower limit exceeded.

*****
Dosing stopped.

4.11.3 Monitoring report

If the method contains commands of type **STAT** or **DOS**, with the context-sensitive menu item **Monitoring report...** in the curve window the dialog window **Monitoring report - 'Command name'** opens for showing information about limit violations for each monitoring switched-on.



The following columns are displayed:

Time [s]
Time in s until limit violation.

Limit

lower
Lower limit exceeded.

upper
Upper limit exceeded.

ok
Measured value is inside limits again.

[pH] / [U]
Measured value limit.

Meas.v. [pH] / Meas.v. [U]
Measured value at limit violation time.

Volume [mL]
Dosing volume at limit violation time.

Temp. [°C]
Temperature at limit violation time.

Action
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.

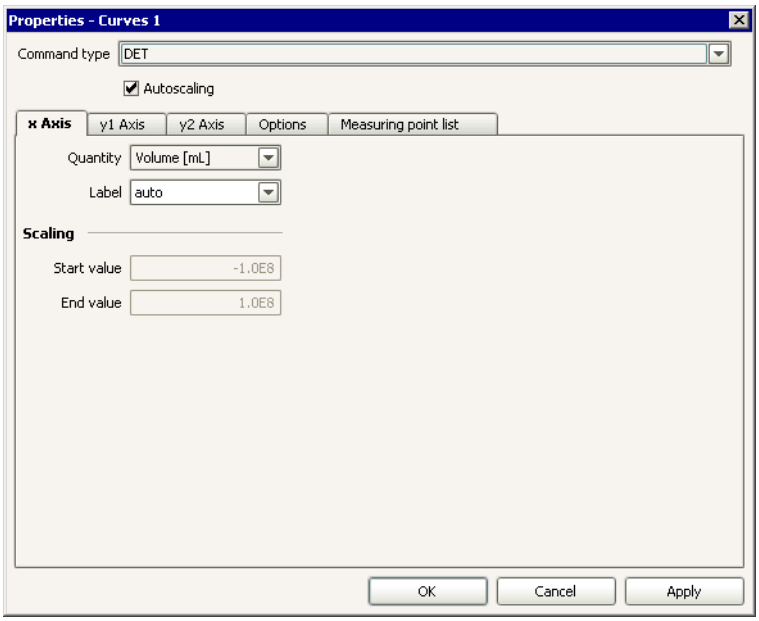
4.11.4 Properties

The properties for the display of curves can be set on the following 5 tabs:

- **x Axis**
  Parameters for the graphical presentation of the graph on the x-axis.
- **y1 Axis**
  Parameters for the graphical presentation of the graph on the y1-axis (left-hand y-axis).
- **y2 Axis**
  Parameters for the graphical presentation of the graph on the y2-axis (right-hand y-axis).
- **Options**
  Options for the graphical presentation of the curves.
- **Measuring point list**
  Parameters for showing the measuring point list.

x Axis

Parameters for the graphical presentation of the curves on the x axis.



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Selection of the command type for which the curve properties are to be defined. The curve properties defined per command type are saved per curve window and per client.

> ***Note***
> *When the dialog window is opened the particular* ***Command type*** *that will be selected as standard is that which applies for the curve shown in the curve window.*

Autoscaling

[on], off

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the x axis.

Label

50 characters, [auto]

Freely definable axis labeling for the x axis. With **auto** the label from the field **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the x axis.

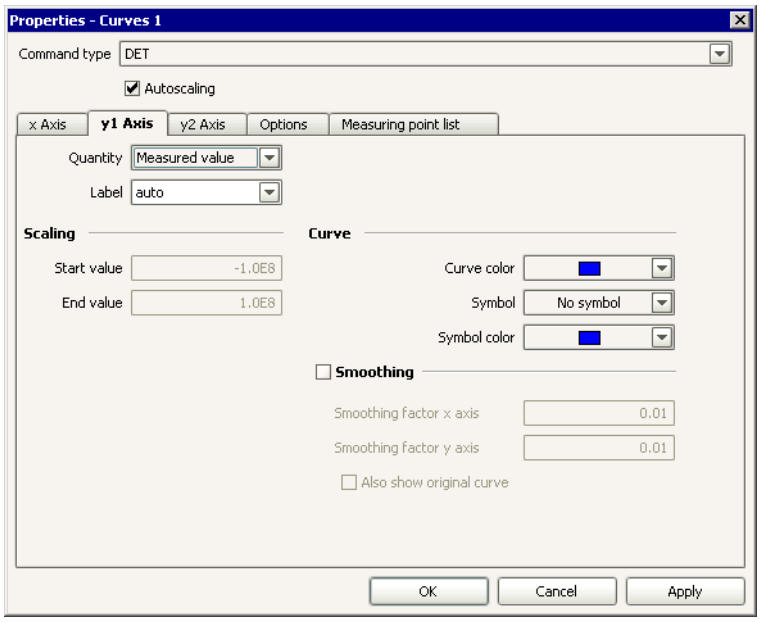
End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the x axis.

y1-axis

Parameters for the graphical presentation of the curves on the y1 axis (left-hand y axis).



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Selects the command type for which the curve properties are to be defined. The curve properties defined per command type are saved per curve window and per client.

> ***Note***
>
> *When the dialog window is opened the particular **Command type** that will be selected as standard is that which applies for the curve shown in the curve window.*

Autoscaling

[on], off

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the y1 axis.

Label

50 characters, [auto]

Freely definable axis labeling for the y1 axis. With **auto** the label from the field **Quantity** will be used.

Scaling

Start value

1 E-8 ... [0.0] ... 1 E+8

Initial value for scaling the y1 axis.

End value

1 E-8 ... [1000.0] ... 1 E+8

Final value for scaling the y1 axis.

Curve

Curve color

Color selection, [pink]

Selection of the color for the curve line.

Symbol

Symbol selection, [off]

Selection of the symbol for showing the measured values. With **off** the measuring points will not be shown.

Symbol color

Color selection, [pink]

Selection of the color for the measuring point symbol.

Smoothing

on, [off]

Switches curve smoothing on/off. The smoothed curve will be shown as dotted line.

Smoothing factor x axis

[0.01] ... 1000

Factor for smoothing on the x axis.

Smoothing factor y axis

[0.01] ... 1000

Factor for smoothing on the y axis.

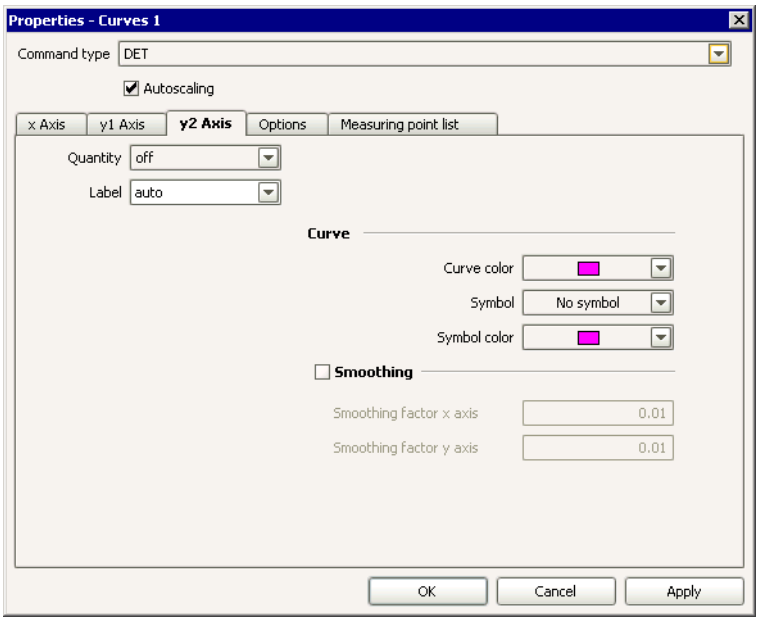
Show with original curve

on, [off]

If this option is enabled then the original curve (solid line) will be shown in addition to the smoothed curve (dotted line, same color).

y2 Axis

Parameters for the graphical presentation of the curves on the y2 axis (right-hand y axis).



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Selection of the command type for which the curve properties are to be defined. The curve properties defined per command type are saved per curve window and per client.

> ***Note***
> *When the dialog window is opened the particular **Command type** that will be selected as standard is that which applies for the curve shown in the curve window.*

Autoscaling

[on], off

If this option is switched on then all axes in the curve window will be scaled automatically.

Quantity

Command-dependent selection

Selection of the quantity to be shown on the y2 axis.

Label

50 characters, [auto]

Freely definable axis labeling for the y2 axis. With **auto** the label from the field **Quantity** will be used.

Curve

Curve color

Color selection, [pink]

Selection of the color for the curve line.

Symbol

Symbol selection, [off]

Selection of the symbol for showing the measured values. With **off** the measuring points will not be shown.

Symbol color

Color selection, [pink]

Selection of the color for the measuring point symbol.

Smoothing

on, [off]
Switches curve smoothing on/off. The smoothed curve will be shown as dotted line.

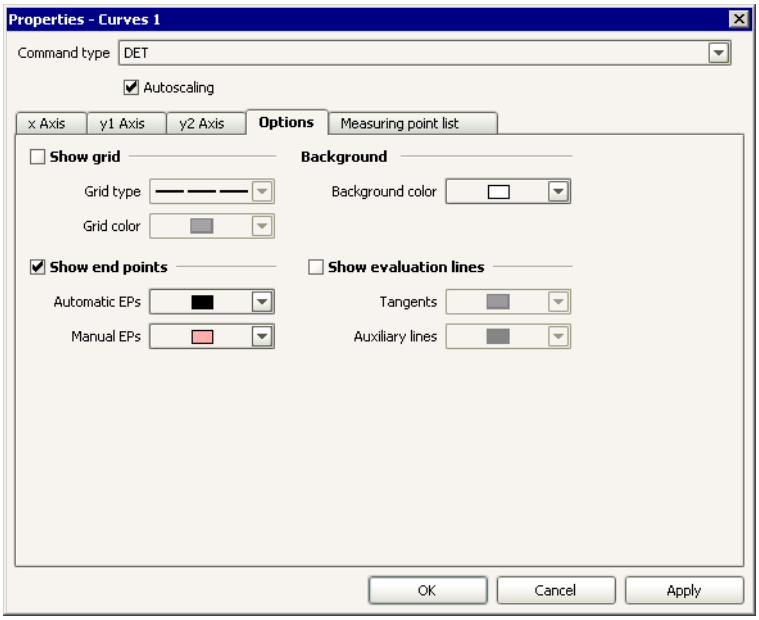
Smoothing factor x axis
[0.01] ... 1000
Factor for smoothing on the x axis.

Smoothing factor y-axis
[0.01] ... 1000
Factor for smoothing on the y axis.

Also show original curve
on, [off]
If this option is switched on then the original curve (solid line) will be shown in addition to the smoothed curve (dotted line, same color).

Options

Options for graphical presentation of curves.



Command type
[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS
Selection of the command type for which the curve properties are to be defined. The curve properties defined per command type are saved per curve window and per client.

> ***Note***
> *When the dialog window is opened the particular* ***Command type*** *that will be selected as standard is that which applies for the curve shown in the curve window.*

Autoscaling
[on], off
If this option is switched on then all axes in the curve window will be scaled automatically.

Show grid

on, [off]
If this option is enabled then a grid will be shown against the background.

Grid type

Select line type
Selection of the type of grid line.

Grid color

Color selection, [dark gray]
Selection of the grid line color.

Background

Background color

Color selection, [white]
Selection of the color for the curve background.

Show end points

on, [off]
If this option is enabled then the found end points will be indicated on the curve by the symbol ♦ and labeled with **EP#** (potentiometric end points), **BP#** (break point) or **FP#** (fixed end point).

Automatic EPs

Color selection, [black]
Selection of the color for automatically set end points.

Manual EPs

Color selection, [light red]
Selection of the color for manually set end points.

Show evaluation lines

on, [off]
If this option is enabled then the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

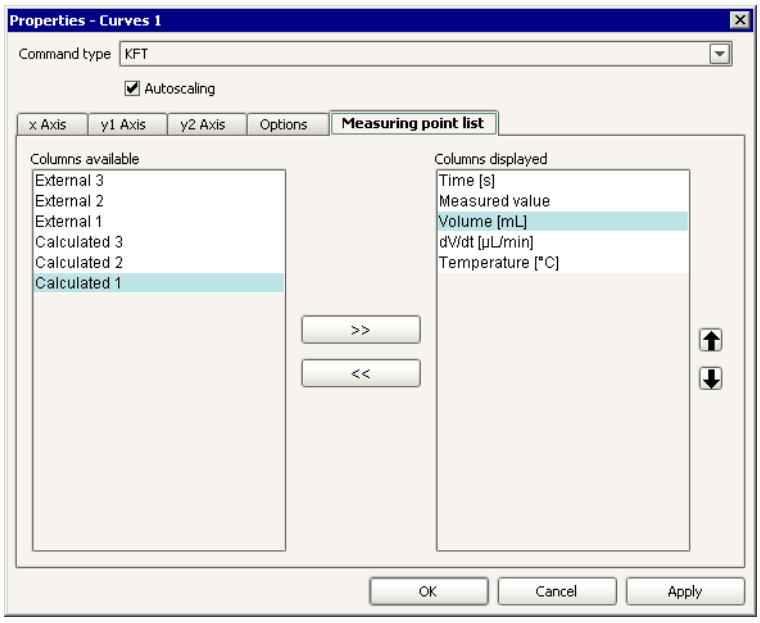
Color selection, [green]
Selection of the color for the tangents and auxiliary lines.

Auxiliary lines

Color selection, [blue]
Selection of the color for the auxiliary lines.

Measuring point list

Parameters for showing the measuring point list.



Command type

[DET], MET, SET, KFT, KFC, STAT, MEAS, MEAS T/Flow, DOS

Selection of the command type for which the curve properties are to be defined. The curve properties defined per command type are saved per curve window and per client.

> ***Note***
> *When the dialog window is opened the particular* ***Command type*** *that will be selected as standard is that which applies for the curve shown in the curve window.*

Autoscaling

[on], off

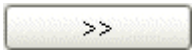
If this option is switched on then all axes in the curve window will be scaled automatically.

Available columns

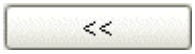
Shows all fields that can be shown as columns in the measuring point list.

Shown 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.

Alters the sequence of displayed columns by moving the selected column up and down.

Chapter 5 Method

5.1 General

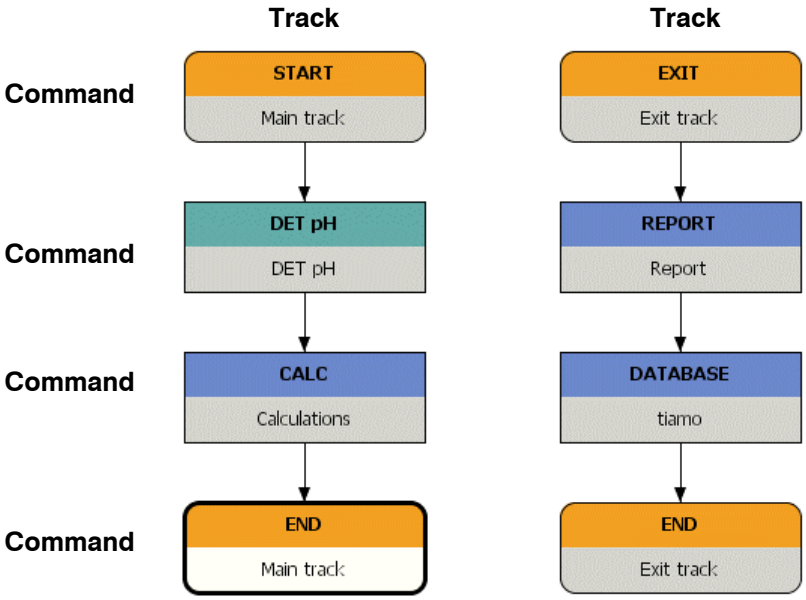
5.1.1 General

Definition

In *tiamo* a **method** is a instruction for processing a sample. The method is created in the program part Method and it can be started in the program part Workplace.

Structure

Each method contains tracks consisting of individual commands.

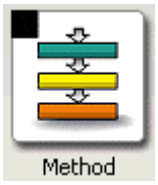


Management

Methods are organized in Method groups. Each time a method is stored a new version is created. Methods can be signed at two levels and therewith be locked against further modifications. Methods are stored in the configuration data base and globally accessible for all clients.

5.1.2 Desktop

Method symbol



By clicking on the method symbol in the vertical strip at the left-hand margin the program part **Method** is opened, at the same time the method symbol is shown in color. The number of the currently opened methods is displayed in a black field in the left upper corner of the symbol (see Method selection).

Elements

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

- Method-specific menu bar.
- Method-specific toolbar.
- Main window, in which several methods can be opened but only 2 can be shown at the same time.

5.1.3 Menu bar

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

- **File**
  Create, open, save, close, check, manage, print methods.
- **Edit**
  Copy, cut, paste, delete, properties, comment.
- **View**
  Display methods, switch on/off toolbar.
- **Insert**
  Command, track.
- **Tools**
  Open the manual control.
- **Help**
  Open *tiamo* help, show program info.

Menu File

New...
Create a new method.

Open...
Open an existing method.

Save
Save the selected method.

Save as...
Save the selected method under a new name.

Close all
Close all opened methods.

Close
Close the selected method.

Method check
Check the selected method for plausibility.

Method manager...
Open the method manager.

Method groups...
Open the method groups manager.

Print (PDF)
PDF file output of the method report.

Logout...
Logout the user.

Exit
End the program.

1 'Method name'
Open the selected method.

Menu Edit

Properties...
Open the properties window of the command selected in the method.

Undo
Undo the last modification of the method.

Redo
Restore the last undone modification of the method.

Cut
Cut the selected element (commands, tracks) and copy them to the clipboard.

Copy
Copy the selected element (commands, tracks) to the clipboard.

Paste
Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.

Delete
Delete the selected element (commands, tracks).

Comment...
Enter or edit a comment for the selected command.

Menu View

Tile horizontally
Split method window vertically and display two methods side by side.

Tile vertically
Split method window horizontally and display two methods below each other.

Unsplit
Undo the splitting of the method window.

Toolbar
Switch toolbar display on/off.

Menu Insert

New command...
Insert a new command above the selected command.

New track...
Insert a new track on the right hand side of the selected track.

Menu Tools

Manual control
Open the dialog window for the manual control of the devices.

Menu Help

tiamo Help
Open *tiamo* help.

About
Display information about the program and the installation.

5.1.4 Toolbar

New...
Create a new method.

Open...
Open an existing method.

Save
Save the selected method.

Close
Close the selected method.

Method manager...
Open the method manager.

Method groups...
Open the method groups manager.

Print (PDF)
PDF file output of the method report.

Method check
Check the selected method for plausibility.

Properties...
Open the properties window of the command selected in the method.

Undo
Undo the last modification of the method.

Redo
Restore the last undone modification of the method.

Cut
Cut the selected element (commands, tracks) and copy it to the clipboard.

Copy
Copy the selected element (commands, tracks) to the clipboard.

Paste
Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.

Delete
Delete the selected element (commands, tracks).

Comment...
Enter or edit a comment for the selected command.

New command...
Insert a new command above the selected command.

New track...
Insert a new track on the right hand side of the selected track.

Zoom method
Select the zoom level.

Manual control
Open the dialog window for the manual control of the devices.

Tile horizontally
Split method window vertically and display two methods side by side.

Tile vertically
Split method window horizontally and display two methods below each other.

Unsplit
Undo the splitting of the method window.

Logout...
Logout the user.

tiamo Help
Open *tiamo* help.

5.1.5 Functions

In the program part **Method** the following functions can be carried out:

Method editor

- Create method
- Open method
- Display method
- Edit method
- Check method
- Save method
- Close method

Manage methods

- Manage methods
- Rename methods
- Copy method
- Move method
- Delete method
- Export method
- Import method
- Sign method
- Show method history

Manage method groups

- Manage method groups
- Edit method groups

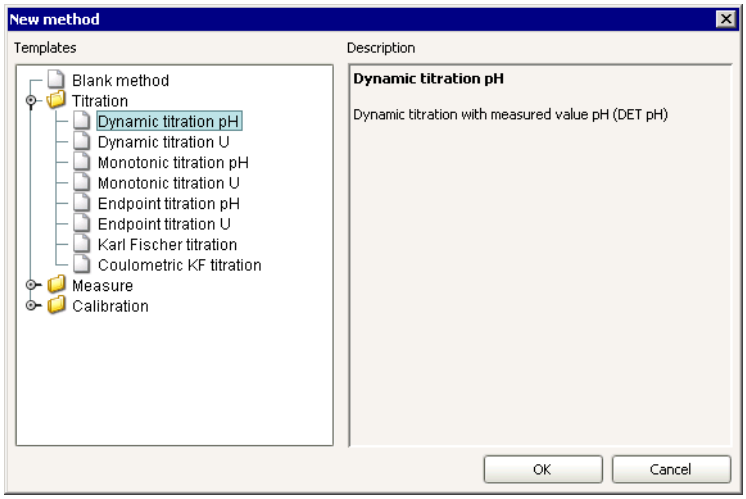
Print method report

- Select method report
- Method sequence report
- Method parameter report
- Titration and measurement parameter report

5.2 Method editor

5.2.1 Create new method

The window **New method** with the available method templates is opened with the icon or with the menu item **File, New...**:



Templates

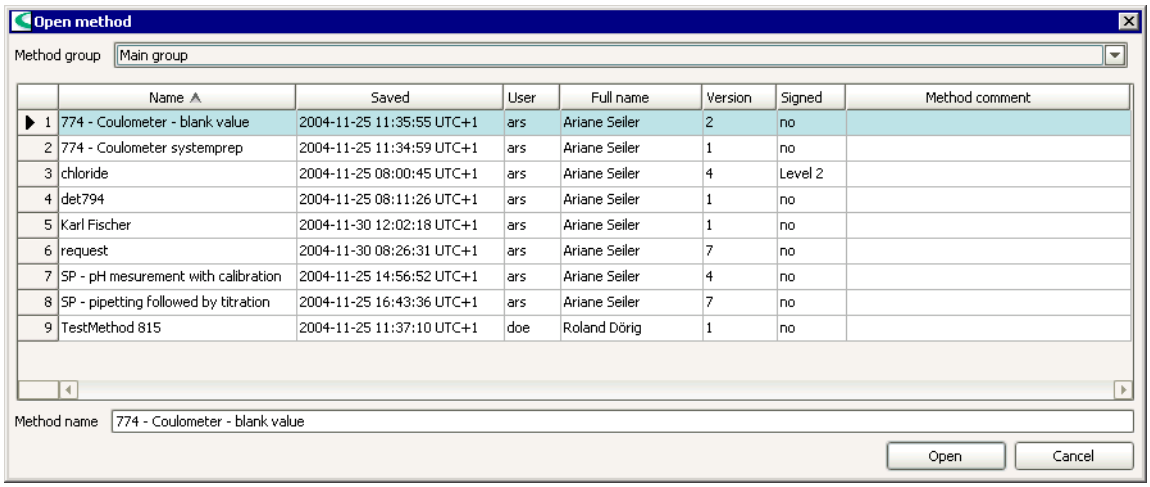
Method templates, [Blank Method]
Selecting a method template as a basis for creating a new method. The template **Blank Method** consists of only the commands **START** and **END**.

Description
Description of the selected method template.

Press **[OK]** to open the selected template for editing.

5.2.2 Open method

With the symbol or the menu item **File, Open...** the window **Open method** opens in which one of the globally available methods can be selected for opening.



Method group

Method group

Method groups, [Main group]

Selection of the Method group whose methods will be displayed in the method table.

Open the window **Method groups** (*see Methods - Manage method groups*) for managing the method groups.

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 sequence.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user having saved the method.

Full name

Full name of the user having saved the method.

Version

Version number of the method.

Signed

Display if and at which level the method has been signed.

no

The method has not been signed. It can be edited and deleted.

Level 1

The method has been signed at level 1. It can be edited and 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 at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

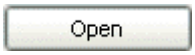
Comment for the method entered as Command comment for the command **START**.

Open method

Method name

50 characters

Name of the method to be opened. The method name will be entered automatically in this entry field if a method is selected in the table. It is also possible to enter the method name manually.



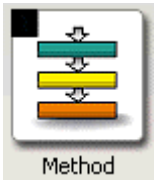
Opening the selected method. The method name is displayed in the title bar of *tiamo*. The number of currently opened methods is displayed in the left upper corner of the method symbol.

> ***Note***
> *10 methods can be opened at maximum but only two can be displayed at the same time.*

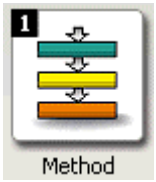
5.2.3 Display method

Selecting the method in the method symbol

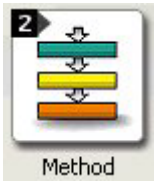
The number of the currently opened methods is displayed in the left upper corner of the method symbol. In case two or more methods are opened, these methods can be selected with a left click on the method symbol. Two methods can be displayed beside each other or one below the other.



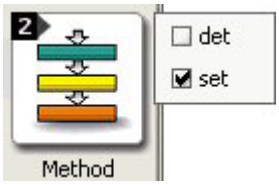
No method is opened. No method is displayed in the main window.



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



Two methods are opened. Only one method is usually displayed in the main window but there is the possibility to display two methods beside each other or one below the other



A menu with the currently opened methods is displayed by clicking with either the left or right mouse button on the method symbol. The visible methods are marked with a checkmark. Another method can easily be displayed by clicking on the corresponding name.

Display single method

By default always the last opened method is separately displayed 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**.

Display methods beside each other

Two methods are displayed beside each other in the main window with the icon or the menu item **View, Tile horizontally**.

Display methods one below the other

Two methods are displayed one below the other in the main window with the icon or the menu item **View, Tile vertically**.

Zoom for methods

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

:

200 %
Zoom in view to 200 %.

150 %
Zoom in view to 150 %.

100 %
Zoom view to 100 %.

75 %
Zoom out view to 75 %.

50 %
Zoom out view to 50 %.

25 %
Zoom out view to 25 %.

Fit to width
Fit view to width of window.

Fit to height
Fit view to height of window.

Fit in window
Fit view to width and height of window.

5.2.4 Edit method

Edit tracks

The following functions for tracks are available for the method currently opened in the main window:

- Insert new track
- Select track
- Move track
- Copy track
- Cut track
- Insert track
- Delete track

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:

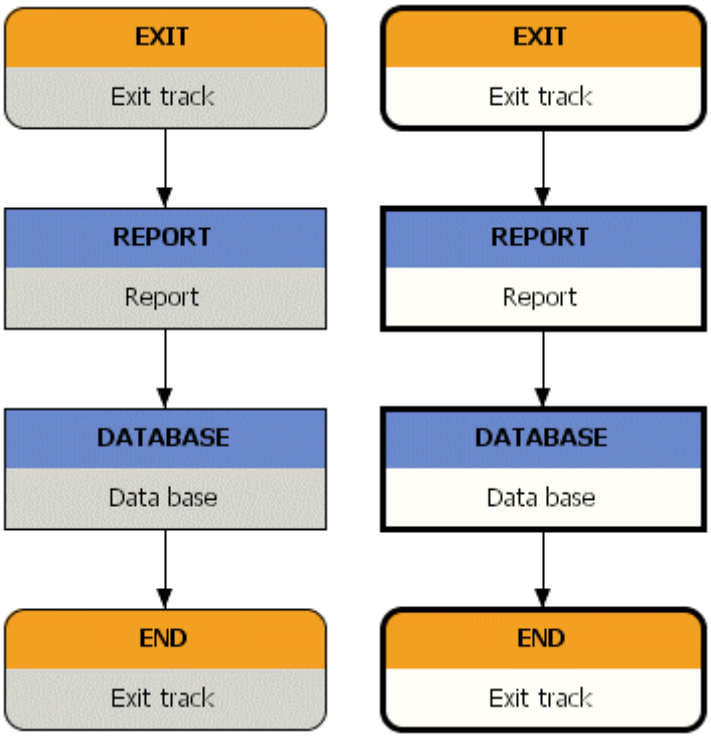
- Normal track
- Series start track
- Series end track
- Exit track
- Error track

The new track is inserted to the right of the selected track after confirming the selection with **[OK]**.

Select track

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.

Nicht ausgewählte Spur **Ausgewählte Spur**



Move track

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 pressed-down left mouse button. 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.

Copy track

Copy track with Drag&Drop

To copy a track with Drag&Drop it has to be selected first. It can can be copied to the desired position with simultaneously pressed-down left mouse button and [Ctr] key. 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 .

Cut track

The selected track is moved to the clipboard with **Edit, Cut**, the context-sensitive menu item **Cut** or with the icon .

Insert track

The track having 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 .

Delete track

The selected track is deleted with **Edit, Delete**, the context-sensitive menu item **Delete**, with the icon or with the key [Delete].

Edit commands

The following functions for commands are available for the method currently opened:

- Insert new command
- Select commands
- Move commands
- Copy commands
- Cut commands
- Insert commands
- Delete commands
- Edit command properties
- Enter command comment

More information *see Methods - Method editor - Edit method - Edit commands*.

Insert new command

The window **New command** is opened with the icon or with the menu item **Insert, New command...**. The desired command can be selected out of the following categories:

- **Titration**
  DET, MET, SET, KFT, KFC, STAT
- **Measure**
  MEAS, STDADD
- **Calibration**
  CAL LOOP pH, CAL MEAS pH, CAL LOOP Conc, CAL MEAS Conc
- **Dosing**
  ADD, DOS, LQH, PREP, EMPTY
- **Automation**
  MOVE, SWING, LIFT, PUMP, STIR, RACK, HEATER, FLOW

- **Results**
  CALC, DATABASE, REPORT, EXPORT
- **Communication**
  CTRL, SCAN, SEND, RECEIVE, TRANSFER
- **Miscellaneous**
  REQUEST, CALL, LOOP, WAIT, SEQUENCE

The new command is inserted in front of the selected command after confirming the selection with **[OK]**.

Select commands

A command is being selected with a left mouse-click. The selected command is marked with a black border. Further commands within the same track can be selected by pressing-down the [Ctrl] key while clicking on the desired command.

Not selected command **Selected command**

Move commands

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 pressed-down left mouse button. 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 in front of the selected command in an existing track.

Copy commands

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 simultaneously pressed-down left mouse button and [Ctrl] key. A red horizontal 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 .

Cut commands

The selected commands are moved to the clipboard with **Edit, Cut**, the context-sensitive menu item **Cut** or with the icon .

Insert commands

The commands having copied to the clipboard are inserted in front of the selected command with **Edit, Paste**, the context-sensitive menu item **Paste** or with the icon .

Delete commands

The selected commands are deleted with **Edit, Delete**, the context-sensitive menu item **Delete**, with the icon or with the key [Delete].

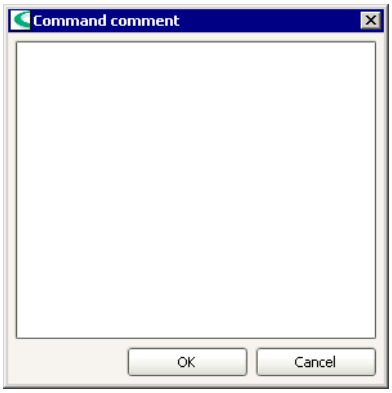
Command properties

The properties window for the selected command is opened with **Edit, Properties**, the context-sensitive menu item **Properties**, with the icon or with a double-click on the command.

> ***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***
> *Entry of a start volume proportional to the sample size:* ***Start volume = 'MV.Sample size' * 0.5***

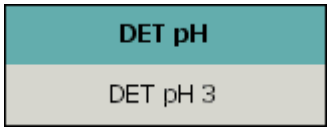
Command comment

A comment for the selected command can be entered or edited in the dialog window **Command comment**. It is opened with **Edit, Comment...**, the context-sensitive menu item **Comment...** or with the icon .

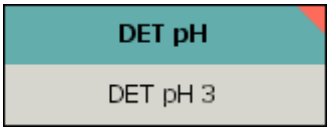


Commands with a comment are marked with a red triangle in the right upper corner. In case the cursor is near the triangle for more than 1 s, the comment is displayed as a tooltip.

Command without comment



Command with comment



5.2.5 Check method

A method check for the focused method is started with the icon or with the menu item **File, Method check**. The following pints are checked:

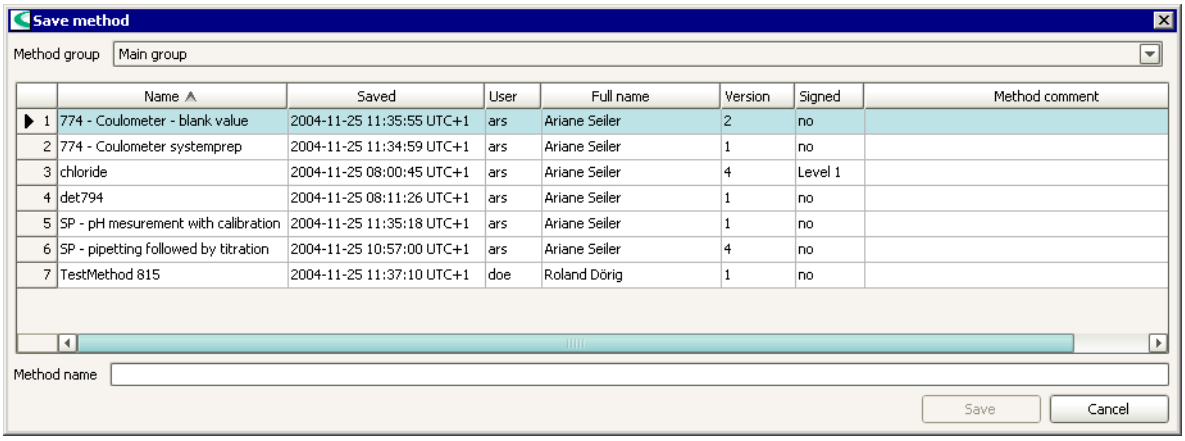
- Are the tracks defined in **CALL** commands available?
- Are the targets of loop commands defined?
- Are the variables defined in calculation formulae available?
- Does a track contain more than one command with conditioning activated?
- Does a special track (Series start track, Series end track, Exit track and Error track) contain a command with conditioning activated?

A message will be displayed for each error. The method check has to be started again afterwards. If the method check has been successfully finished, a corresponding message will be displayed.

5.2.6 Save method

An existing method is saved under the same name with the icon or with the menu item **File, Save** without opening the dialog window **Save method**.

When saving a new method with **File, Save** or when saving an existing method with **File, Save as...** the dialog window **Save method** is opened. A method group can be selected and a method name can be entered or selected.



Method group

Method group

Method groups, [Main group]

Selection of the Method group where the method should be stored.

Open the window **Method groups** (*see Methods - Manage method groups*) for managing the method groups.

Method table

The non-editable method table contains all information of the methods of the selected method group. With a click on the column title (**Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) the table can be sorted according to the selected column in either increasing or decreasing sequence.

Name
Name of the method.

Saved
Date and time when the method was saved.

User
Short name of the user having saved the method.

Full name
Full name of the user having saved the method.

Version
Version number of the method.

Signed
Display if and at which level the method has been signed.

no
The method has not been signed. It can be edited and deleted.

Level 1
The method has been signed at level 1. It can be edited and 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 at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment
Comment for the method entered as Command comment for the command **START**.

Save method

Method name
50 characters
Name of the method.

> ***Note***
> *The method name must be unambiguous in the whole Client/Server system.*

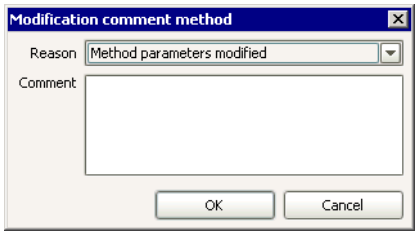
Save the focused method under the desired method name in the selected method group.

The method check is automatically carried out before saving the method. It can be started manually anytime as well. The method is checked as thorough as possible. Checks for devices, sensors and titrants/solutions are carried out not until the start of the method. This is important to ensure that commands for devices etc. can be created which are not yet configured in the system. If an error is found, a message whether the method should be saved nonetheless will be displayed. Faulty methods can't be started.

A new method version with a new identification is created after each storage of a modified method. If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for the modification must be entered before the method is saved.

5.2.7 Comment on modification for method

If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for the modification must be entered.



Reason

Selection of default reasons

Selection of a Default reason out of the category **Modifications of methods** defined in the dialog window **Security settings**.

Comment

1000 characters

Entry of a comment for modifying the method.

5.2.8 Close method

Close single method

The focused method is closed with the icon or with the menu item **File, Close**. If the method has been modified, there will be a request to save the method as a new version.

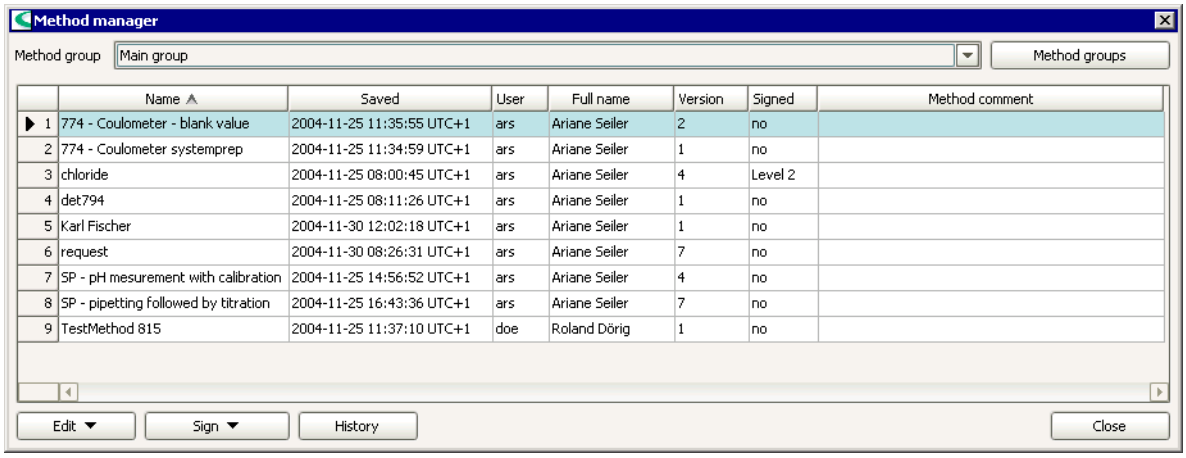
Close all methods

All the opened methods are closed with the menu item **File, Close all**. A request to save the method as a new version will appear for each method having been modified.

5.3 Manage methods

5.3.1 Manage methods

With the icon 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

Method groups, [Main group]
Selection of the Method group whose methods should be displayed in the table.

Open the window **Method groups** (*see Methods - Manage method groups*) for managing the method groups.

Method table

The non-editable method table contains all information of the methods of the selected method group. With a click on the column title (**Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) the table can be sorted according to the selected column in either increasing or decreasing sequence.

Name
Name of the method.

Saved
Date and time when the method was saved.

User
Short name of the user having saved the method.

Full name
Full name of the user having saved the method.

Version
Version number of the method.

Signed
Display if and at which level the method has been signed.

no
The method has not been signed. It can be edited and deleted.

Level 1
The method has been signed at level 1. It can be edited and 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 at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment
Comment for the method entered as Command comment for the command **START**.

Window menus

The menu **Edit** contains the following menu items:

Rename...
Rename the selected method.

Copy
Copy the selected method(s) within the same method group.

Move...
Move the selected method(s) to another method group.

Delete...
Delete the selected method(s).

Export...
Export the selected method(s).

Import...
Import method(s).

The menu **Sign** contains the following menu items:

Signature 1...
Sign selected method at level 1.

Signature 2...
Sign selected method at level 2.

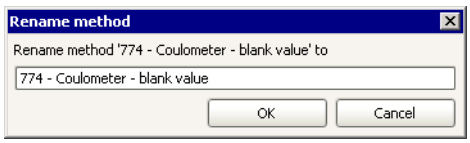
Show signatures...
Show all signatures of the selected method.

Delete signatures 2...
Delete all the signatures at level 2 of the selected method.

Opening the window **Method history** of the selected method.

5.3.2 Rename method

The dialog window **Rename method** for renaming methods is opened with **Edit, Rename...** in the dialog window **Method manager**.



Rename method 'Name' to 50 characters
Entering the new method name.

> ***Notes***
> *The method name must be unambiguous in the whole Client/Server system.*
> *Locked methods (i.e. methods signed at level 2) cannot be renamed.*
> *Renaming the method is not regarded as modification i.e. the method version does not change.*

5.3.3 Copy method

In the dialog window **Method manager** the selected methods can be copied within the same method group with the parameter **Edit, Copy**. The copy will be stored as **Copy of 'method name'**.

5.3.4 Move method

In the dialog window **Method manager** 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)**.

Select method group

Group names, [Main group]

Selection of the method group where the selected methods should be moved to.

> ***Note***
> *Locked methods (i.e. methods signed at level 2) cannot be deleted.*

5.3.5 Delete method

In the dialog window **Method manager** the selected methods are deleted with the menu item **Edit, Delete...**. All the method versions are deleted as well.

If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for deleting the method must be entered before the method is deleted. The reason and the comment are logged in the Audit Trail.

> ***Note***
> *Locked methods (i.e. methods signed at level 2) cannot be deleted.*

5.3.6 Export method

In the dialog window **Method manager** the selected methods can each be exported as a file named as **'Method name'.mmet** with the menu itmen **Edit, Export...**. The directory where the method should be exported to has to be selected in the dialog window **Select directory for export**.

> ***Note***
> *The exported methods are stored uncoded but with a checksum. In case a file stored in this manner is being manipulated, it cannot be imported again.*

5.3.7 Import method

The dialog window **Select files to import** is opened with **Edit, Import...** in the dialog window **Method manager**. The selected methods are imported in the currently opened method group.

> ***Method examples***
> *Examples of methods which can be imported into an open method group can be found in the program directory under* **...\tiamo\examples\methods\...**.

5.3.8 Sign methods

Rules

In *tiamo* methods can be **electronically signed** at two levels. The following rules apply:

- **Signature levels**
  Methods can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.
- **Multiple signing**
  Methods can be signed several times at each level. All the 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 when signatures already exist at Level 1.
- **Different users**
  The same user can only sign at either Level 1 or Level 2.
- **Reason and note**
  Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can be entered additionally.
- **Saved data**
  The signature date, user name, full name, reason and note are saved for each signature.
- **Deleting Level 1 signatures**
  Signatures at Level 1 are automatically deleted when a new version is generated.
- **Deleting Level 2 signatures**
  Signatures at Level 2 can only be deleted by users who have the appropriate rights.
- **Signing methods**
  Methods can always only be signed individually.
- **Signature options**
  The options for electronic signatures are set on the tab Signatures in the dialog window **Security settings**.

Sign method at level 1

The dialog window **Signature Level 1** is opened with **Sign, Signature 1...** in the dialog window **Method manager**. Methods can be signed several times at this level.

> ***Note***
> *Methods signed at level 1 can 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.*

Info

Information about signing and deleting signatures is displayed here. The following messages are possible:

Signature possible
The selected method can be signed.

Signature 1 not possible (signature 2 exists)
The selected method 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 cannot be signed as it is already marked to be signed on a different client.

User

Entry of the short name of the user.

Password

Entry of the password.

Reason

Selection of standard reasons
Selecting a Default reason out of the category **Signature level 1** defined in the dialog window **Security settings**.

Comment

1000 characters
Entry of a comment for the signature.

Sign the method. The dialog window remains open.

> ***Note***
> *Methods can only be signed at level 1 if the user belongs to a user group with the corresponding authorization.*

Sign method at level 2

The dialog window **Signature Level 2** is opened with **Sign, Signature 2...** in the dialog window **Method manager**. Methods can be signed several times at this level.

> ***Note***
> *Methods signed at level 2 are **locked** i.e. they can neither be edited nor deleted. In order to make those methods modifiable again, all signatures at level 2 must be deleted.*

Info

Information about signing and deleting signatures is displayed here. The following messages are possible:

Signature possible
The selected method can be signed.

Signature 2 not possible (signature 1 missing)
The selected method 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 cannot be signed as it is already marked to be signed on a different client.

User

Entry of the short name of the user.

Password

Entry of the password.

Reason

Selection of standard texts
Selection of a Default reason out of the category **Signature level 2** defined in the dialog window **Security settings**.

Comment

1000 characters
Entry of a comment for the signature.

Sign the method. The dialog window remains open.

> ***Note***
> *Methods can only be signed at level 2 if the user belongs to a user group with the corresponding authorization.*

Show method signatures

The dialog window **Signatures - Method 'method name'** with information to the signatures of the selected method is opened with the menu item **Sign, Show signatures...** in the dialog window **Method manager**.

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.

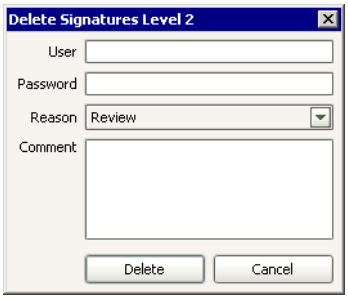
Full name
Full name of the user who signed the method.

Reason
Reason for signature.

Signature comment
Remarks about the signature.

Delete signatures 2

The dialog window **Delete Signature Level 2** is opened with the menu item **Sign, Delete signatures 2...** in the dialog window **Method manager**. All the signatures at level 2 of the selected method will be deleted.



User
Entry of the short name of the user.

Password
Entry of the password.

Reason
Selection of standard reason
Selection of a Default reason out of the category **Signature level 2** defined in the dialog window **Security settings**.

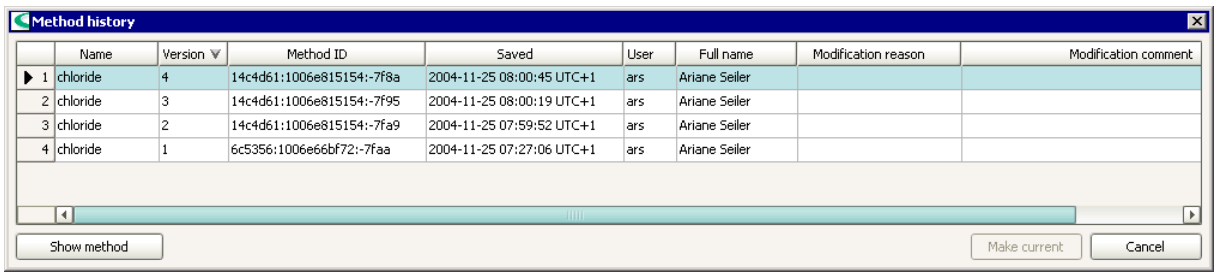
Comment
1000 characters
Entry of a comment for deleting the signatures at level 2.

Delete the signatures 2.

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

5.3.9 Show method history

The window **Method history** showing all **versions** of the selected method is opened with the button **[History]** in the dialog window **Method manager**.



Name
Name of the method.

Version
Version number of the method.

Method ID
Unambiguous mthod identification.

Saved
Date and time when the method was saved.

User
Short name of the user having saved the method.

Full name
Full name of the user having saved the method.

Modification reason
Reason entered when saving the modified method.

Modification comment
Comment entered when saving the modified method.

Show method

Opening the dialog window **Method 'Method name' - Version #** with the method for the selected version.

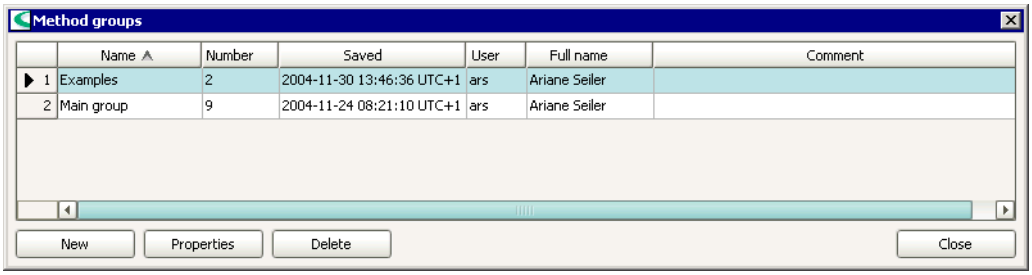
Make current

The selected method version is set 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 Manage method groups

5.4.1 Manage method groups

The dialog window **Method groups** is opened with the icon or with the menu item **File, Method groups...**. A user with the corresponding access right is allowed to manage the method groups. The details of the method groups are listed in the non-editable table. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.



Name
Name of the method group.

Number
Number of methods in the method group.

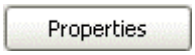
Saved
Date and time when the method group has been created.

User
Short name of the user who has created the method group.

Full name
Full name of the user who has created the method group.

Comment
Comment about the method group.

Opening the dialog window **Properties - Method group - New Group** to create a new method group.



Opening the dialog window **Properties - Method group - 'Name'** to edit the selected method group.

Deleting the selected method group.

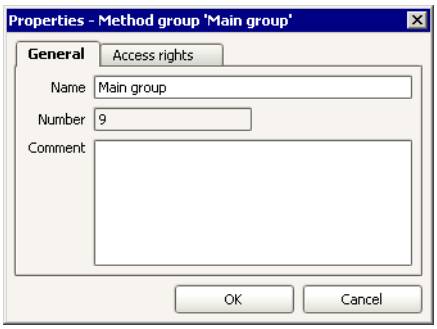
5.4.2 Method group properties

The dialog window **Properties - Method group 'Name'** with the properties of the selected method group is opened with the button **[Properties** or by double-clicking on the selected method group.

The parameters for the method groups are configured on the following 2 tabs:

- **General**
  General parameters
- **Access rights**
  Access rights for method groups and their methods.

General



Name

50 characters

Name of the method group. The name has to be entered when creating a new method group.

Number

shows the number of methods in this method group.

Comment

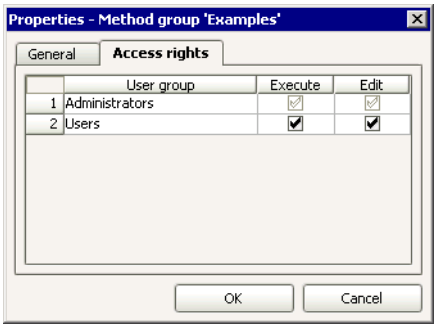
1000 characters

Comment about the method group.

Access rights

Access rights for method groups and their methods can be assigned per user group.

> ***Note***
> *The user group **Administrators** does always have both access rights. They cannot be switched off.*



Execute

[on], off

Authorization to start methods contained in the method group. Methods in this group can only be opened and started but can not be edited or deleted.

Edit

[on], off

Authorization to edit methods contained in the method group. Methods in this group can be opened, started, edited and deleted. New methods can be added as well.

5.5 Tracks

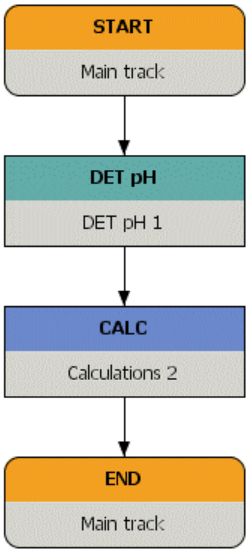
5.5.1 General

Definition

A **track** is a sequence of a method consisting of commands. In addition to the Main track existing in each method there are Normal tracks and **special tracks** (Series start track, Series end track, Exit track and Error track). The normal track is being called with a **CALL** command. The special tracks cannot be called but are executed automatically on certain occasions.

Structure

Each track contains a **START** or **TRACK** command respectively and a **END** command. Between them as many commands as you like can be inserted.



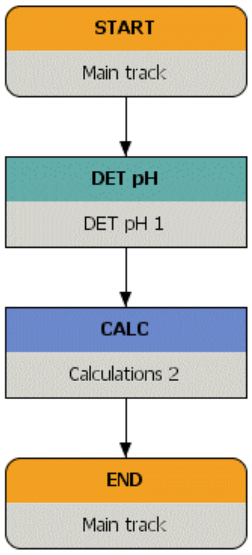
Display

The individual tracks are arranged side by side. The track name is displayed in the **START** or **TRACK** command respectively as well as in the **END** command.

5.5.2 Track types

Main track

The **main track** contains the main sequence of the method and exists in each method. It starts with a start command **START** and finishes with a end command **END**. The method variables 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.



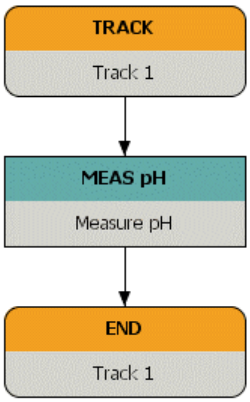
Normal track

A **normal track** is a track that can be created manually with **Insert, New track, Normal track** or with the icon . It starts with a start command **TRACK** and finishes with a end command **END**.

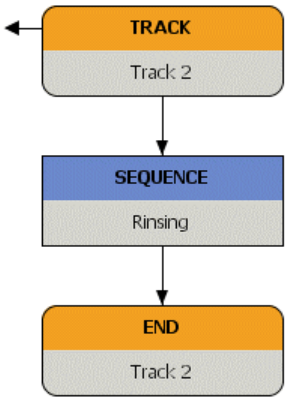
Normal tracks can be called with the command **CALL**. Branching and parallel processes can be realized. The following two cases can be differentiated when calling normal tracks:

- **Sequential running normal tracks**
  If the option **Return immediately** is switched off in the command **TRACK**, all commands of this track are executed one after the other when this normal track is called. As soon as the track has been finished it sends an acknowledgement to the calling command **CALL** and the run is continued there.
- **Parallel running normal tracks**
  If the option **Return immediately** is switched on in the command **TRACK**, the command is marked 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 command **CALL**. The calling track is being continued i.e. both tracks are running simultaneously.

Sequential running normal track



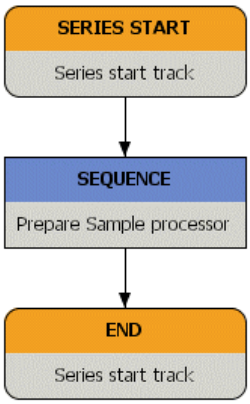
Parallel running normal track



Series start track

An **series start track** is a track that can be created manually with **Insert, New track, Series start track** or with the icon . It starts with a start command **SERIES START** and finishes with a end command **END**. A method can only contain one series start track.

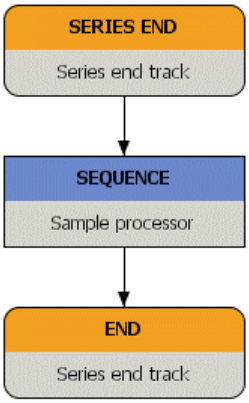
The series start track is executed only once at the beginning of the first determination of a series and even before the Main track. Sample Processors for example can be initialized at the beginning of a determination series.



Series end track

An **series end track** is a track that can be created manually with **Insert, New track, Series end track** or with the icon . It starts with a start command **SERIES END** and finishes with a end command **END**. A method can only contain one series end track.

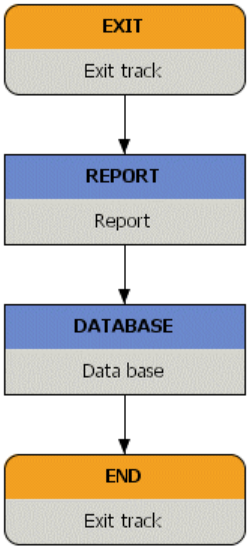
The series end track is executed only once at the end of the last determination of a series after the Main track. Sample Processors for example can be put in the desired condition after a determination series.



Exit track

An **exit track** is a track that can be created manually with **Insert, New track, Exit track** or with the icon . It starts with a start command **EXIT** and finishes with a end command **END**. A method can only contain one exit track.

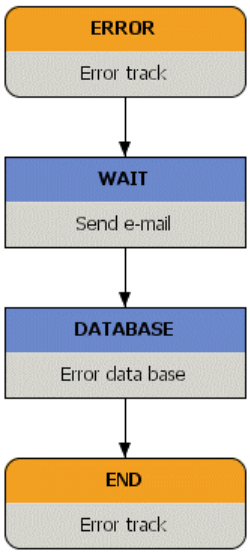
The exit track is executed as soon as all Normal tracks and the Main track are finished or if the determination has been stopped manually. If a new exit trackis created a **DATABASE** and a **REPORT** command are automatically inserted in this track. With these commands it can be guaranteed that a data base entry and a report are created for each determination even if the determination has been stopped either manually or due to an error.



Error track

An **error track** is a track that can be created manually with **Insert, New track, Error track** or with the icon . It starts with a start command **ERROR** and finishes with a end command **END**. A method can only contain one error track.

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

The following functions for tracks are available for the 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 General

Definition

A **command** is a part of a track with the following general properties:

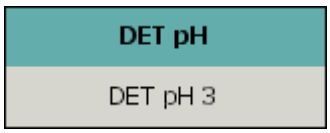
- **Command type**
  Each Command type defines the function of the command. The identification of the command type (short description in capital letters) cannot be changed.
- **Command name**
  Each command has got a selectable command name. It has to be unambiguous within the method.

> ***Note***
> *In case a command has been renamed afterwards, the cross references to this command (e.g. command variables) are adjusted automatically.*

- **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 sequence**
  Commands within the same track are carried out one after the other.

Appearance

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 selectable command name. 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**
  Automation and dosing commands
- **Blue**
  All remaining commands

5.6.2 Edit commands

The following functions for commands are available for the method currently opened:

- Insert new command
- Select commands
- Move commands
- Copy commands
- Cut commands
- Insert commands
- Delete commands
- Edit command properties
- Enter command comment

More information *see Methods - Method editor - Edit method - Edit commands*.

5.6.3 Method command overview

- **ADD**
  Adding a predefined volume.
- **CAL LOOP pH**
  Calibration loop for calibrating pH electrodes.
- **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).
- **CALC**
  Calculation of intermediate and end results, titer values and common variables.
- **CALL**
  Calling tracks.
- **CTRL**
  Setting output lines.
- **DATABASE**
  Storage of the determination data in data bases.
- **DET**
  Dynamic Equivalence Point Titrations.
- **DOS pH**
  Controlled dosing with the parameter pH.
- **DOS U**
  Controlled dosing with the parameter potential 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**
  Regulation of the gas flow of the 774 Oven Sample Processor.
- **HEATER**
  Controlling the oven temperature of the 774 Oven Sample Processor.
- **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.
- **SCAN**
  Scanning input lines.
- **SEND**
  Sending event messages.
- **SERIES END**
  Start command for Series end track.
- **SERIES START**
  Start command for Series start track.
- **SEQUENCE**
  Combining several commands to one command.
- **SET**
  Set Endpoint Titrations.

- **START**
  Start command for Main track.
- **STAT pH**
  STAT titration with pH electrodes (measurement quantity pH)
- **STAT U**
  STAT titration with metal electrodes (measurement quantity U).
- **STDADD auto**
  Standard addition with automatic addition of the standard addition solution using a dosing device in such a way that a constant potential difference results.
- **STDADD dos**
  Standard addition with automatic addition of the standard addition solution using 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).
- **TRACK**
  Start command for Normal track.
- **TRANSFER**
  Data transfer via RS232 to external devices.
- **WAIT**
  Interrupt the method run.

5.6.4 Track commands

The following track commands exist for the different tracks:

- **START**
  Start command for Main track.
- **TRACK**
  Start command for Normal track.
- **SERIES START**
  Start command for Series start track.
- **SERIES END**
  Start command for Series end track.
- **EXIT**
  Start command for Exit track.
- **ERROR**
  Start command for Error track.
- **END**
  End command for all tracks.

START

Start command for Main track.

Appearance

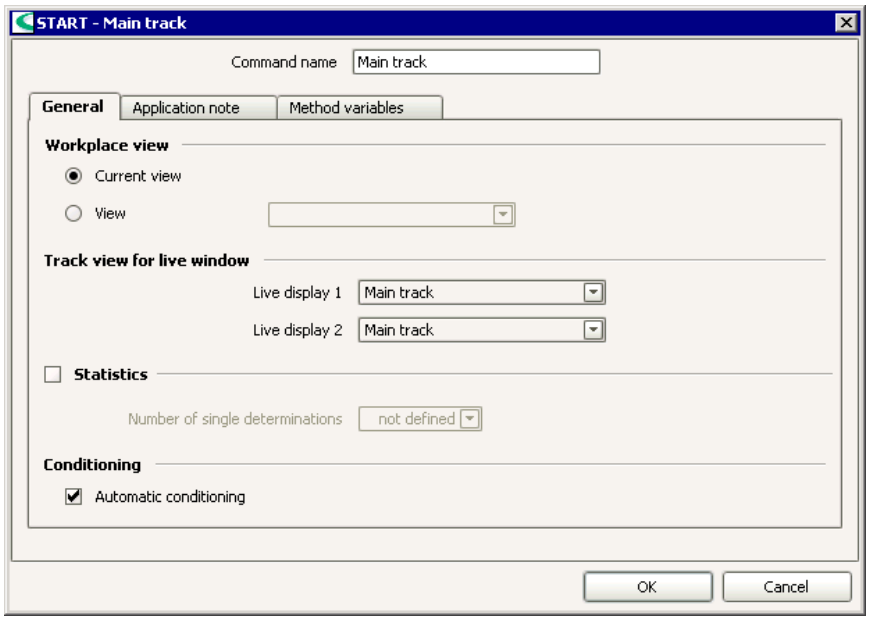
The command has the following appearance:

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 being available for the method.

General



Command name

25 characters, [Main track]
Name of the command.

Workplace view

Current view

[on], off
If this option is enabled, the current view of the workplace remains opened when starting a determination.

View

on, [off]; list of defined workplace views
If this option is enabled, the selected workplace view is automatically opened when starting a determination.

> ***Note***
> *The selected workplace view will only be opened when starting a single determination or starting the first determination of a series. It won't be opened when a new method within a determination series is being loaded.*

Track view for live window

Live display 1

[Main track], Selection from available tracks
Selection of the track to be displayed in the subwindow **Live display 1**.

Live display 2

[Main track], Selection from available tracks
Selection of the track to be displayed in the subwindow **Live display 2**.

Statistics

on, [off]
The statistics defined in the **CALC** command are only calculated if this parameter is switched on.

> ***Note***
> *In order that the statistics is calculated it must be switched on in the Workplace as well.*

Number of single determinations

1 ... 99, [not defined]
The number of single determinations defined here is valid for all **CALC** commands in the method. When **not defined** is selected, the number of single determinations must be defined in the Workplace.

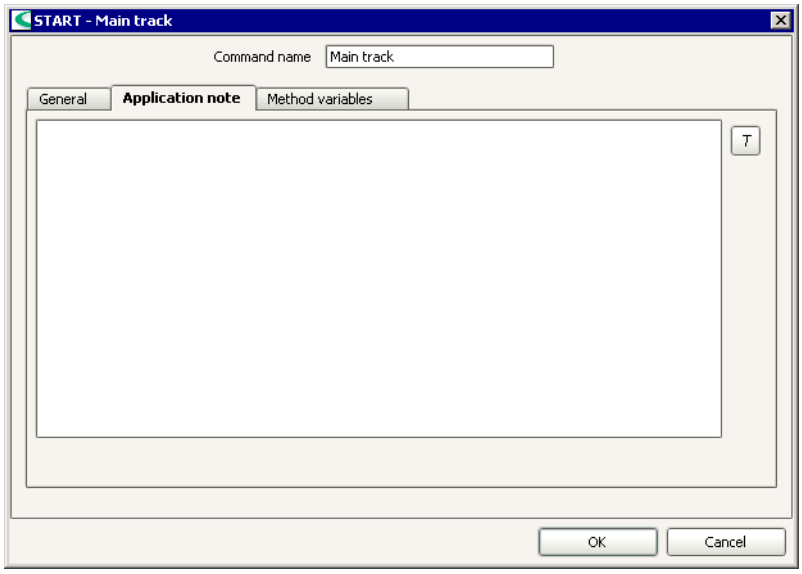
Conditioning

Automatic conditioning

[on], off
If this parameter is **enabled**, the conditioning will be started automatically at the start of a determination for the all commands with activated conditioning (**SET**, **KFT**, **KFC**). After the track including the command with conditioning has been finished, the conditioning is started again and will be continued even at the end of the determination.

If this parameter is **disabled**, the conditioning won't be started until the start of the command with the conditioning. The conditioning isn't started again after the track including the command with conditioning has been finished. This parameter must be switched off for **automation applications**.

Application note



Command name

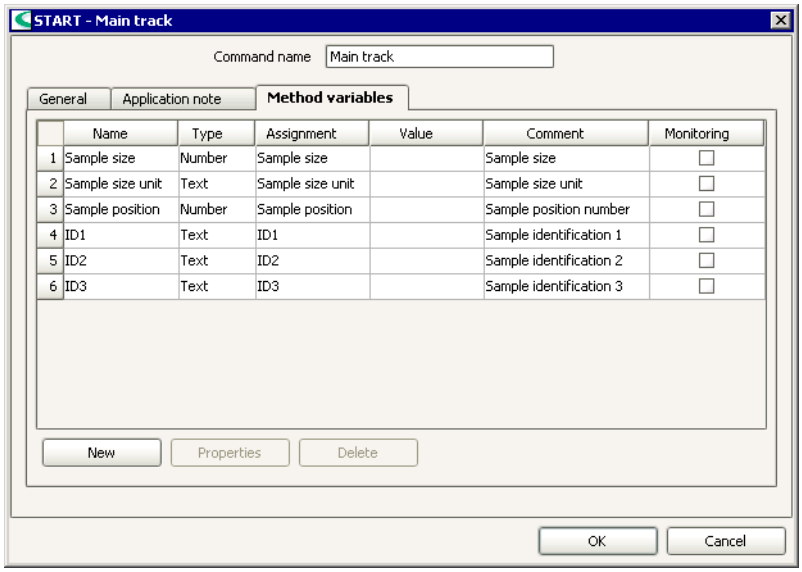
25 characters, [Main track]

Name of the command.

The application note defined here is automatically displayed in the live window of the workplace when loading this method.

The Text editor to enter or change the application note is opened with or by double-clicking into the text field.

Method variables (table)



Command name

25 characters, [Main track]

Name of the command.

The variables (**MV.Name of variable**) available in other commands within the method (i.e. **CALC** command) must be defined here. Either a sample data variable (entry in field **Assignment**) or a certain value (entry in field **Value**) can be assigned to a method variable.

The table shows all defined method variables. 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 columns are explained in Method variables (details).

New

Open the dialog window **Method variable - New** (*see START - Method variables (Properties)*) to add a new method variable.

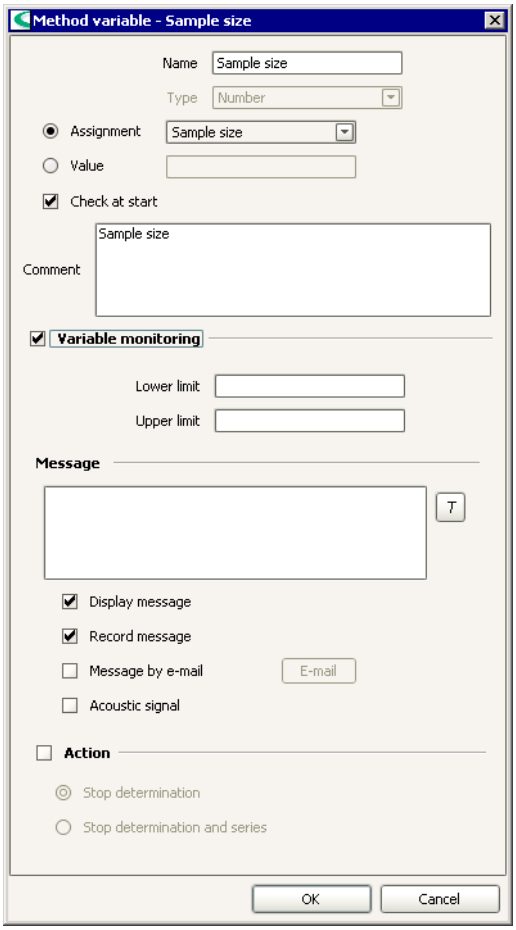
Properties

Open the dialog window **Method variable - 'Name'** (*see START - Method variables (Properties)*) to edit the selected method variable.

Delete

Delete the selected method variable.

Method variables (properties)



Definition of the method variable

Name

50 characters

Name of the method variable which must be unambiguous inside the method.

Type

[Text], Number, Date/Time

Selection of the type of the variable. This parameter is inactive for the method variables **Sample Size**, **Sample size unit**, **Sample position**.

Assignment

[on], off

ID1 ... ID8, Sample size, Sample size unit, Sample position

If this option is enabled, a sample variable can be selected which will be assigned to this method variable. Only those variables are selectable which are not yet assigned. Sample data variables not assigned to a method variable are not selectable in other commands and are not stored in the determination either. No formulae can be entered in this field.

> ***Note***
> *For the sample data variables **ID1 ... ID8**, **Sample size**, **Sample size unit**, **Sample position** the name of the assigned method variable will be shown automatically on the tab **Single determination** in the window **Run** as well as on the tab **Sample** in the subwindow **Information**.*

Value

on, [off]

-1.0E-99 ... 1.0E+99 (for **Type** = **Number**)

100 characters (for **Type** = **Text**)

'Date' (for **Type** = **Date/Time**)

If this option is enabled, any value can be assigned to the method variable. The date has to be entered in the calendar window for variables of the type **Date/Time**.

Check at start

[on], off

If this option is enabled, the start check will check if the method variable is valid and if the limits are met when monitoring is switched on.

> ***Note***
> *Switching off this option can be useful if the method variable is invalid at the start of the method because it will be defined in a **REQUEST** command during the run.*

Comment

1000 characters

Comment about the method variable.

Variable monitoring

on, [off]

The limits for the variable will be monitored while the determination is running if this option is enabled. The monitoring cannott be activated for method variables of the type **Text**.

Lower limit

10 numbers (for **Type** = **Number**)

'Date' (for **Type** = **Date/Time**)

Lower limit for the variable.

Upper limit

10 numbers (for **Type** = **Number**)

'Date' (for **Type** = **Date/Time**)

Upper limit for the variable.

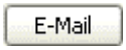
Message

Text (unlimited)
The message defined here can be put out to different targets if the limits are exceeded. The Text editor to enter or change the message is opened with or by double-clicking into the message field.

Display message
[on], off
If this option is enabled, all active tracks are halted and the message defined above will be displayed in case the limits are exceeded.

Record message
[on], off
If this option is enabled, the message defined above will be documented in the determination in case the limits are exceeded.

Message by e-mail
on, [off]
If this option is enabled, the message defined above will be sent to the address defined under **[E-mail]** in case the limits are exceeded.



Opening the dialog window **Send e-mail** for defining the e-mail parameter.

Acoustic signal
on, [off]
If this option is enabled, an acoustic signal will be emitted additionally to the message defined above in case the limits are exceeded.

Action

on, [off]
Selecting the action to be taken when the limits are exceeded.

Stop determination
[on], off
The current determination (or the conditioning) is terminated and the next determination of the series is started.

Stop determination and series
on, [off]
The current determination (or the conditioning) and the series are terminated.

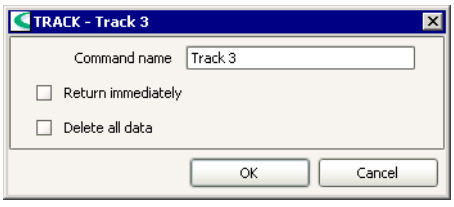
TRACK

Start command for Normal track.

Appearance

The command has the following appearance:

Parameter

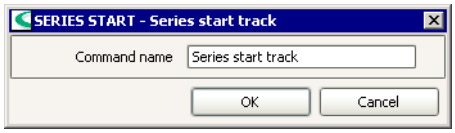


Command name
25 characters, [Track #]
Name of the command.

Return immediately
on, [off]
If this option is disabled, the track containing a Call for this track will wait until this track has been finished.
If this option is enabled, this track sends an acknowledgement immediately to the track containing a Call for this track. From now on, both tracks are running simultaneously.

Delete all data
on, [off]
All data created by this track will be deleted at each new start of the track if this option is activated.

SERIES START



Start command for Series start track.

Appearance

The command has the following appearance:

Parameter

Command name
25 characters, [Series start track]
Name of the command.

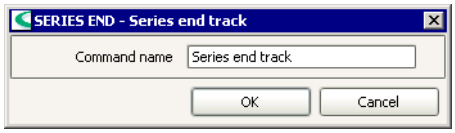
SERIES END

Start command for Series end track.

Appearance

The command has the following appearance:

Parameter



Command name
25 characters, [Series end track]
Name of the command.

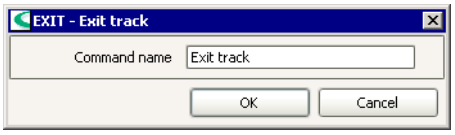
EXIT

Start command for Exit track.

Appearance

The command has the following appearance:

Parameter



Command name

25 characters, [Exit track]

Name of the command.

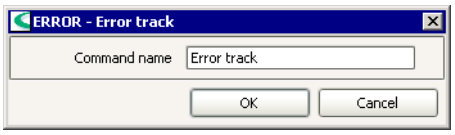
ERROR

Start command for Error track.

Appearance

The command has the following appearance:

Parameter



Command name

25 characters, [Error track]

Name of the command.

END

End command for all tracks.

Appearance

The command has the following appearance (example for main track):

Parameters

The END command doesn't have any parameters. It is created automatically at the end of a track when inserting a new track.

5.6.5 Titration commands

Commands for titrations.

Modes

The following titration commands can be selected:

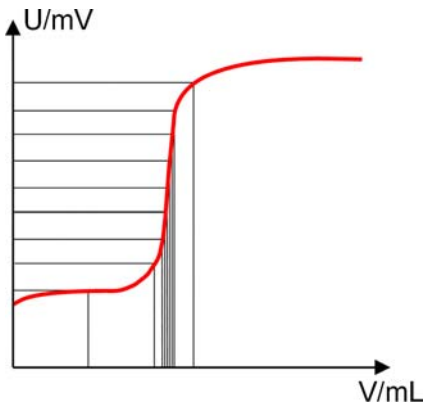
- **DET**
  Dynamic Equivalence Point Titrations.
- **MET**
  Monotonic Equivalence Point Titrations.
- **SET**
  Set Endpoint Titrations.
- **KFT**
  Volumetric Karl Fischer Titrations.
- **KFC**
  Coulometric Karl Fischer Titrations with voltametric measurement.
- **STAT**
  STAT Titrations.

DET

Command for **Dynamic Equivalence Point Titrations** (**DET**).

Principle

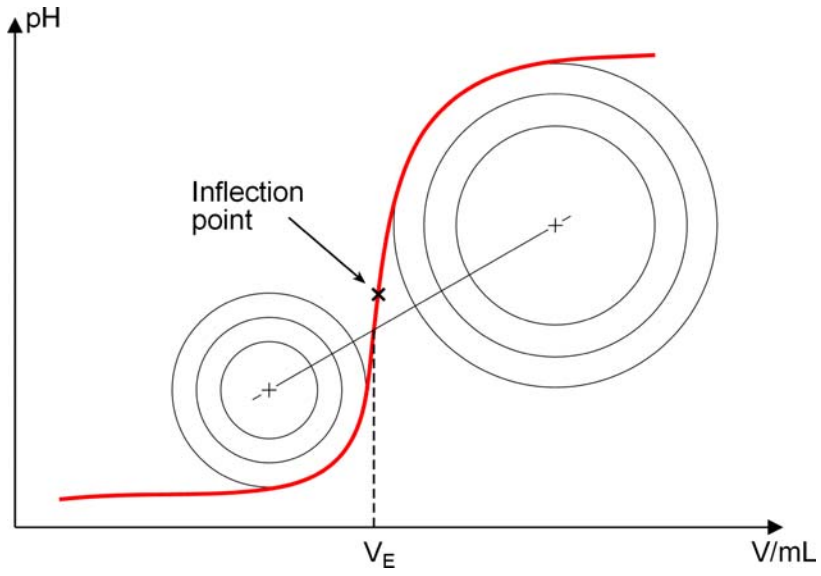
With this command titrations with dynamic incremental reagent addition are carried out. The volume increments vary as a function of the slope of the curve. An attempt is made to achieve constant measured value alterations with each reagent addition. The optimal volume for dosing is determined from the measured value alterations of the previous reagent additions. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting period.



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 (EPs) 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 (V_E) is shifted from the point of inflection towards the smaller circle of curvature for real asymmetric titration curves.



The figure shows that the evaluation also requires measuring points after the equivalence point too.

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 chosen:

- **DET pH**
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- **DET U**
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- **DET Ipol**
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- **DET Upol**
  Amperometric measurement with selectable polarization voltage (measured quantity current I).

DET pH

Command for **Dynamic Equivalence Point Titrations** with potentiometric pH measurement.

Devices

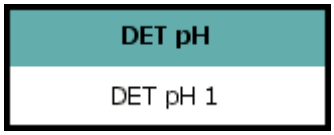
This command can be executed with the following devices which have the **DET** mode:

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 855

Appearance

The command has the following appearance:



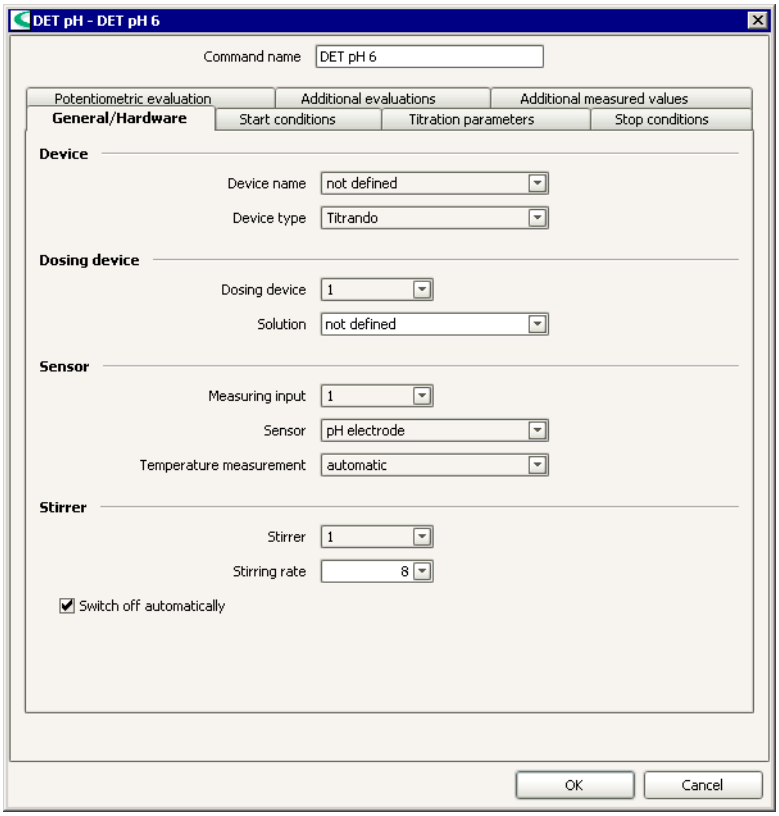
Parameters

The parameters for the command **DET 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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [DET pH #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando)
[internal D0] (Titrino)
external D1, external D2 (only Titrino 736, 751, 758, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution name, [not defined]

Input or selection of the titrant or solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct titrant is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected titrant will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Sensor

Measuring input

[1] ... 2 (808, 809, 835, 836)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [pH electrode]

Selection of the pH sensor from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous

A temperature sensor must be connected. The temperature is measured continuously.

[automatic]

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off

The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

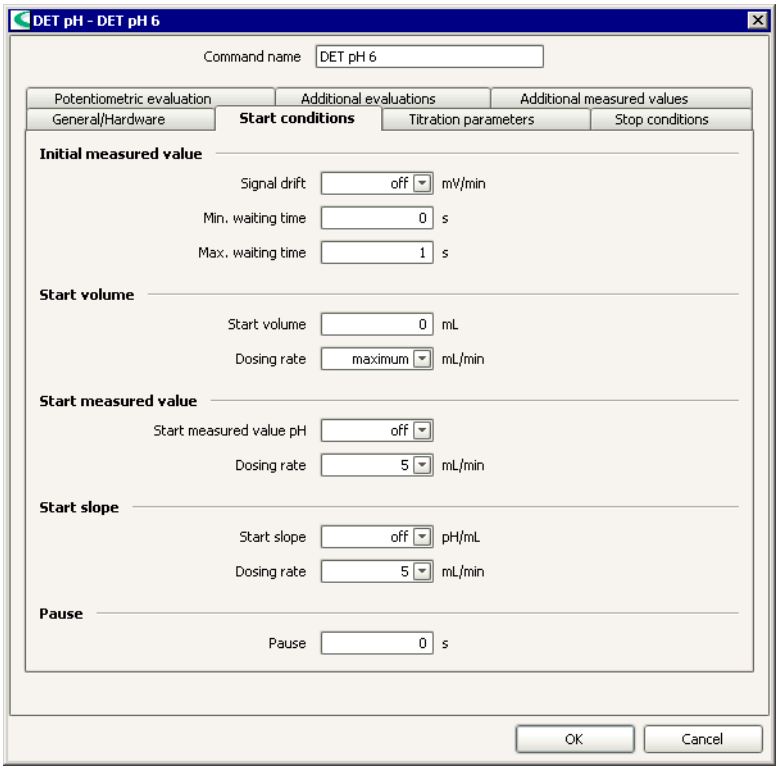
[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

Switch on/off automatically

[on], off only 751, 785, 798, 799)
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.

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [DET pH #]
Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.1 ... 999.0 mV/min, [off] (only Titrando)
The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)
The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)
If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando)
[0.000] ... 999.99 mL (Titrino)
Volume to be added before the start of the titration with the below entered speed.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start measured value

Start measured value pH

-20.000 ... 20.000, [off] (only Titrando)
When 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 the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)
Speed at which the start volume is added until the start measured value is reached. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start slope

Start slope

0.000 ... 9.999 pH/mL, [off] (only Titrando)
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 addition of a start volume then the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)
Speed at which the start volume is added until the start measured value is reached. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

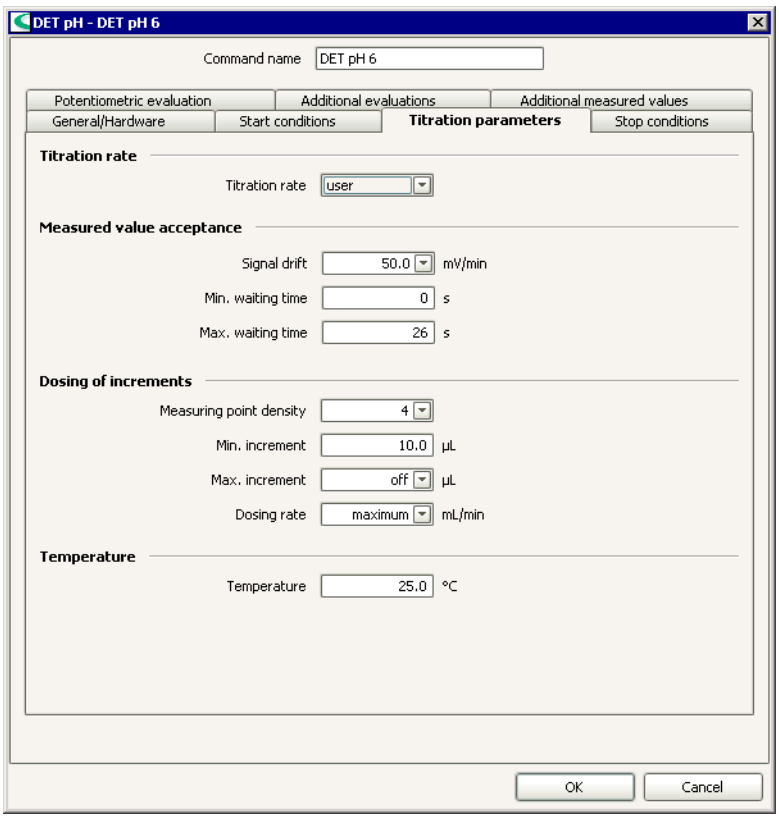
Pause

Pause

[0] ... 999999 s
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.

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [DET pH #]
Name of the command.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Measured value acceptance** and **Dosing of increments** are not displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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

(only visible for **Titration rate** = **user**)

Signal drift

0.1 ... [20.0 (slow)] ... [50.0 (optimal)] ... [80.0 (fast)] ... 999.0 mV/min (Titrando)
0.5 ... [20.0 (slow)] ... [50.0 (optimal)] ... [80.0 (fast)] ... 999.0 mV/min (Titrino)
off

Drift for accepting the measured value. **off** means that the measured value will be accepted when the maximum waiting time has elapsed.

Min. waiting time

[0 (slow, optimal, fast)] ... 999999 s (only Titrando)
The minimum waiting period is only important for drift-controlled measurements. Measured value acceptance only takes place when the minimum waiting time has elapsed, even when the measured value drift has already been achieved. The drift continues to be checked while the waiting time is elapsing.

Max. waiting time

0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 999999 s (Titrando)
0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 9999 s (Titrino)
If measured value drift is switched off or has not yet been achieved then the measured value will be accepted after the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Dosing of increments

(only visible for **Titration rate** = **user**)

Measuring point density

0 ... [2 (slow)] ... [4 (optimal)] ... [6 (fast)] ... 9
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.

Min. increment

0.1 ... [10.0 (slow, optimal)] ... [30.0 (fast)] ... 999.9 µL (Titrando)
0.0 ... [10.0 (slow, optimal)] ... [30.0 (fast)] ... 999.9 µL (Titrino)
This smallest permitted volume increment is added at the start of the titration and with steep curves in the equivalence point region. Very small values should only be used if a low titrant consumption is expected, as unwanted equivalence points could be evaluated.

Max. increment

0.1 ... 9999.9 µL, [off] (only Titrando)
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.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Temperature

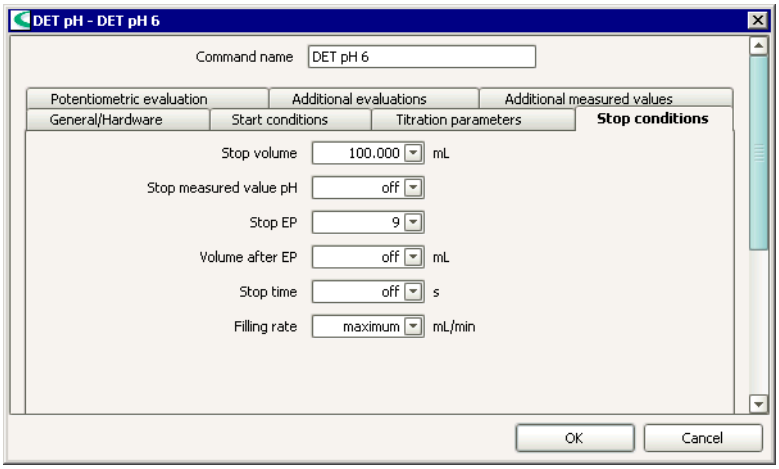
Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General / Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Stop conditions

Conditions for stopping the titration. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [DET pH #]
Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)
0.000 ... [100.000] ... 9999.99 mL, off (Titrino)
Stops when the given volume (including start conditions) has been added after the start of the titration. The stop volume should be adapted to suit the sample weight or the titration vessel size.

Stop measured value pH

-20.000 ... 20.000, [off] (Titrando)
-20.00 ... 20.00, [off] (Titrino)
Stops when the preset value for a measuring point has been exceeded or undercut since the start of the titration.

Stop EP

1 ... [9], off
Stops when the given number of EPs has been found.

Volume after EP

0.01000 ... 9999.99 mL, [off] (only Titrando)
When the number of equivalence points defined under **Stop EP** has been found this volume will be added. In this way the curve can be continued after the equivalence point has been reached.

Stop time

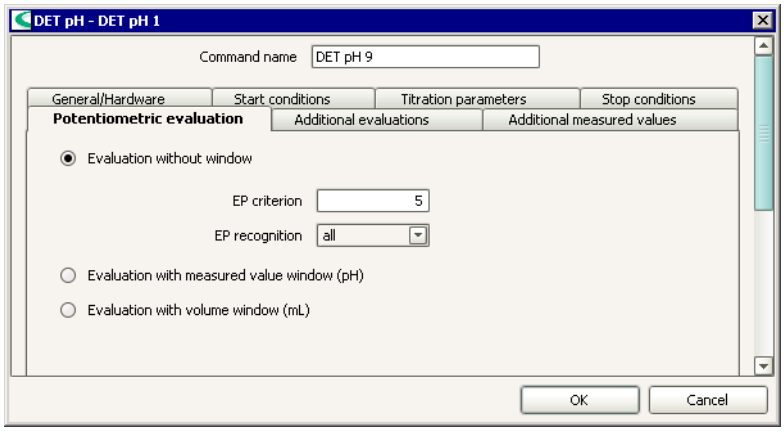
0 ... 999999 s, [off] (only Titrando)
Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
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 unit used.

Potentiometric evaluation

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:



Command name

25 characters, [DET pH #]
Name of the command.

Evaluation without window

[on], off
With this option set the two following parameters will be applied on the whole range of the titration curve.

EP criterion

0 ... [5] ... 200
Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

EP recognition

Filter for the recognition of equivalence points:

[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.

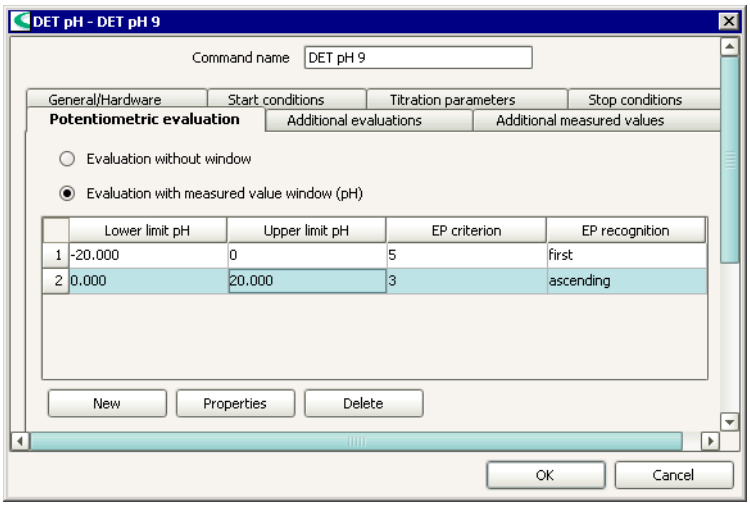
last
Only the last equivalence point to be found will be recognized.

ascending (only Titrando)
Only equivalence points with a positive slope of the titration curve will be recognized.

descending (only Titrando)
Only equivalence points with a negative slope of the titration curve will be recognized.

off
The equivalence point evaluation is switched off.

Evaluation with measured value window (pH)



on, [off]
With this option set up to nine 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 table and can be edited with the following buttons:

Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be entered.

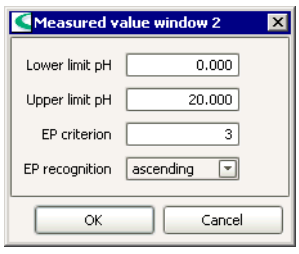
Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be edited.

Deletes the selected window in the table.

EP criterion

0 ... [5] ... 200 (only Titrino)
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.

Measured value window (pH)



Measured value windows are regions on the measured value axis for which different parameters for the potentiometric evaluation can be defined. 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.

Lower limit pH

[-20.000] ... 20.000

Lower limit for the measured value window.

Upper limit pH

-20.000 ... [20.000]

Upper limit for the measured value window.

EP criterion

0 ... [5] ... 200

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

EP recognition

Filter for the recognition of equivalence points (only Titrando):

first

Only the first equivalence point to be found 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

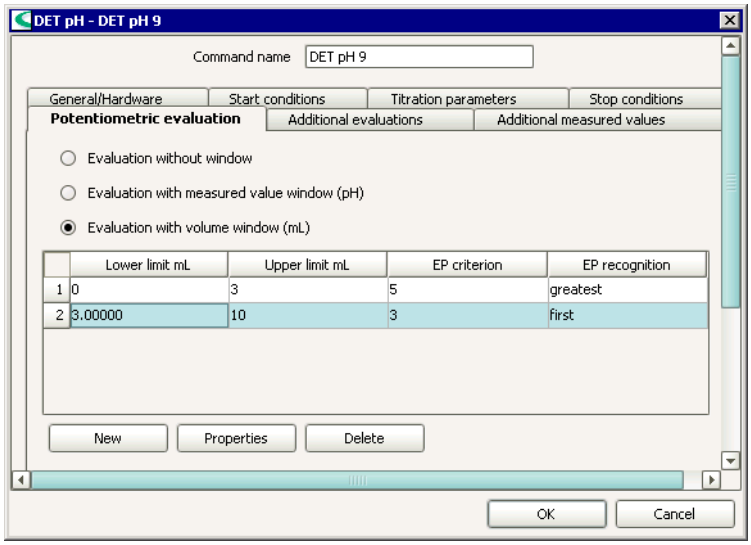
Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

Evaluation with volume window (mL)

on, [off] (only Titrando)



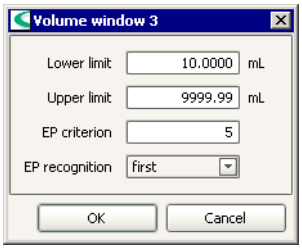
With this option set up to nine regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the table an can be edited with the following buttons:

Opens the dialog window **Volume window #** (*see below*) in which the parameters for a new window can be entered.

Opens the dialog window **Volume window #** (*see below*) in which the parameters for a new window can be edited.

Deletes the selected window in the table.

Volume window (mL)



Volume windows are regions on the volume axis for which different parameters for the potentiometric evaluation can be defined. 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.

Lower limit

[0.00000] ... 9999.99 mL (only Titrando)
Lower limit for the volume window.

Upper limit

0.00000 ... [9999.99] mL (only Titrando)
Upper limit for the volume window.

EP criterion

0 ... [5] ... 200 (only Titrando)
Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

EP recognition

Filter for the recognition of equivalence points (only Titrando):

first
Only the first equivalence point to be found will be recognized.

greatest
Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

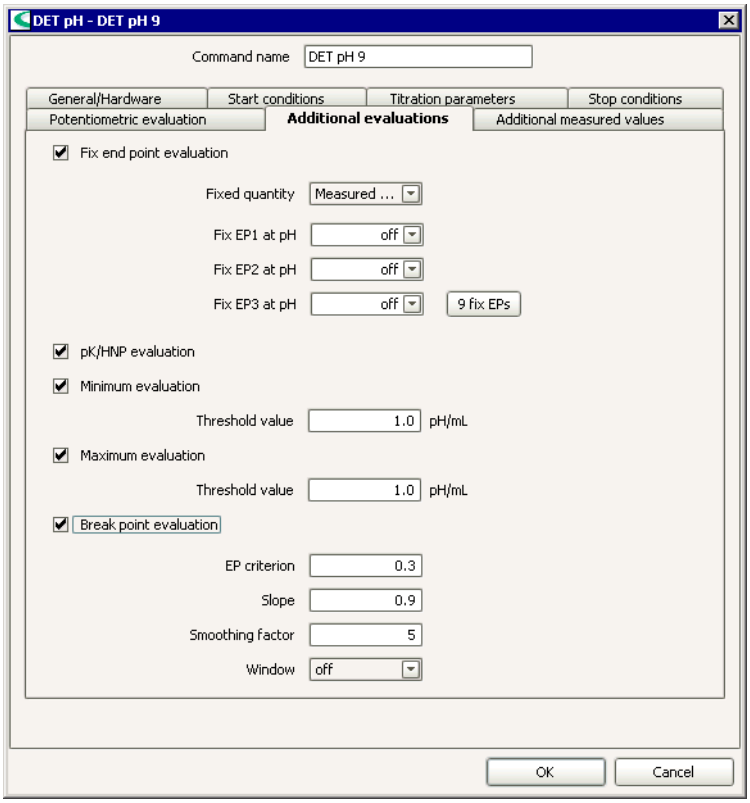
last
Only the last equivalence point to be found will be recognized.

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.

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [DET pH #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at pH

-20.000 ... 20.000, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

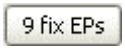
0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.



With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

pK/HNP evaluation

on, [off]
With this evaluation from the titration curve the pK value can be determined .which corresponds to the pH value at the half neutralization point (*see Titration commands - Evaluation - pK value and half neutralization potential*).

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Break point evaluation

on, [off] (only Titrando)
With the break point evaluation sharp changes of direction in the titration curve are determined (*see Titration commands - Evaluation - Breakpoint evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure of the minimum sharpness of the break point. The lower the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value alteration, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window
Measured value, Volume, Time, [off]
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.

Lower limit pH
[-20.000] ... 20.000 (for **Window** = **Measured value**)
Value for the lower limit of the window.

Lower limit
[0.00000] ... 9999.99 mL (for **Window** = **Volume**)
[0] ... 999999 s (for **Window** = **Time**)
Value for the lower limit of the window.

Upper limit pH

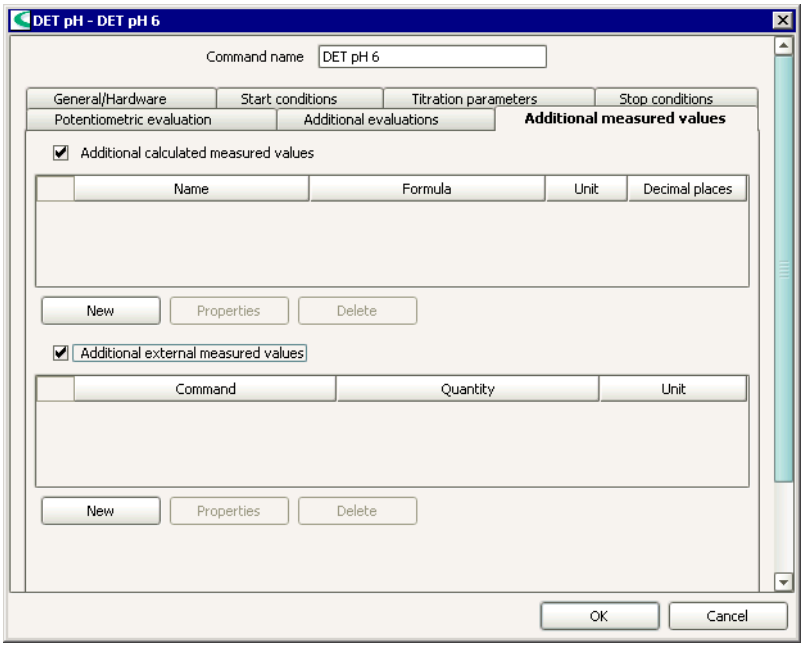
-20.000 ... [20.000] (for **Window** = **Measured value**)
Value for the upper limit of the window.

Upper limit

0.00000 ... [9999.99] mL (for **Window** = **Volume**)
0 ... [999999] s (for **Window** = **Time)**
Value for the upper limit of the window.

Additional measured values

6 further measured values can be defined here at the maximum. These additional measured values are saved together with the default measured values in the list of measuring points in additional columns **Calculated #** or **External #** respectively:



Command name

25 characters, [DET pH #]
Name of the command.

Additional calculated measured values

on, [off]
3 new measured values can be calculated from existing measured values. They can be displayed in curves with the identification **Calculated 1...3** or used as variables **'Command name.CA1...3'** in formulae.

New

Open the dialog window **Calc. measured value #** (*see below*) with the parameters for the additional measured value.

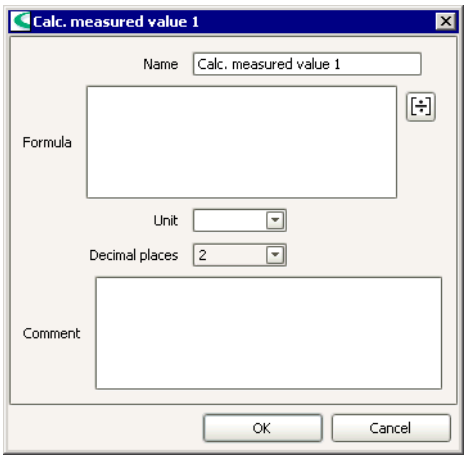
Properties

Open the dialog window **Calc. measured value #** (*see below*) to edit the parameters of the additional measured value.

Delete

Delete the selected calculated measured value.

Calculated measured value



With the option **Additional calculated measured values** 3 new measured values can be calculated from existing measured values. They can be displayed in curves with the identification **Calculated 1...3** or used as variables **'Command name.CA1...3'** in formulae.

Name

25 characters, [Calc. measured value #]
Designation for the calculated measured value. This name is used as axis legend.

Formula

1000 characters, ['empty']
Formula to calculate the measured value. It can either be entered directly or can be created in the formula editor which opens with .

Unit

16 characters, ['empty']
Unit of calculated measured value.

Decimal places

0 ... [2] ... 5
Number of decimal places with which the calculated measured value will be displayed.

Comment

250 characters, ['empty']
Comment about the calculated measured value.

Additional external measured values

on, [off]
3 new measured values can be taken over from existing measuring commands (i.e. **MEAS**) running simultaneously in other tracks. They can be displayed in curves with the identification **External 1...3** or used as variables **'Command name.EX1...3'** in formulae.

New

Open the dialog window **External measured value #** (*see below*) with the parameters for the external measured value.

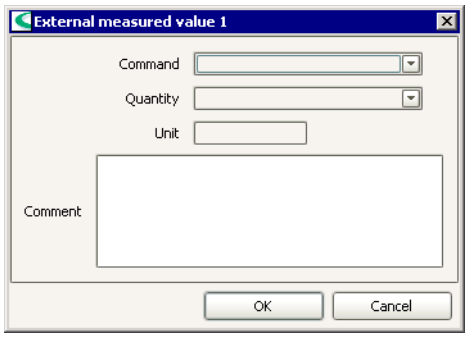
Properties

Open the dialog window **External measured value #** (*see below*) to edit the parameters of the external measured value.

Delete

Delete the selected external measured value.

External measured value



With the option **Additional measured value** 3 new measured values can be taken over from existing measuring commands (i.e. **MEAS**). They can be displayed in curves with the identification **External 1...3** or used as variables **'Command name.EX1...3'** in formulae.

Command
Selection from existing measuring commands
Selection of the command from which the additional measured value will be taken over.

Quantity
Selection from existing measuring quantities
Selection of the quantity from the command which will be adopted as quantity of the additional external measured value.

Unit
Unit of calculated measured value.

Comment
250 characters, ['empty']
Comment about the external measured value.

DET U

Command for **Dynamic Equivalence Point Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices which have the **DET** mode:

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **DET U** are configured in the following 7 tabs:

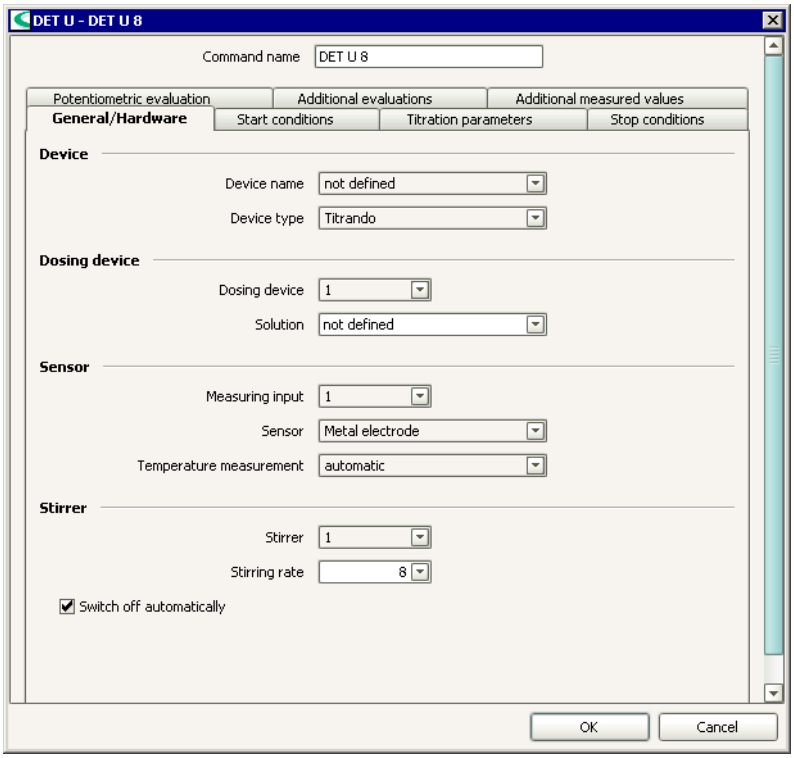
- **General/Hardware**
  Parameters for devices, dosing devices, sensors and stirrers.
- **Start conditions**
  Parameters for the measurement of the initial measured value and for

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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [DET U #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (808, 809, 835, 836)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (only 736, 751, 758, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution names, [not defined]

Input or selection of the titrant or solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct titrant is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected titrant will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Sensor

Measuring input

[1] ... 2 (808, 809, 835, 836)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, pH electrode, [Metal electrode], ISE electrode, Conductivity sensor

Selection of the sensor from the list of sensors defined in the sensor table. The calibration data for the ISE and pH sensors will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous

A temperature sensor must be connected. The temperature is measured continuously.

[automatic]

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off

The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

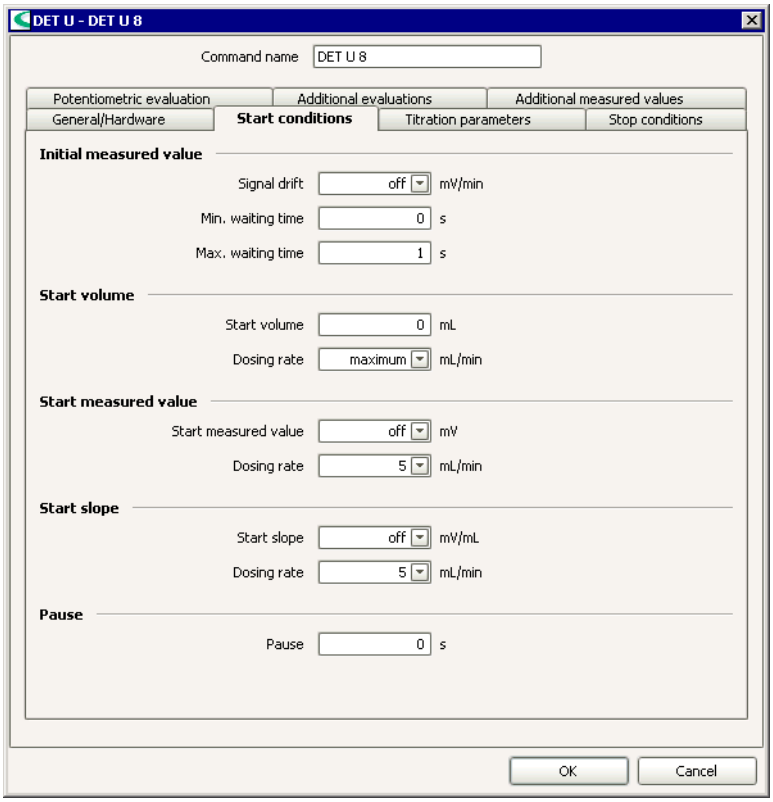
[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

Switch on/off automatically

[on], off only 751, 785, 798, 799)
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.

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [DET U #]
Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.1 ... 999.0 mV/min, [off] (only Titrando)
The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)
The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)
If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando)
[0.000] ... 999.99 mL (Titrino)
Volume to be added before the start of the titration with the below entered speed.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start measured value

Start measured value

-2000.0 ... 2000.0 mV, [off] (only Titrando)
When 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 the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)
Speed at which the start volume is added until the start measured value is reached. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start slope

Start slope

0 ... 999 mV/mL, [off] (only Titrando)
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 addition of a start volume then the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)

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 used exchange unit or dosing unit.

Pause

Pause

[0] ... 999999 s

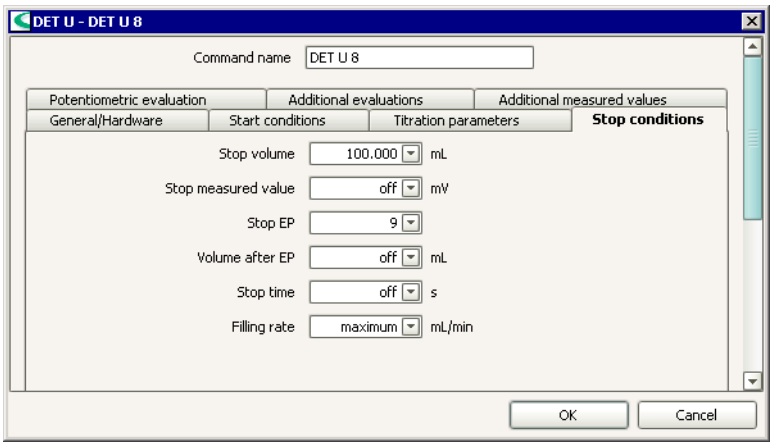
Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Titration parameters

Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Stop conditions

Conditions for stopping the titration. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [DET U #]

Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)

0.000 ... [100.000] ... 9999.99 mL, off (Titrino)

Stops when the given volume (including start conditions) has been added after the start of the titration. The stop volume should be adapted to suit the sample weight or the titration vessel size.

Stop measured value

-2000.0 ... 2000.0 mV, [off] (Titrando)

-2000 ... 2000 mV, [off] (Titrino)

Stops when the preset value for a measuring point has been exceeded or undercut since the start of the titration.

Stop EP

1 ... [9], off

Stops when the given number of EPs has been found.

Volume after EP.

Volume after EP

0.01000 ... 9999.99 mL, [off] (only Titrando)

When the number of equivalence points defined under **Stop EP** has been found this volume will be added. In this way the curve can be continued after the equivalence point has been reached.

Stop time

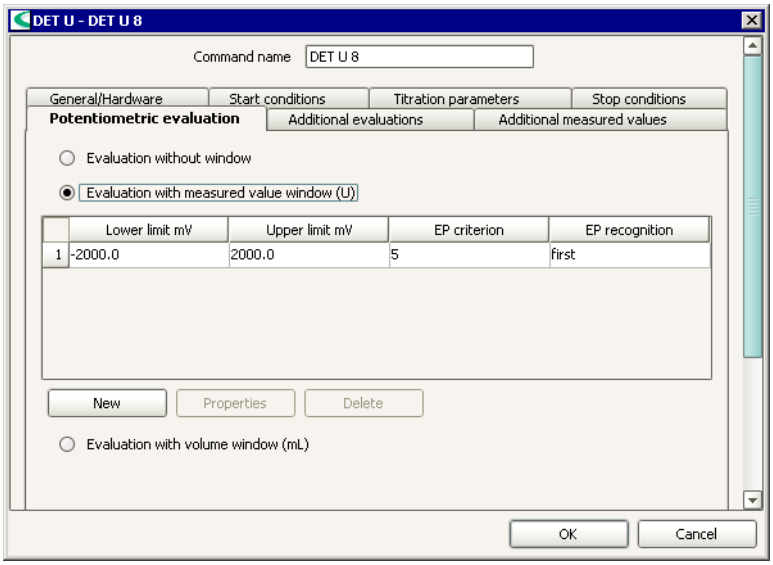
0 ... 999999 s, [off] (only Titrando)
Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed with which the buret is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Potentiometric evaluation

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:



Command name

25 characters, [DET U #]
Name of the command.

Evaluation without window

Parameters: *see DET pH - Potentiometric evaluation*

Evaluation with measured value window (U)

on, [off]
With this option set up to nine 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 table and can be edited with the following buttons:

Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be entered.

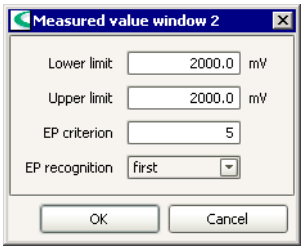
Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be edited.

Deletes the selected window in the table.

EP criterion

0 ... [5] ... 200 (only Titrino)
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.

Measured value window (U)



Measured value windows are regions on the measured value axis for which different parameters for the potentiometric evaluation can be defined. 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.

Lower limit

[-2000.0] ... 2000.0 mV (Titrando)
[-2000] ... 2000 mV (Titrino)
Lower limit for the measured value window.

Upper limit

-2000.0 ... [2000.0] mV (Titrando)
-2000 ... [2000] mV (Titrino)
Upper limit for the measured value window.

EP criterion

0 ... [5] ... 200
Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

EP recognition

Filter for the recognition of equivalence points (only Titrando):

first
Only the first equivalence point to be found 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.

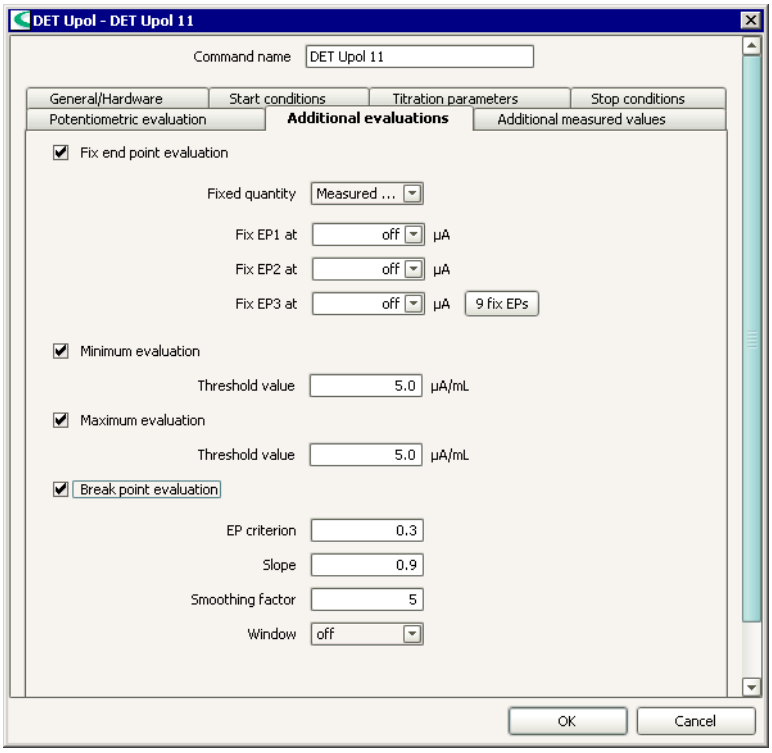
descending
Only equivalence points with a negative slope of the titration curve will be recognized.

Evaluation with volume window (mL)

Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [DET U #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-2000.0 ... 2000.0 mV, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

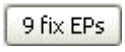
0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.



With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

pK/HNP evaluation

on, [off]
With this evaluation from the titration curve the pK value can be determined .which corresponds to the pH value at the half neutralization point (see *Titration commands - Evaluation - pK value and half neutralization potential*).

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Break point evaluation

on, [off] (only Titrando)
With the break point evaluation sharp changes of direction in the titration curve are determined (see *Titration commands - Evaluation - Breakpoint evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure of the minimum sharpness of the break point. The lower the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value alteration, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window
Measured value, Volume, Time, [off]
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.

Lower limit
[-2000.0] ... 2000.0 mV (for **Window** = **Measured value**)
[0.00000] ... 9999.99 mL (for **Window** = **Volume**)
[0] ... 999999 s (for **Window** = **Time**)
Value for the lower limit of the window.

Upper limit

-2000.0 ... [2000.0] mV (for **Window** = **Measured value**)
0.00000 ... [9999.99] mL (for **Window** = **Volume**)
0 ... [999999] s (for **Window** = **Time)**
Value for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

DET Ipol

Command for **Dynamic Equivalence Point Titrations** with voltametric measurement with (selectable polarization current).

Devices

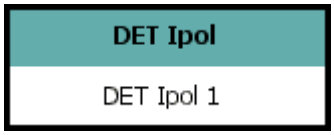
This command can be executed with the following devices which have the **DET** mode:

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 855

Appearance

The command has the following appearance:



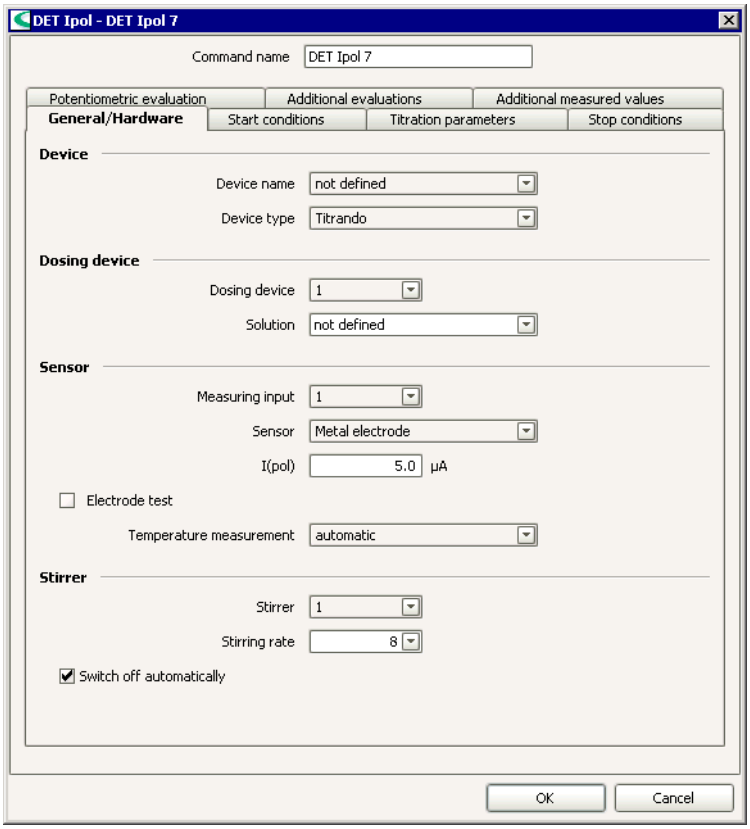
Parameters

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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [DET Ipol #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (808, 809, 835, 836)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (only 736, 751, 758, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution names, [not defined]

Input or selection of the titrant or solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct titrant is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected titrant will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Sensor

Measuring input

[1] ... 2 (only 808, 809, 835, 836)
[1] (only 855)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Metal electrode], Conductivity sensor
Selection of the sensor from the list of sensors defined in the sensor table.

I(pol)

-125.0 ... [5.0] ... 125.0 µA (Titrando, in 2.5 **µ**A steps)
-127 ... [5] ... 127 µA (Titrino, in 1 **µ**A steps)
The polarization current is the current applied to the polarized electrode during a voltametric measurement.

Electrode test

on, [off]
Switching on/off the electrode test for polarized electrodes. The electrode test for polarized electrodes is carried out during the transition from an inactive condition to a measuring condition.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off
The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

Switch on/off automatically

[on], off only 751, 785, 798, 799)
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.

Start conditions

Screenshot and parameters: *see DET U - Start conditions*

Titration parameters

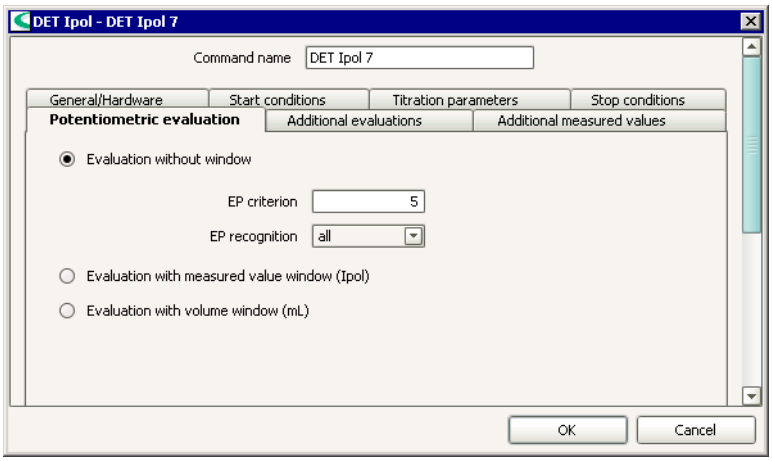
Screenshot and parameters: *see DET pH - Titration parameters*

Stop conditions

Screenshot and parameters: *see DET U - Stop conditions*

Potentiometric evaluation

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:



Command name

25 characters, [DET Ipol #]
Name of the command.

Evaluation without window

Parameters: *see DET pH - Potentiometric evaluation*

Evaluation with measured value window (Ipol)

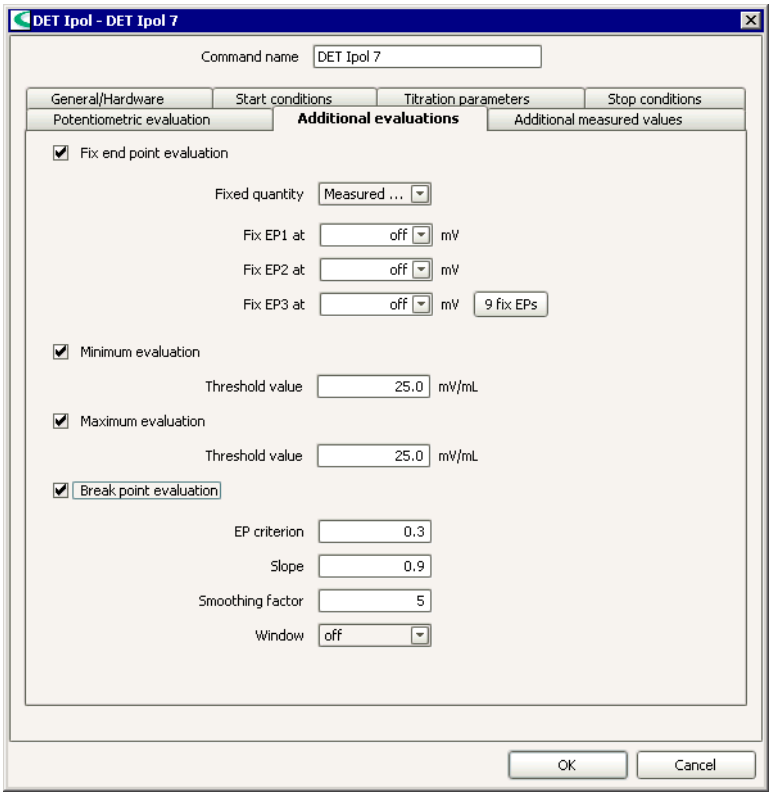
Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Evaluation with volume window (mL)

Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [DET Ipol #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-2000.0 ... 2000.0 mV, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

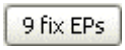
0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.



With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

pK/HNP evaluation

on, [off]
With this evaluation from the titration curve the pK value can be determined .which corresponds to the pH value at the half neutralization point (*see Titration commands - Evaluation - pK value and half neutralization potential*).

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Break point evaluation

on, [off] (only Titrando)
With the break point evaluation sharp changes of direction in the titration curve are determined (*see Titration commands - Evaluation - Breakpoint evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure of the minimum sharpness of the break point. The lower the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value alteration, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window
Measured value, Volume, Time, [off]
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.

Lower limit
[-2000.0] ... 2000.0 mV (for **Window** = **Measured value**)
[0.00000] ... 9999.99 mL (for **Window** = **Volume**)
[0] ... 999999 s (for **Window** = **Time**)
Value for the lower limit of the window.

Upper limit

-2000.0 ... [2000.0] mV (for **Window** = **Measured value**)
0.00000 ... [9999.99] mL (for **Window** = **Volume**)
0 ... [999999] s (for **Window** = **Time)**
Value for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

DET Upol

Command for **Dynamic Equivalence Point Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices which have the **DET** mode:

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 855

Appearance

The command has the following appearance:

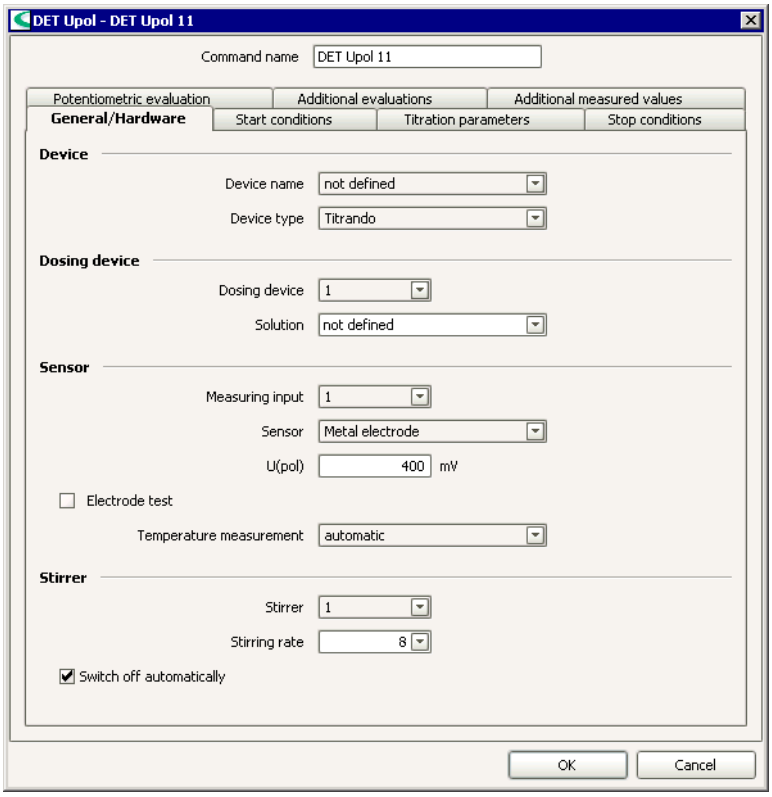
Parameters

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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [DET Upol #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (808, 809, 835, 836)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (only 736, 751, 758, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution names, [not defined]

Input or selection of the titrant or solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct titrant is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected titrant will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Sensor

Measuring input

[1] ... 2 (only 808, 809, 835, 836)
[1] (only 855)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Metal electrode], Conductivity sensor
Selection of the sensor from the list of sensors defined in the sensor table.

U(pol)

-1250 ... [400] ... 1250 mV (Titrando, in 25 mV steps)
-1270 ... [400] ... 1270 mV (Titrino, in 10 mV steps)
The polarization voltage is the voltage applied to the polarized electrode during a amperometric measurement.

Electrode test

on, [off]
Switching on/off the electrode test for polarized electrodes. The electrode test for polarized electrodes is carried out during the transition from an inactive condition to a measuring condition.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off
The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

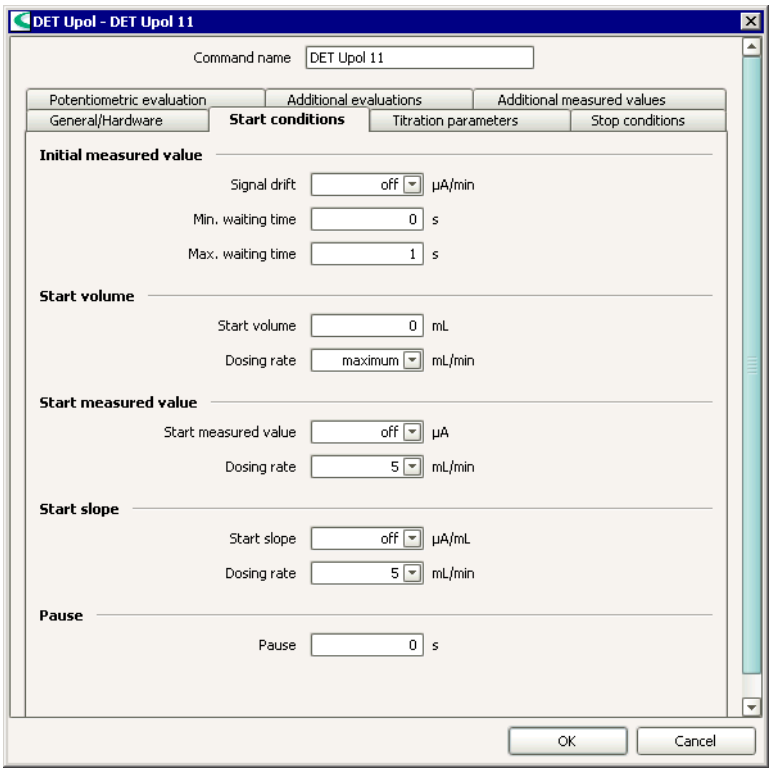
[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

Switch on/off automatically

[on], off (only 751, 785, 798, 799)
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.

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [DET Upol #]
Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.01 ... 99.90 µA/min, [off] (only Titrando)
The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)
The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)
If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando)
[0.000] ... 999.99 mL (Titrino)
Volume to be added before the start of the titration with the below entered speed.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start measured value

Start measured value

-200.0 ... 200.0 µA, [off] (only Titrando)
When 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 the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)
Speed at which the start volume is added until the start measured value is reached. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Start slope

Start slope

0 ... 99 µA/mL, [off] (only Titrando)
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 addition of a start volume then the titration starts directly.

Dosing rate

0.01 ... [5.00] ... 166.00 mL/min, maximum (only Titrando)
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 used exchange unit or dosing unit.

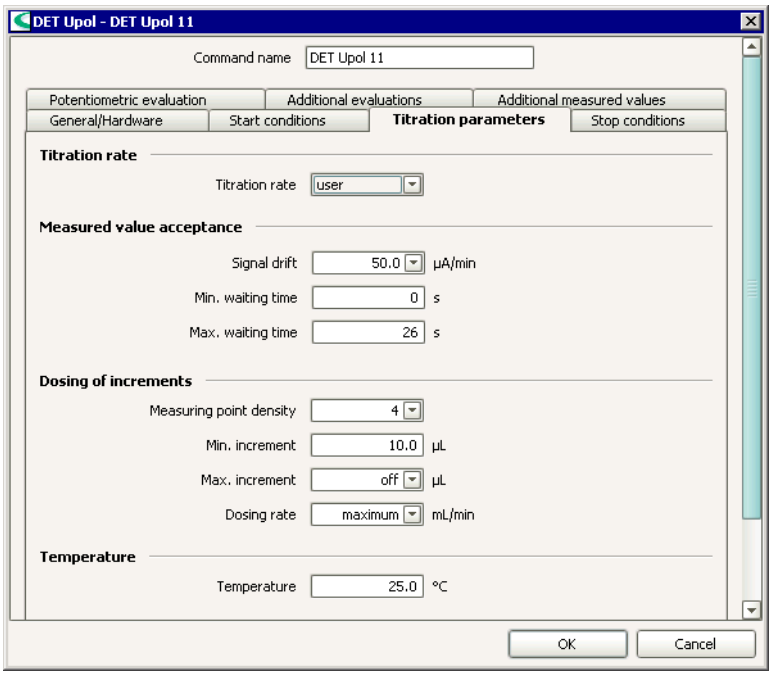
Pause

Pause

[0] ... 999999 s
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.

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [DET Upol #]
Name of the command.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Measured value acceptance** and **Dosing of increments** are not displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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

(only visible for **Titration rate** = **user**)

Signal drift

0.01 ... [20.00 (slow)] ... [50.00 (optimal)] ... [80.00 (fast)] ... 99.90 µA/min
(Titrando)
0.05 ... [20.00 (slow)] ... [50.00 (optimal)] ... [80.00 (fast)] ... 99.90 µA/min
(Titrino)
off
Drift for accepting the measured value. **off** means that the measured value will be accepted when the maximum waiting time has elapsed.

Min. waiting time

[0 (slow, optimal, fast)] ... 999999 s (only Titrando)
The minimum waiting period is only important for drift-controlled measurements. Measured value acceptance only takes place when the minimum waiting time has elapsed, even when the measured value drift has already been achieved. The drift continues to be checked while the waiting time is elapsing.

Max. waiting time

0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 999999 s (Titrando)
0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 9999 s (Titrino)
If measured value drift is switched off or has not yet been achieved then the measured value will be accepted after the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Dosing of increments

(only visible for **Titration rate** = **user**)

Measuring points density

0 ... [2 (slow)] ... [4 (optimal)] ... [6 (fast)] ... 9
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.

Min. increment

0.1 ... [10.0 (slow, optimal)] ... [30.0 (fast)] ... 999.9 µL (Titrando)
0.0 ... [10.0 (slow, optimal)] ... [30.0 (fast)] ... 999.9 µL (Titrino)
This smallest permitted volume increment is added at the start of the titration and with steep curves in the equivalence point region. Very small values should only be used if a low titrant consumption is expected, as unwanted equivalence points could be evaluated.

Max. increment

0.1 ... 9999.9 µL, [off] (only Titrando)
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.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Temperature

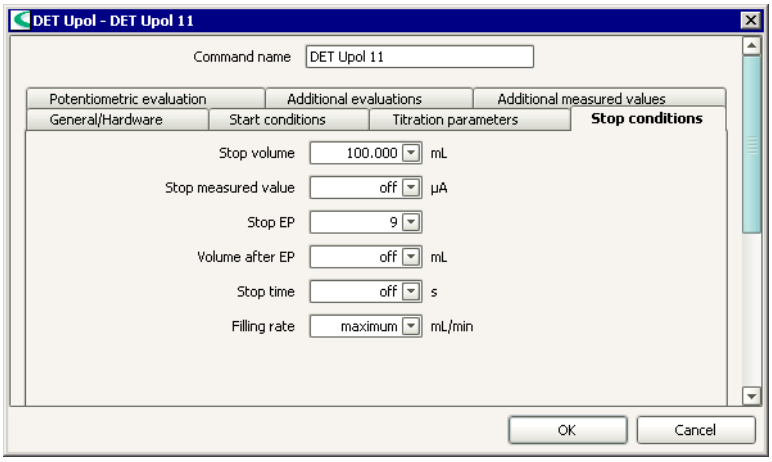
Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General / Hardware** un-

der **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously.

Stop conditions

Conditions for stopping the titration. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [DET Upol #]
Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)
0.000 ... [100.000] ... 9999.99 mL, off (Titrino)
Stops when the given volume (including start conditions) has been added after the start of the titration. The stop volume should be adapted to suit the sample weight or the titration vessel size.

Stop measured value

-200.0 ... 200.0 µA, [off]
Stops when the preset value for a measuring point has been exceeded or undercut since the start of the titration.

Stop EP

1 ... [9], off
Stops when the given number of EPs has been found..

Volume after EP

0.01000 ... 9999.99 mL, [off] (only Titrando)
When the number of equivalence points defined under **Stop EP** has been found this volume will be added. In this way the curve can be continued after the equivalence point has been reached.

Stop time

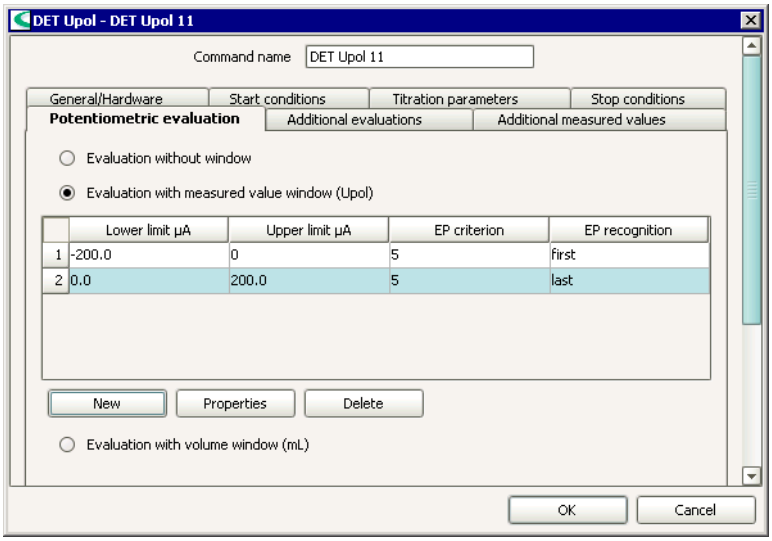
0 ... 999999 s, [off] (only Titrando)
Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed with which the buret is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Potentiometric evaluation

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:



Command name

25 characters, [DET Upol #]

Name of the command.

Evaluation without window

Parameters: *see DET pH - Potentiometric evaluation*

Evaluation with measured value window (Upol)

on, [off]

With this option set up to nine 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 table and can be edited with the following buttons:

New

Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be entered.

Properties

Opens the dialog window **Measured value window #** (*see below*) in which the parameters for a new window can be edited.

Delete

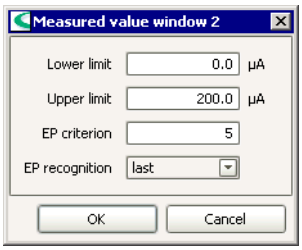
Deletes the selected window in the table.

EP criterion

0 ... [5] ... 200 (only Titrino)

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.

Measured value window (Upol)



Measured value windows are regions on the measured value axis for which different parameters for the potentiometric evaluation can be defined. 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.

Lower limit

[-200.0] ... 200.0 µA

Lower limit for the measured value window.

Upper limit

-200.0 ... [200.0] µA

Upper limit for the measured value window.

EP criterion

0 ... [5] ... 200

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

EP recognition

Filter for the recognition of equivalence points (only Titrando):

first

Only the first equivalence point to be found 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

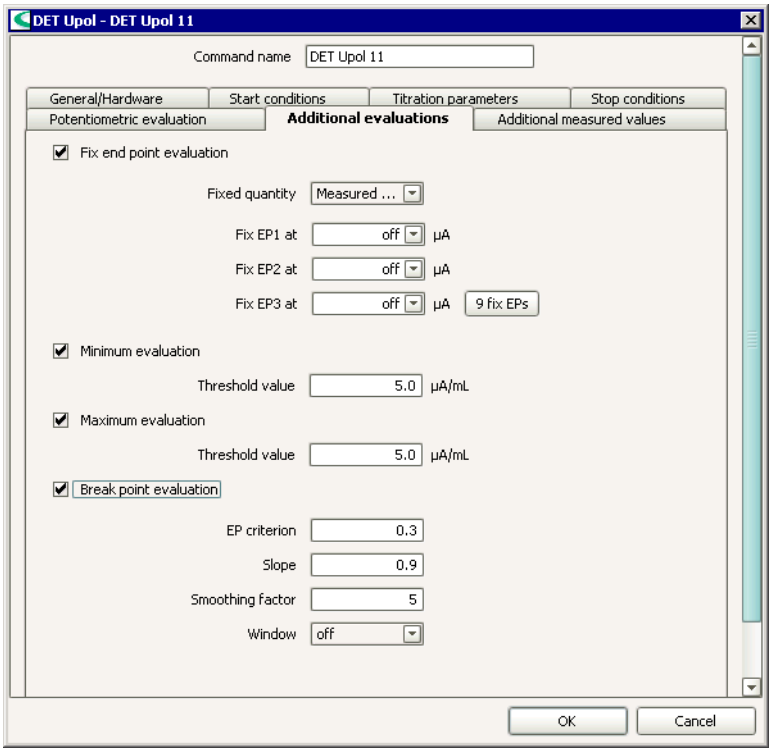
Only equivalence points with a negative slope of the titration curve will be recognized.

Evaluation with volume window (mL)

Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [DET Upol #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-200.0 ... 200.0 µA, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

pK/HNP evaluation

on, [off]
With this evaluation from the titration curve the pK value can be determined .which corresponds to the pH value at the half neutralization point (*see Titration commands - Evaluation - pK value and half neutralization potential*).

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Break point evaluation

on, [off] (only Titrando)
With the break point evaluation sharp changes of direction in the titration curve are determined (*see Titration commands - Evaluation - Breakpoint evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure of the minimum sharpness of the break point. The lower the EP criterion set, the more break points will be found. As this is a relative value related to the total measured value alteration, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window
Measured value, Volume, Time, [off]
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.

Lower limit
[-200.0] ... 200.0 µA (for **Window** = **Measured value**)
[0.00000] ... 9999.99 mL (for **Window** = **Volume**)
[0] ... 999999 s (for **Window** = **Time**)
Value for the lower limit of the window.

Upper limit

-200.0 ... [200.0] µA (for **Window** = **Measured value**)
0.00000 ... [9999.99] mL (for **Window** = **Volume**)
0 ... [999999] s (for **Window** = **Time)**
Value for the upper limit of the window.

Additional measured values

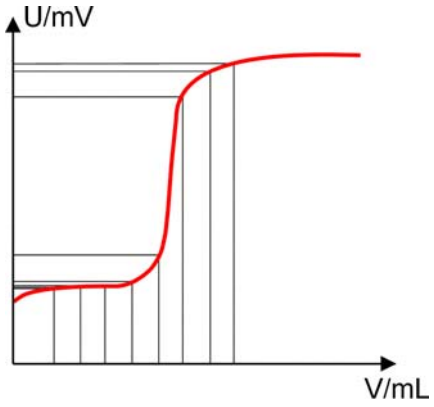
Screenshot and parameters: *see DET pH - Additional measured values*

MET

Command for **Monotonic Equivalence Point Titrations** (**MET**).

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 period.



Note
This command is suited for titrations with relatively high signal variations or suddenly occurring potential jump 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 alteration (Δ_n). The exact EP is determined by using an interpolation factor ρ; this depends on the Δ-values before and after Δ_n:

$$V_{EP} = V_0 + \rho\ \Delta V$$

V_{EP} = EP volume, V_0 = total volume added before Δ_n, ΔV = volume increment, ρ = interpolation factor according to Fortuin

For the recognition of the EPs found the set **EP criterion** is compared with the **ERC** (**E**quivalence point **R**ecognition **C**riterion) found. The ERC is the sum of the measured value alterations 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 a single summand are 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 chosen:

- **MET pH**
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- **MET U**
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- **MET Ipol**
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- **MET Upol**
  Amperometric measurement with selectable polarization voltage (measured quantity current I).
-

MET pH

Command for **Monotonic Equivalence Point Titrations** with potentiometric pH measurement.

Devices

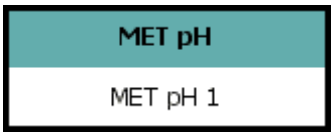
This command can be executed with the following devices which have the **MET** mode:

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 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 evaluation of the titrations curves.

- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

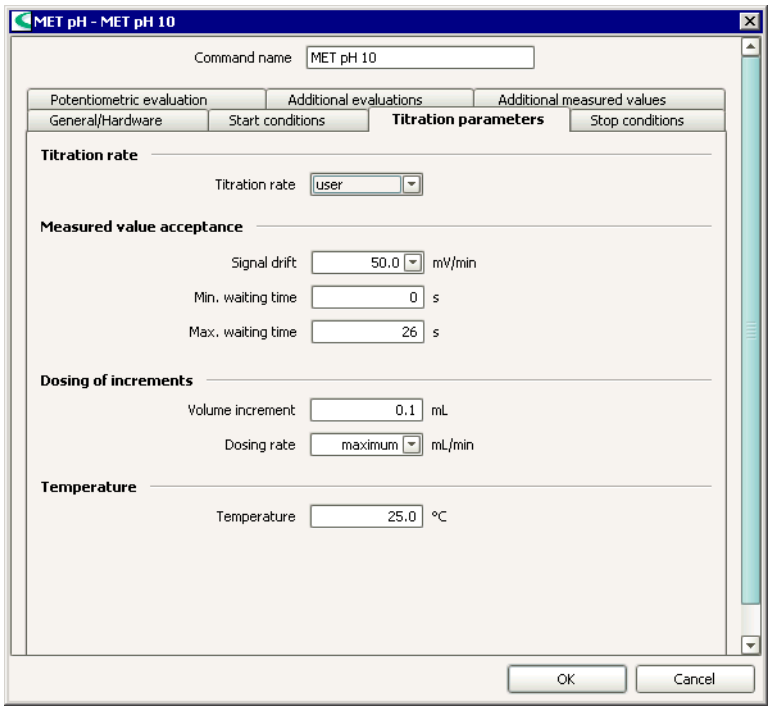
Screenshot and parameters: *see DET pH - General/Hardware*

Start conditions

Screenshot and parameters: *see DET pH - Start conditions*

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [MET pH #]
Name of the command.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Measured value acceptance** and **Dosing of increments** are not displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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

(only visible for **Titration rate** = **user**)

Signal drift

0.1 ... [20.0 (slow)] ... [50.0 (optimal)] ... [80.0 (fast)] ... 999.0 mV/min (Titrando)

0.5 ... [20.0 (slow)] ... [50.0 (optimal)] ... [80.0 (fast)] ... 999.0 mV/min (Titrino)

off
Drift for accepting the measured value. **off** means that the measured value will be accepted when the maximum waiting time has elapsed.

Min. waiting time

[0 (slow, optimal, fast)] ... 999999 s (only Titrando)
The minimum waiting period is only important for drift-controlled measurements. Measured value acceptance only takes place when the minimum waiting time has elapsed, even when the measured value drift has already been achieved. The drift continues to be checked while the waiting time is elapsing.

Max. waiting time

0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 999999 s (Titrando)
0 ... [38 (slow)] ... [26 (optimal)] ... [21 (fast)] ... 9999 s (Titrino)
If measured value drift is switched off or has not yet been achieved then the measured value will be accepted after the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Dosing of increments

(only visible for **Titration rate** = **user**)

Volume increment

0.0001 ... [0.05 (slow)] ... [0.10 (optimal)] ... [0.20 (fast)] ... 9.9999 mL (Titrando),
0.00 ... [0.05 (slow)] ... [0.10 (optimal)] ... [0.20 (fast)] ... 9.999 mL (Titrino)
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 be nearer 1/100 of the expected EP volume and for flat jumps nearer 1/10. 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.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Temperature

Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General / Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Stop conditions

Screenshot and parameters: *see DET pH - Stop conditions*

Potentiometric evaluation

Screenshot and parameters: *see DET pH - Potentiometric evaluation*

Additional evaluations

Screenshot and parameters: *see DET pH - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MET U

Command for **Monotonic Equivalence Point Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices which have the **MET** mode:

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET U - General/Hardware*

Start conditions

Screenshot and parameters: *see DET U - Start conditions*

Titration parameters

Screenshot and parameters: *see MET pH - Titration parameters*

Stop conditions

Screenshot and parameters: *see DET U - Stop conditions*

Potentiometric evaluation

Screenshot and parameters: *see DET U - Potentiometric evaluation*

Additional evaluations

Screenshot and parameters: *see DET U - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MET Ipol

Command for **Monotonic Equivalence Point Titrations** with voltametric measurement with (selectable polarization current).

Devices

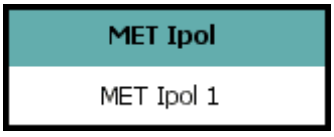
This command can be executed with the following devices which have the **DET** mode:

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET Ipol - General/Hardware*

Start conditions

Screenshot and parameters: *see DET Ipol - Start conditions*

Titration parameters

Screenshot and parameters: *see MET pH - Titration parameters*

Stop conditions

Screenshot and parameters: *see DET U - Stop conditions*

Potentiometric evaluation

Screenshot and parameters: *see DET Ipol - Potentiometric evaluation*

Additional evaluations

Screenshot and parameters: *see DET Ipol - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MET Upol

Command for **Monotonic Equivalence Point Titrations** with amperometric measurement (selectable polarization voltage).

Devices

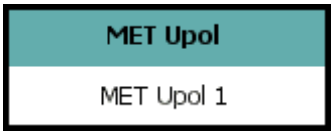
This command can be executed with the following devices which have the **MET** mode:

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 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 evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET Upol - General/Hardware*

Start conditions

Screenshot and parameters: *see DET Upol - Start conditions*

Titration parameters

Screenshot and parameters: *see DET Upol - Titration parameters*

Stop conditions

Screenshot and parameters: *see DET Upol - Stop conditions*

Potentiometric evaluation

Screenshot and parameters: *see DET Upol - Potentiometric evaluation*

Additional evaluations

Screenshot and parameters: *see DET Upol - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

SET

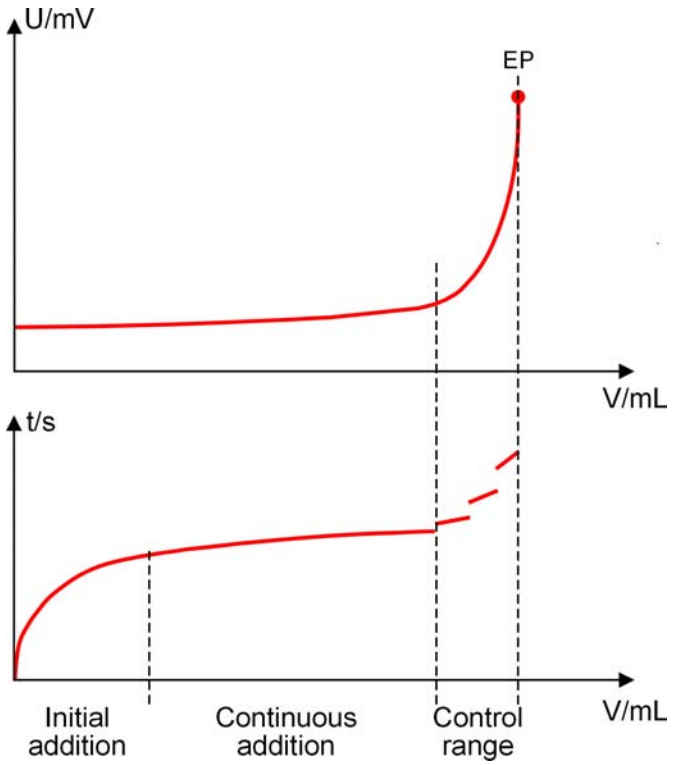
Command for **Set Endpoint Titrations** (**SET**).

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 addition**
  During this phase the dosing rate increases continuously. It starts with the **Minimum rate** and increases to the **Maximum rate**.
- **Continuous addition**
  In this phase addition is carried out at the **Maximum rate** until the **Control range** is reached.
- **Control range**
  In this range addition is finely controlled. Shortly before the end point is reached addition is only carried out at the **Minimum rate** (see "Control range").



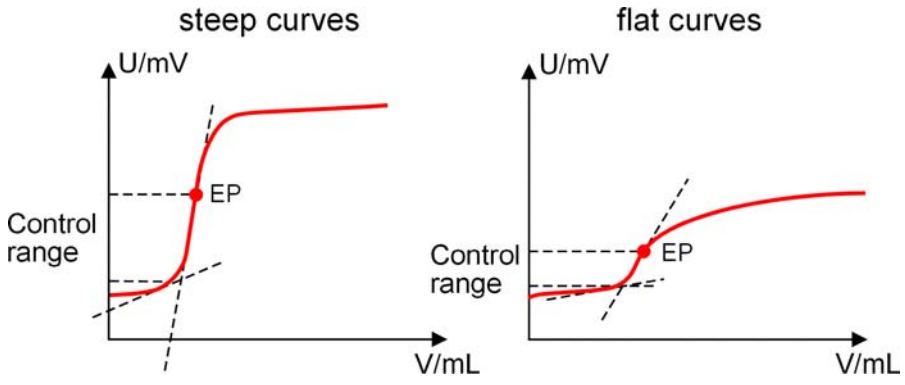
Note
This command is used for rapid routine determinations when the end point does not change throughout a series or when an excess of reagent must be avoided.

Commands

Depending on the measured value one of the following four **SET** commands can be chosen:

- **SET pH**
  Potentiometric pH measurement with pH electrodes (measured quantity pH).
- **SET U**
  Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- **SET Ipol**
  Voltametric measurement with selectable polarization current (measured quantity voltage U).
- **SET Upol**
  Amperometric measurement with selectable polarization voltage (measured quantity current I).

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.



SET pH

Command for **Set Endpoint Titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices which have the **SET** mode:

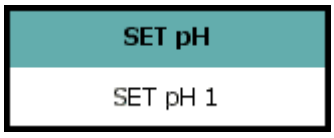
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 855

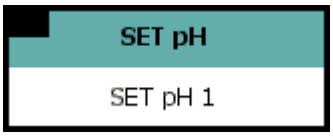
Appearance

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:

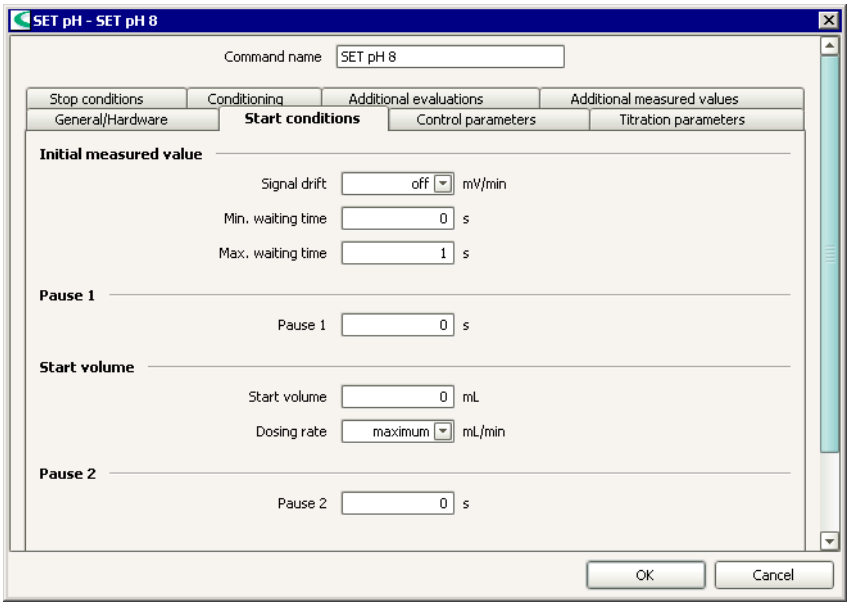
- **General/Hardware**
  Parameters for devices, dosing devices, sensors and stirrers.
- **Start conditions**
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- **Control parameters**
  Control parameter for endpoint 1 and endpoint 2 (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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET pH - General/Hardware*

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [SET pH #]

Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.1 ... 999.0 mV/min, [off] (only Titrando)

The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)

The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)

If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed.

Pause 1

Pause 1

[0] ... 999999 s (only Titrando and 719, 720, 736, 751, 758, 785, 794, 798, 799)

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando),

[0.00] ... 999.99 mL (Titrino)

Volume to be added before the start of the titration with the below entered speed.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando),

0.01 ... 150.00 mL/min, [maximum] (Titrino)

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Pause 2

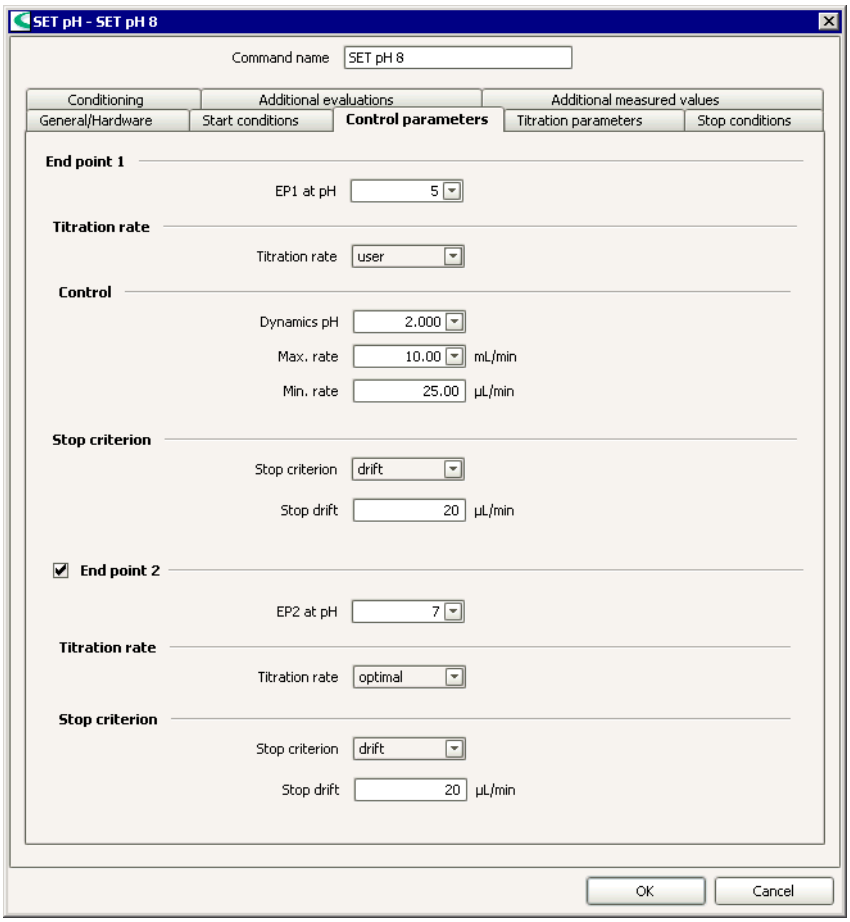
Pause 2

[0] ... 999999 s

Waiting time, e.g. until the electrode has settled down after the start or a reaction time after the addition of a start volume. The pause takes place at the end of all start conditions.

Control parameters

The Control parameters can be set for each endpoint separately.



Command name

25 characters, [SET pH #]
Name of the command.

Endpoint 1

EP1 at pH

-20.000 ... 20.000, [off] (Titrando),
-20.00 ... 20.00, [off] (Titrino)
Measured value for the first endpoint.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Control** are not displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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.

Control

(only visible for **Titration rate** = **user**)

Dynamics pH
0.001 ... [2.000 (slow)] ... [2.000 (optimal)] ... [0.500 (fast)] ... 20.000, off (Titrando),
0.01 ... [2.00 (slow)] ... [2.00 (optimal)] ... [0.50 (fast)] ... 20.00, off (Titrino)
Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. rate**. The nearer the endpoint the slower the dosing takes place until the **Min. rate** has been reached. Outside the range the dosing takes place with **Max. rate**) (*see Control range*).

Max. rate
0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 166.00 mL/min, [maximal (fast)] (Titrando)
0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 150.00 mL/min, [maximal (fast)] (Titrino)
Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used.

Min. rate
0.01 ... [5.00 (slow)] ... [25.00 (optimal)] ... [50.00 (fast)] ... 9999.00 µL/min
Speed of addition at the start and finish of the titration. The slower the minimum rate that is selected, the slower the titration and the higher the accuracy.

Stop criterion

Stop criterion
[drift], time, off
The titration stops when 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**. If no stop criterion has been selected the titration will not be stopped. In older instructions the **Delay time** was usually defined as the **Stop criterion**. The stop criterion **time** means that 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. In contrast, if **drift** is used as the stop criterion then the switch-off point will always have the same curve slope dV/dt.

Note
The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Stop drift
1 ... [20] ... 999 µL/min
If the EP and the stop drift have been reached the titration will be stopped. This parameter is only shown for **Stop criterion** = **drift**.

Delay time
0 ... [10] ... 999 s (Titrando 835, 836, 841),
0 ... [10] ... 999 s, inf. (Titrino 720, 736, 751, 758, 784, 795, 799)
If the EP has been reached, after the last dosing the delay time here defined is awaited and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. **inf.** stands for infinite.

Note
You can use the switch-off time in the following way to calculate the maximum stop drift to be used: the size of the last increment to be added depends on the volume of the attached exchange unit. With a 20 mL exchange unit (10'000 pulses per cylinder volume) – number of impulses depends on the dosing device – the smallest possible increment is 2 µL. With a delay time of 5 s this means that the last 2 µL of reagent to be added must be sufficient for 5 s or longer. This results in a drift of ≤ 2 µL/5 s ≤ 24 µL/min. The drift can be smaller than 24 µL/min as we do not know whether the last increment would also have been sufficient for 10 s. This means that if you have previously worked with a 20 mL exchange unit (10'000 pulses per cylinder volume) and 5 s switch-off delay then you should set a value of ≤ 24 µL/min as the stop drift.

Stop time

1 ... 999999 s (only Titrino 720, 736, 751, 758, 784, 795, 799)
The titration is stopped if the defined stop time has elapsed. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Endpoint 2

(only visible for **EP1 at pH** ≠ **off**)

[on], off
Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

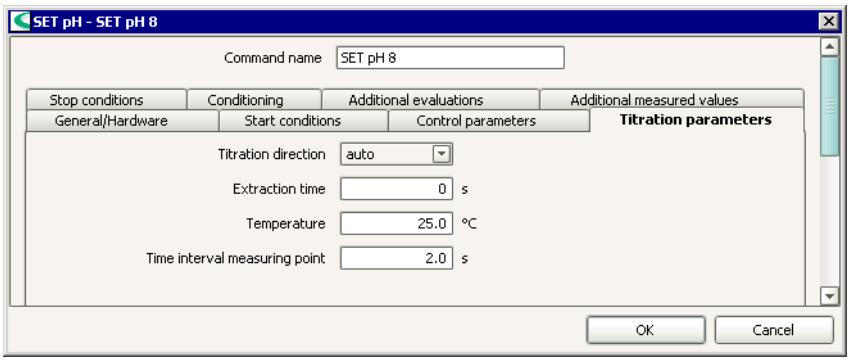
EP2 at pH

-20.000 ... 20.000, [off] (Titrando),
-20.00 ... 20.00, [off] (Titrino)
Measured value for the second endpoint.

Parameters for endpoint 2 see above.

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [SET pH #]
Name of the command.

Titration direction

Selection of the titration direction. If two endpoints are set the direction is already given and the following selection is ignored.

+
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

0 ... 999999 s (only Titrando and 719, 720, 736, 751, 758, 785, 794, 798, 799)
The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, the entry of an extraction time is a good idea for the titration of sparingly soluble samples.

Temperature

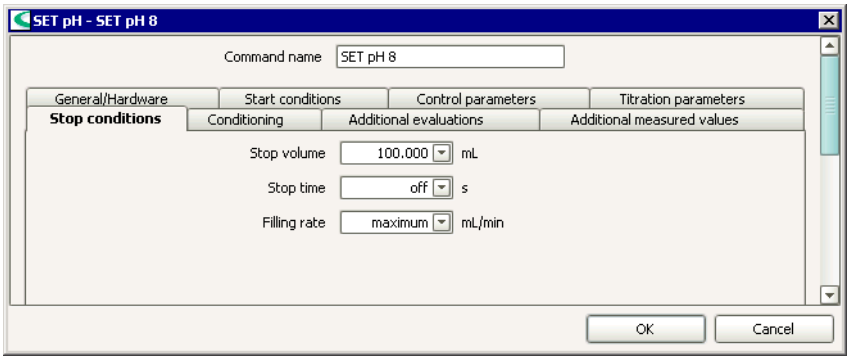
-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General/Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously.

Time interval measuring point

0.1 ... [2.0] ... 999999 s (Titrando)
0.08 ... [2.00] ... 16200 s (Titrino)
Time interval for entering a measuring point in the list of measuring points.

Stop conditions

Conditions for stopping the titration. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [SET pH #]
Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)
0.00 ... [100.00] ... 9999.99 mL, off (Titrino)
Stops when the given volume (including start conditions) has been added after the start of the titration. The stop volume should be adapted to suit the sample weight or the titration vessel size in order to prevent it from overflowing.

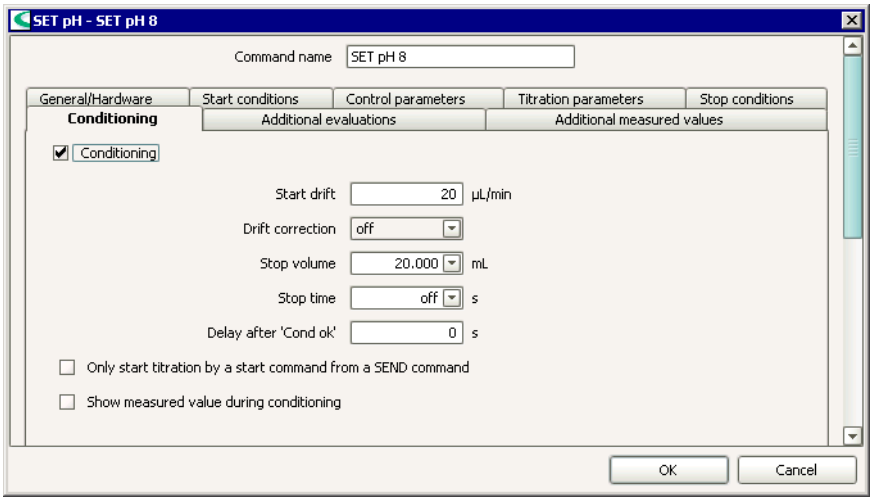
Stop time

0 ... 999999 s, [off] (only Titrando)
Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed with which the buret is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Conditioning



Command name

25 characters, [SET pH #]
Name of the command.

Conditioning

[on], off
Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

1 ... [20] ... 999 µL/min (only Titrando)
The determination can only be started when the measured drift is below the entered value. The Status in the Run window (Single determination or Determination series) then switches to **COND READY**.

Drift correction

automatic, manual, [off]
If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** x Titration time) caused by blank consumption during titration is deducted from the total consumption. With **automatic** the drift value at the start of the titration applies with **manual** the value defined under **Drift value** is applied

Drift value

[0] ... 99.9 µL/min
Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Stop volume

0.000000 ... [20.00] ... 9999.99 mL, [off] (only Titrando)
Stops when the given volume has been added after the start of the titration. This value should be adapted the volume of the sample used to prevent overflow.

Stop time

0 ... 999999 s, [off] (only Titrando)
Stops when the given time has elapsed after the start of the titration.

Delay after 'Cond ok'

[0] ... 999 s
Waiting period until the start of the titration during which the conditioning condition must be fulfilled.

Only start titration by a start command from a SEND command

on, [off]
If this option is set the titration is only started when the **Event message Start titration** from a **SEND** command reaches this command.

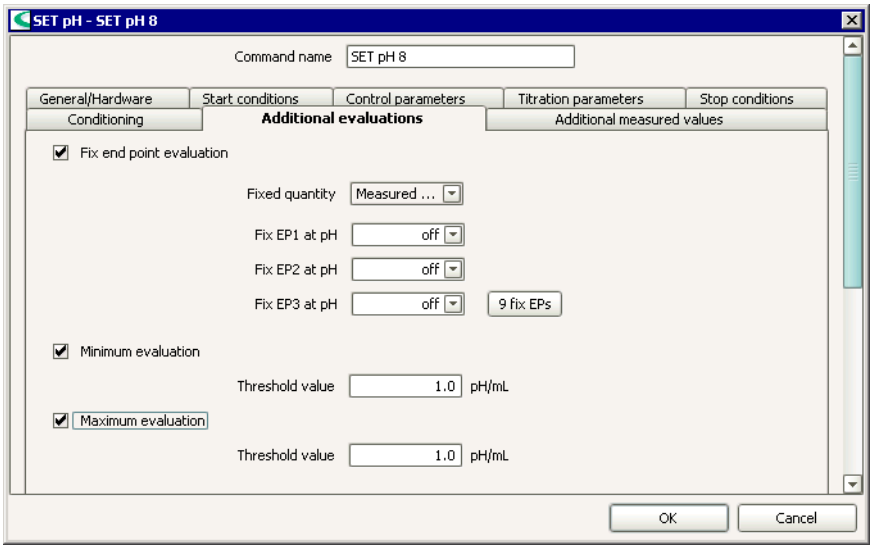
> ***Note***
> *At the time of reception of the **SEND** command conditioning must already be terminated (= **Condok**) otherwise the command to start the titration will be ignored.*

Show measured value during conditioning

on, [off]
If this option is set additionally to the drift and time the measured value is shown in the Live display.

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name
25 characters, [SET pH #]
Name of the command.

Fix end point evaluation

on, [off]
For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity
[Measured value], Time, Volume
Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at pH
-20.000 ... 20.000, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at
0.0 ... 999999.9 s, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at
0.00000 ... 9999.99 mL, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.

9 fix EPs

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

3 fix EPs

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

SET U

Command for **Set Endpoint Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices which have the **SET** mode:

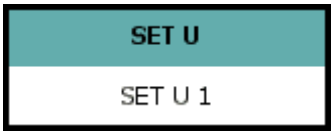
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 855

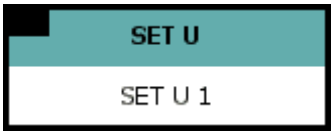
Appearance

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 parameter for endpoint 1 and endpoint 2 (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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

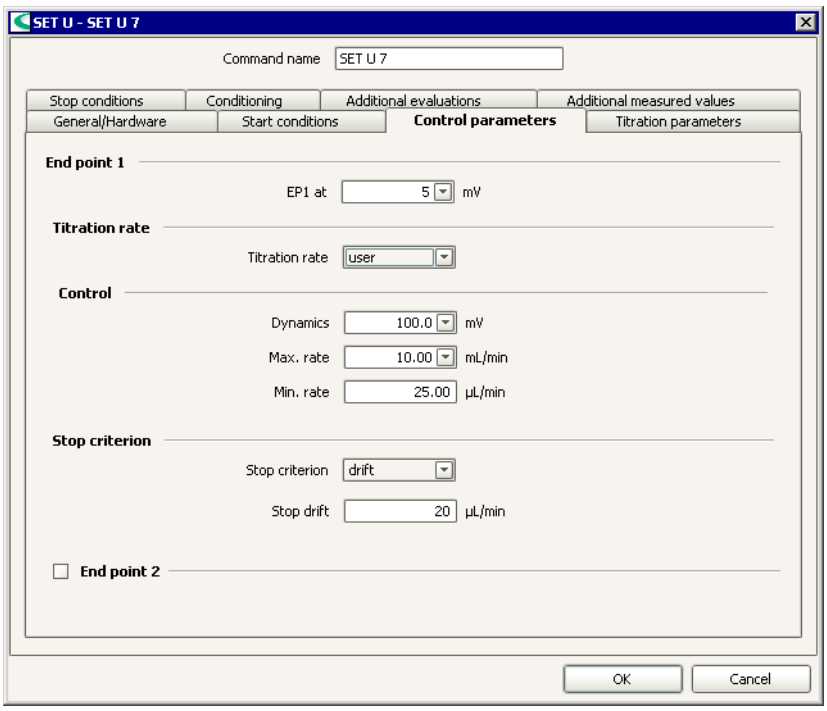
Screenshot and parameters: *see DET U - General/Hardware*

Start conditions

Screenshot and parameters: *see SET pH - Start conditions*

Control parameters

The Control parameters can be set for each endpoint separately.



Command name

25 characters, [SET U #]
Name of the command.

Endpoint 1

EP1 at

-2000.0 ... 2000.0 mV, [off] (Titrando)
-2000 ... 2000, [off] (Titrino)
Measured value for the first endpoint.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Control** are not displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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.

Control

(only visible for **Titration rate** = **user**)

Dynamics

0.1 ... [300.0 (slow)] ... [100.0 (optimal)] ... [30.0 (fast)] ... 2000.0 mV, off (Titrando)

1 ... [300 (slow)] ... [100 (optimal)] ... [30 (fast)] ... 2000 mV, off (Titrino)

Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. rate**. The nearer the endpoint the slower the dosing takes place until the **Min. rate** has been reached. Outside the range the dosing takes place with **Max. rate** (*see Control range*).

Max. rate

0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 166.00 mL/min, [maximal (fast)] (Titrando)

0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 150.00 mL/min, [maximal (fast)] (Titrino)

Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used.

Min. rate

0.01 ... [5.00 (slow)] ... [25.00 (optimal)] ... [50.00 (fast)] ... 9999.00 µL/min

Speed of addition at the start and finish of the titration. The slower the minimum rate that is selected, the slower the titration and the higher the accuracy.

Stop criterion

Stop criterion

[drift], time, off

The titration stops when 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**. If no stop criterion has been selected the titration will not be stopped. In older instructions the **Delay time** was usually defined as the **Stop criterion**. The stop criterion **time** means that 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. In contrast, if **drift** is used as the stop criterion then the switch-off point will always have the same curve slope dV/dt.

Note
The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Stop drift

1 ... [20] ... 999 µL/min

If the EP and the stop drift have been reached the titration will be stopped. This parameter is only shown for **Stop criterion** = **drift**.

Delay time

0 ... [10] ... 999 s (Titrando)

0 ... [10] ... 999 s, inf. (Titrino)

If the EP has been reached, after the last dosing the delay time here defined is awaited and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. **inf.** stands for infinite.

Note
You can use the switch-off time in the following way to calculate the maximum stop drift to be used: the size of the last increment to be added depends on the volume of the attached exchange unit. With a 20 mL exchange unit (10'000 pulses per cylinder volume) – number of impulses depends on the dosing device – the smallest possible increment is 2 µL. With a delay time of 5 s this means that the last 2 µL of reagent to be added must be sufficient for 5 s or longer. This results in a drift of ≤ 2 µL/5 s ≤ 24 µL/min. The drift can be smaller than 24 µL/min as we do not know whether the last increment would also have been sufficient for 10 s. This means that if you have previously worked with a 20 mL exchange unit (10'000 pulses per cylinder volume) and 5 s switch-off delay then you should set a value of ≤ 24 µL/min as the stop drift.

Stop time

1 ... 999999 s (only 720, 736, 751, 758, 784, 795, 799)
The titration is stopped if the defined stop time has elapsed. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Endpoint 2

(only visible for **EP1 bei** ≠ **off**)

[on], off
Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

EP2 at

-2000.0 ... 2000.0 mV, [off] (Titrando),
-2000 ... 2000, [off] (Titrino)
Measured value for the second endpoint.

Parameters for endpoint 2 see above.

Titration parameters

Screenshot and parameters: *see SET pH - Titration parameters*

Stop conditions

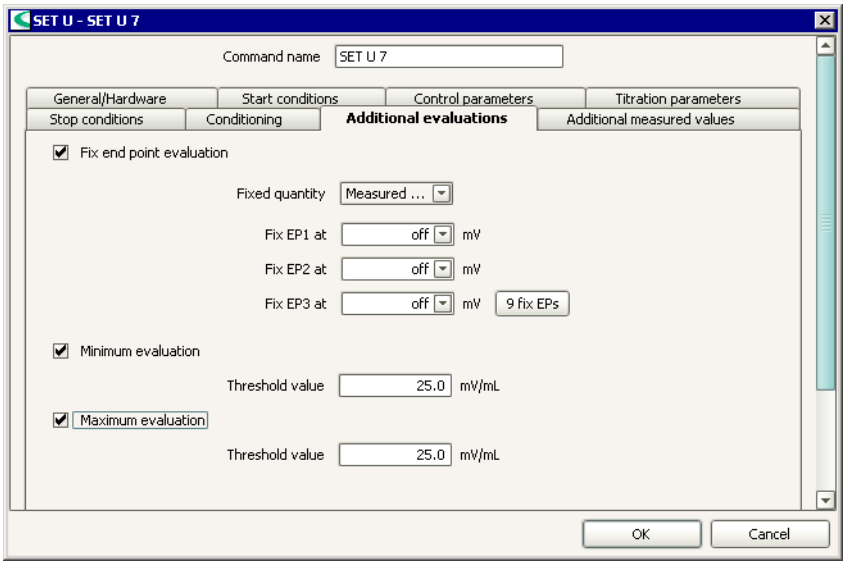
Screenshot and parameters: *see SET pH - Stop conditions*

Conditioning

Screenshot and parameters: *see SET pH - Conditioning*

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [SET U #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-2000.0 ... 2000.0 mV, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Minimum evaluation

on, [off]

For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value

0.1 ... [25.0] ... 2000.0 mV/mL

The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]

For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value

0.1 ... [25.0] ... 2000.0 mV/mL

The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

SET Ipol

Command for **Set Endpoint Titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices which have the **SET** mode:

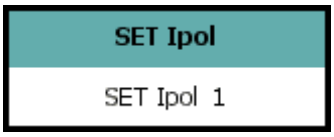
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 855

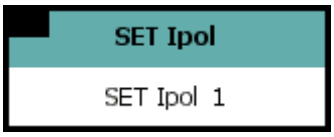
Appearance

The command has the following appearance:

without conditioning



with conditioning



Parameter

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 parameter for endpoint 1 and endpoint 2 (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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET Ipol - General/Hardware*

Start conditions

Screenshot and parameters: *see SET pH - Start conditions*

Control parameters

Screenshot and parameters: *see SET U - Control parameters*

Titration parameters

Screenshot and parameters: *see SET pH - Titration parameters*

Stop conditions

Screenshot and parameters: *see SET pH - Stop conditions*

Conditioning

Screenshot and parameters: *see SET pH - Conditioning*

Additional evaluations

Screenshot and parameters: *see SET U - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

SET Upol

Command for **Set Endpoint Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices which have the **SET** mode:

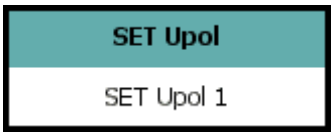
Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 855

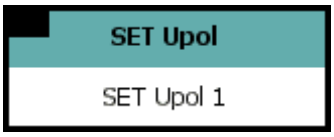
Appearance

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:

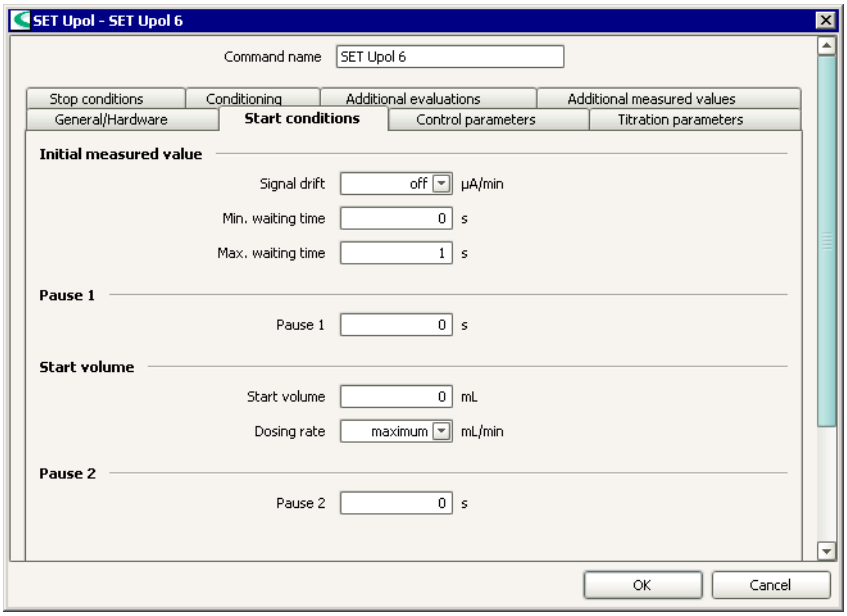
- **General/Hardware**
  Parameters for devices, dosing devices, sensors and stirrers.
- **Start conditions**
  Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- **Control parameters**
  Control parameter for endpoint 1 and endpoint 2 (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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET Upol - General/Hardware*

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [SET Upol #]
Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.1 ... 99.90 µA/min, [off] (only Titrando)
The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)
The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)
If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed

Pause 1

Pause 1

[0] ... 999999 s (only Titrando and Titrino 719, 720, 736, 751, 758, 785, 794, 798, 799)
Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando),
[0.00] ... 999.99 mL (Titrino)
Volume to be added before the start of the titration with the below entered speed.

Dosing rate

0.01 ... 166.00 mL/min, [maximum] (Titrando),
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

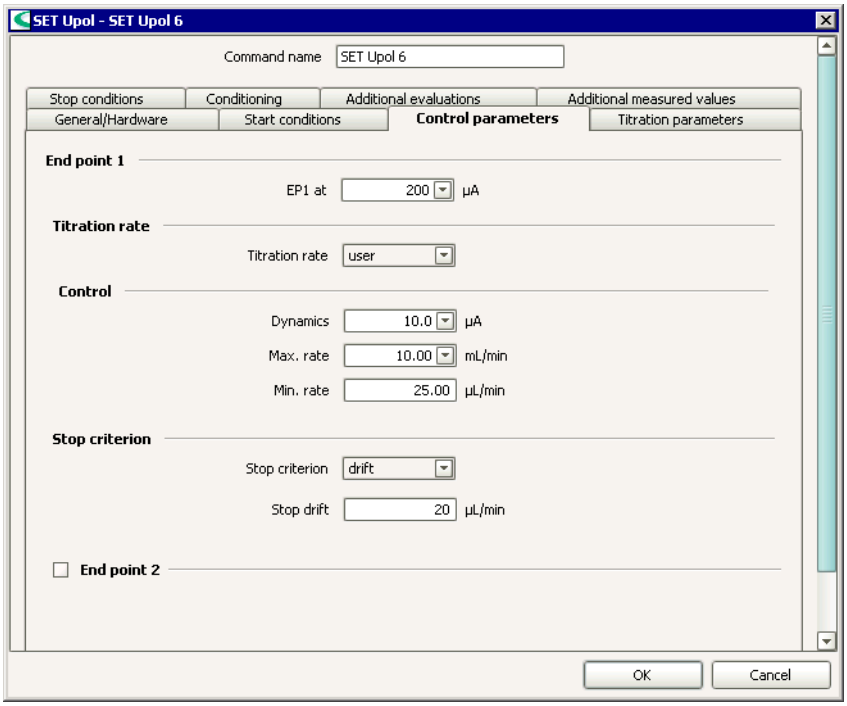
Pause 2

Pause 2

[0] ... 999999 s
Waiting time, e.g. until the electrode has settled down after the start or a reaction time after the addition of a start volume. The pause takes place at the end of all start conditions.

Control parameters

The Control parameters can be set for each endpoint separately.



Command name

25 characters, [SET Upol #]
Name of the command.

Endpoint 1

EP1 at

-200.0 ... 200.0 µA, [off]
Measured value for the first endpoint.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Control** are not

displayed. In order to edit these parameters the value **user** must be selected.

slow
For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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.

Control

(only visible for **Titration rate** = **user**)

Dynamics
0.01 ... [40.00 (slow)] ... [10.00 (optimal)] ... [5.00 (fast)] ... 200.00 µA, off (Titrando)
0.1 ... [40.0 (slow)] ... [10.0 (optimal)] ... [5.0 (fast)] ... 200.0 µA, off (Titrino)
Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. rate**. The nearer the endpoint the slower the dosing takes place until the **Min. rate** has been reached. Outside the range the dosing takes place with **Max. rate** (*see Control range*).

Max. rate
0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 166.00 mL/min, [maximal (fast)] (Titrando)
0.01 ... [1.00 (slow)] ... [10.00 (optimal)] ... 150.00 mL/min, [maximal (fast)] (Titrino)
Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used.

Min. rate
0.01 ... [5.00 (slow)] ... [25.00 (optimal)] ... [50.00 (fast)] ... 9999.00 µL/min
Speed of addition at the start and finish of the titration. The slower the minimum rate that is selected, the slower the titration and the higher the accuracy.

Stop criterion

Stop criterion
[drift], time, off
The titration stops when 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**. If no stop criterion has been selected the titration will not be stopped. In older instructions the **Delay time** was usually defined as the **Stop criterion**. The stop criterion **time** means that 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. In contrast, if **drift** is used as the stop criterion then the switch-off point will always have the same curve slope dV/dt.

Note
The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Stop drift

1 ... [20] ... 999 µL/min
If the EP and the stop drift have been reached the titration will be stopped. This parameter is only shown for **Stop criterion** = **drift**.

Delay time

0 ... [10] ... 999 s (Titrando)
0 ... [10] ... 999 s, inf. (Titrino)
If the EP has been reached, after the last dosing the delay time here defined is awaited and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. **inf.** stands for infinite.

> ***Note***
> *You can use the switch-off time in the following way to calculate the maximum stop drift to be used: the size of the last increment to be added depends on the volume of the attached exchange unit. With a 20 mL exchange unit (10'000 pulses per cylinder volume) – number of impulses depends on the dosing device – the smallest possible increment is 2 µL. With a delay time of 5 s this means that the last 2 µL of reagent to be added must be sufficient for 5 s or longer. This results in a drift of ≤ 2 µL/5 s ≤ 24 µL/min. The drift can be smaller than 24 µL/min as we do not know whether the last increment would also have been sufficient for 10 s. This means that if you have previously worked with a 20 mL exchange unit (10'000 pulses per cylinder volume) and 5 s switch-off delay then you should set a value of ≤ 24 µL/min as the stop drift.*

Stop time

1 ... 999999 s (only 720, 736, 751, 758, 784, 795, 799)
The titration is stopped if the defined stop time has elapsed. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**

Endpoint 2

(only visible for **EP1 bei** ≠ **off**)

[on], off
Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

EP2 at

-200.0 ... 200.0 µA, [off]
Measured value for the second endpoint.

Parameters for **Endpoint 2** see above.

Titration parameters

Screenshot and parameters: *see SET pH - Titration parameters*

Stop conditions

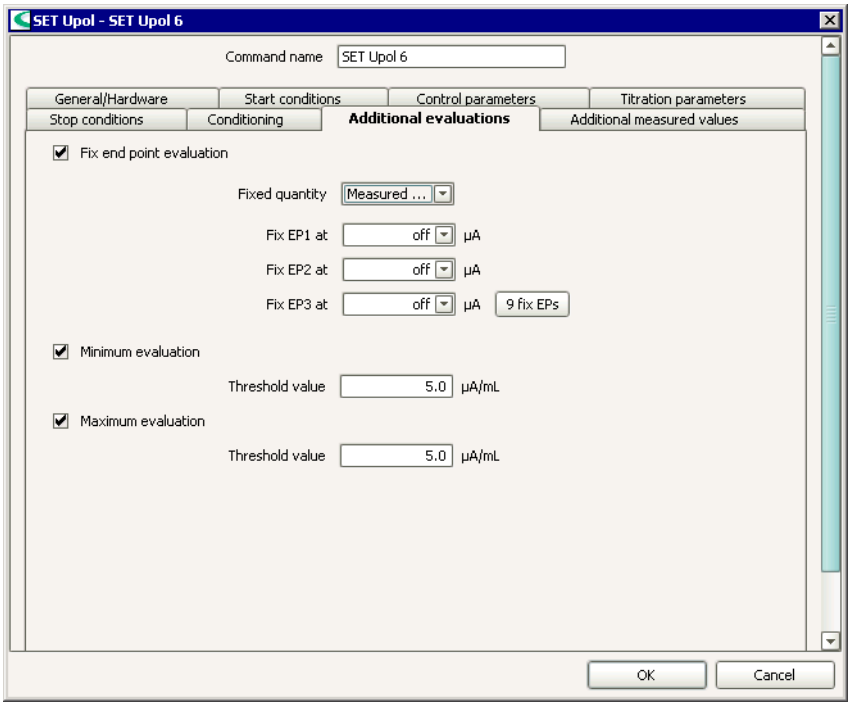
Screenshot and parameters: *see SET pH - Stop conditions*

Conditioning

Screenshot and parameters: *see SET pH - Conditioning*

Additional evaluations

The following additional methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [SET Upol #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

[Measured value], Time, Volume

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-200.0 ... 200.0 µA, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999999.9 s, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at

0.00000 ... 9999.99 mL, [off]

Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
0.5 ... [5.0] ... 10.0 µA/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (*see Titration commands - Evaluation - Minimum/maximum evaluation*.

Threshold value
0.5 ... [5.0] ... 10.0 µA/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

KFT

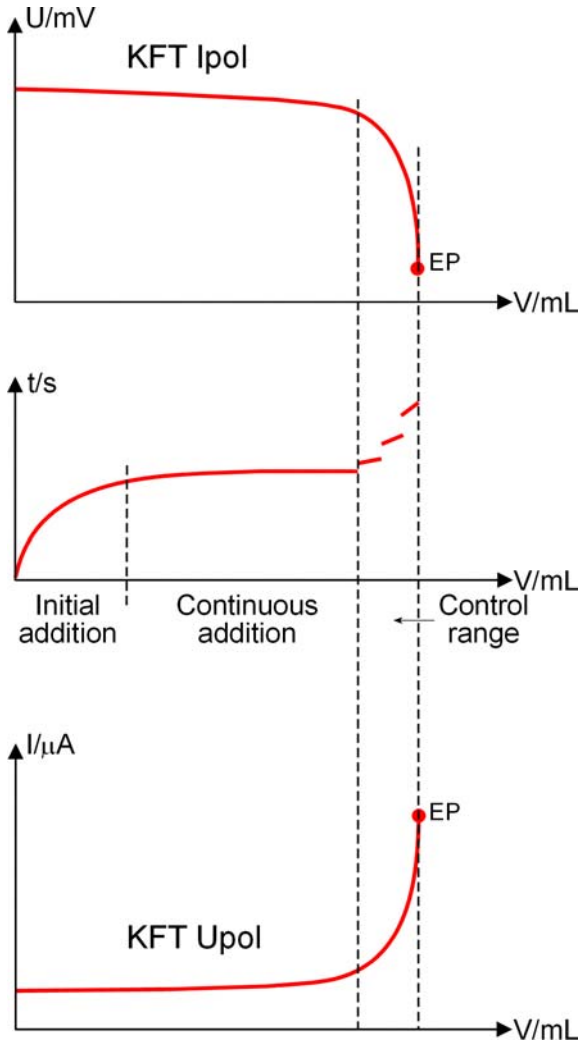
Command for volumetric **Karl Fischer Titrations** (**KFT**).

Principle

With this command volumetric titration for determining the water content by the Karl Fischer method with automatic pre- and post-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 addition**
  During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous addition**
  Addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Control range**
  In this range addition is finely controlled. Shortly before the endpoint is reached addition is only carried out 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 value voltage U).
- **KFT Upol**
  Amperometric measurement with selectable polarization voltage (measured value current I).

KFT Ipol

Command for coulometric **Karl Fischer Titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices which have the **KFT** mode:

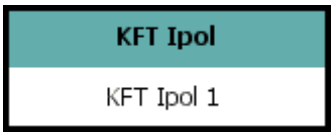
Titrino: 720, 736, 751, 758, 784, 795, 799

Titrando: 835, 836, 841

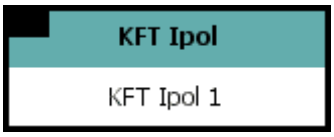
Appearance

The command has the following appearance:

without conditioning



with conditioning



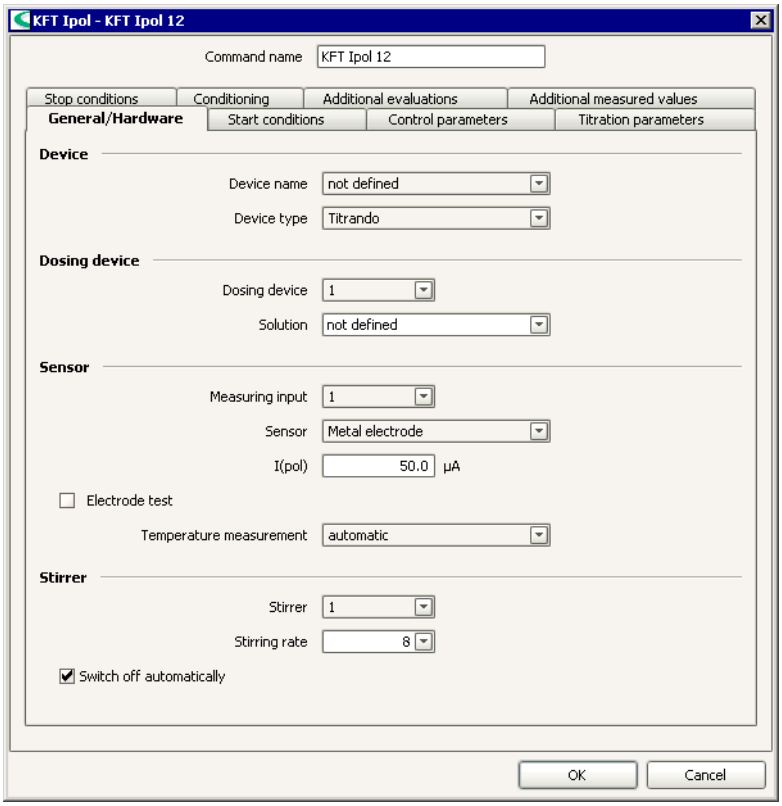
Parameters

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 parameter 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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [KFT Ipol #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando)

[internal D0] (Titrino)

external D1, external D2 (only 736, 751, 758, 799)

Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution names, [not defined]

Input or selection of the titrant or solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct titrant is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected titrant will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Sensor

Measuring input

[1] ... 2 (only Titrando)

Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Metal electrode], Conductivity sensor

Selection of the sensor from the list of sensors defined in the sensor table.

I(pol)

-125.0 ... [50.0] ... 125.0 µA (Titrando, in 2.5 **µ**A steps)

-127 ... [50] ... 127 µA (Titrino, in 1 **µ**A steps)

The polarization current is the current applied to the polarized electrode during a voltametric measurement.

Electrode test

on, [off]

Switching on/off the electrode test for polarized electrodes. The electrode test for polarized electrodes is carried out during the transition from an inactive condition to a measuring condition.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous

A temperature sensor must be connected. The temperature is measured continuously.

[automatic]

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off

The temperature will not be measured. The **Temperature** (see Titration parameters) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)

Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)

Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando)

If this option is enabled, the stirrer will be switched off automatically when the command is finished.

Switch on/off automatically

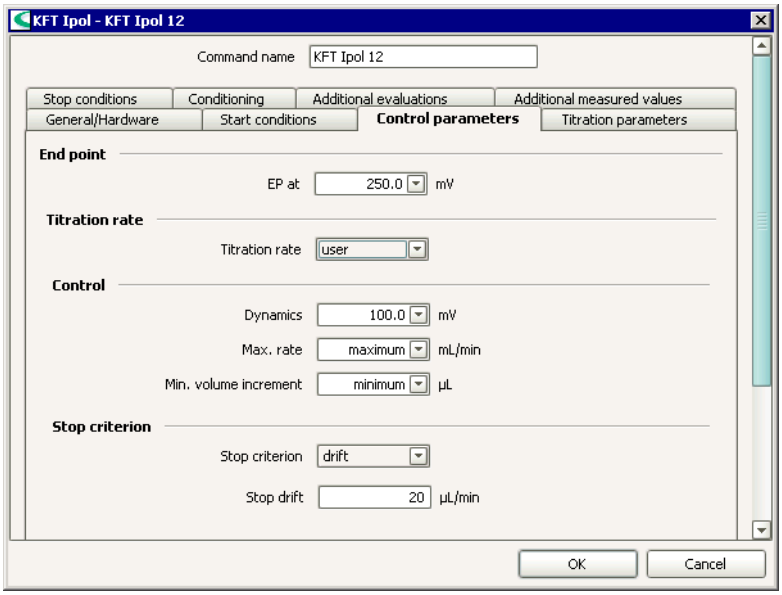
[on], off only 751, 785, 798, 799)

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.

Start conditions

Screenshot and parameters: *see SET pH - Start conditions*

Control parameters



Command name

25 characters, [KFT Ipol #]

Name of the command.

Endpoint

EP at

-2000.0 ... [250.0] ... 2000.0 mV, off

Measured value for the endpoint.

Titration rate

Titration rate

Three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**. For these sets the parameters for the **Control** are not displayed. In order to edit these parameters the value **user** must be selected.

slow

For titrations in which the finest details are also to be visible. However, this can also increase noise and lead to the production of 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.

Control

(only visible for **Titration rate** = **user**)

Dynamics

0.1 ... [300.0 (slow)] ... [100.0 (optimal)] ... [30.0 (fast)] ... 2000.0 mV (Titrando),
1 ... [300 (slow)] ... [100 (optimal)] ... [30 (fast)] ... 2000 mV (Titrino)
Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. volume increment**. The nearer the endpoint the slower the dosing takes place until the **Min. volume increment** has been reached. Outside the range the dosing takes place with **Max. rate**.

Max. rate

0.01 ... [1.00 (slow)] ... [maximal (optimal)] ... [maximal (fast)] ... 166.00 mL/min (Titrando)
0.01 ... [1.00 (slow)] ... [maximal (optimal)] ... [maximal (fast)], 150.00 mL/min (Titrino)
Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used.

Min. volume increment

0.1 ... [minimal (slow)] ... [minimal (optimal)] ... [5.0 (fast)] ... 9.9 µL/min
Minimum 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.

Stop criterion

Stop criterion

[drift], rel. drift, off (only Titrando 835, 836, 841)**, time**
The titration stops when 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**. If the criterion **off** has been selected the titration will not be stopped.

> *Note*
> *The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.*

Stop drift

1 ... [20] ... 999 µL/min
If the EP and the stop drift have been reached the titration will be stopped. This parameter is only shown for **Stop criterion** = **drift**.

Relative stop drift

1 ... [10] ... 999 µL/min (only 835, 836, 841)
If the EP and the stop drift have been reached the titration will be stopped. 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**.

Delay time

0 ... [10] ... 999 s (835, 836, 841),
0 ... [10] ... 999 s, inf. (720, 736, 751, 758, 784, 795, 799)
If the EP has been reached, after the last dosing the delay time here defined is awaited and then the titration is stopped. This parameter is only shown for **Stop criterion** = **time**. **inf.** stands for infinite.

Note

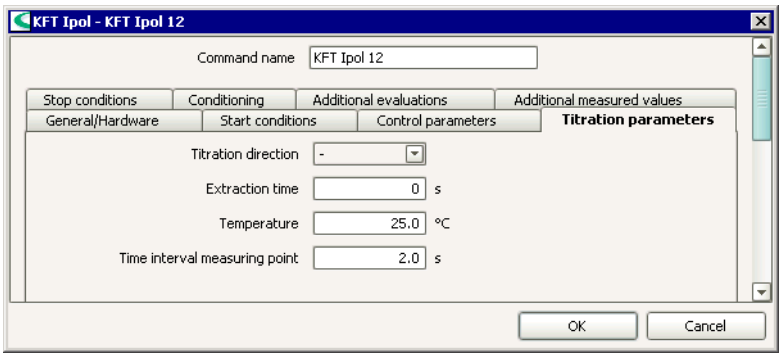
*You can use the **Delay time** to calculate the maximum **Stop drift** to be used in the following way: the size of the last added increment depends on the volume of the attached exchange unit. With a 20 mL exchange unit (10'000 pulses per cylinder volume; for KFT command is independent of the dosing drive) the smallest possible increment is 2 µL. With a Delay time of 5 s the last 2 µL of reagent must therefore suffice for 5 s or longer. This gives a drift of ≤ 2 µL/5 s ≤ 24 µL/min. (The drift may be smaller than 24 µL/min as we do not know whether the last increment would also have been sufficient for 10 s.) This means that if you use a 20 mL exchange unit (10'000 pulses per cylinder volume; independent of the dosing drive) and 5 s switch-off delay then you should set a value of ≤ 24 µL/min as the stop drift.*

Stop time

1 ... 999999 s (only 720, 736, 751, 758, 784, 795, 799)
The titration is stopped if the defined stop time has elapsed. This parameter is only shown for **Stop criterion** = **time** and **Delay time** = **inf.**.

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [KFT Ipol #]
Name of the command.

Titration direction

Selection of the titration direction. If two endpoints are set the direction is already given and the following selection is ignored.

+
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

[0] ... 999999 s
The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, the entry of an extraction time is a good idea for the titration of sparingly soluble samples.

Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General/Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously.

Time interval measuring point

0.1 ... [2.0] ... 999999 s (Titrando)
0.08 ... [2.00] ... 16200 s (Titrino)
Time interval for entering a measuring point in the list of measuring points.

Stop conditions

Screenshot and parameters: *see SET pH - Stop conditions*

Conditioning

Screenshot and parameters: *see SET pH - Conditioning*

Additional evaluations

Screenshot and parameters: *see SET U - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

KFT Upol

Command for **Karl Fischer Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices which have the **KFT** mode:

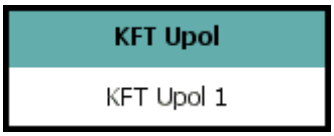
Titrino: 720, 736, 751, 758, 784, 795, 799

Titrando: 835, 836, 841

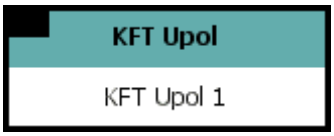
Appearance

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 parameter 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**
  Switching conditioning on/off. Definition of start drift, drift correction and stop condition.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

Screenshot and parameters: *see DET Upol - General/Hardware*

Start conditions

Screenshot and parameters: *see SET Upol - Start conditions*

Control parameters

Screenshot and parameters: *see SET Upol - Control parameters*

Titration parameters

Screenshot and parameters: *see KFT Ipol - Titration parameters*

Stop conditions

Screenshot ans parameters: *see SET pH - Stop conditions*

Conditioning

Screenshot and parameters: *see SET pH - Conditioning*

Additional evaluations

Screenshot and parameters: *see SET Upol - Additional evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

KFC

Command for coulometric **Karl Fischer Titrations** with voltametric measurement.

> ***Note***
> *The coulometric water determination is mainly used to determine small amounts of water.*

Devices

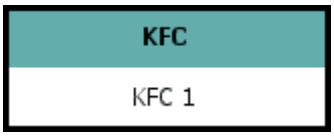
This command can be executed with the following devices which have the **KFC** mode:

Coulometer: 756, 831

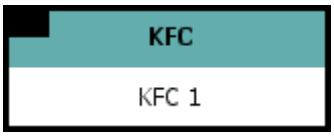
Appearance

The command has the following appearance:

without conditioning



with conditioning



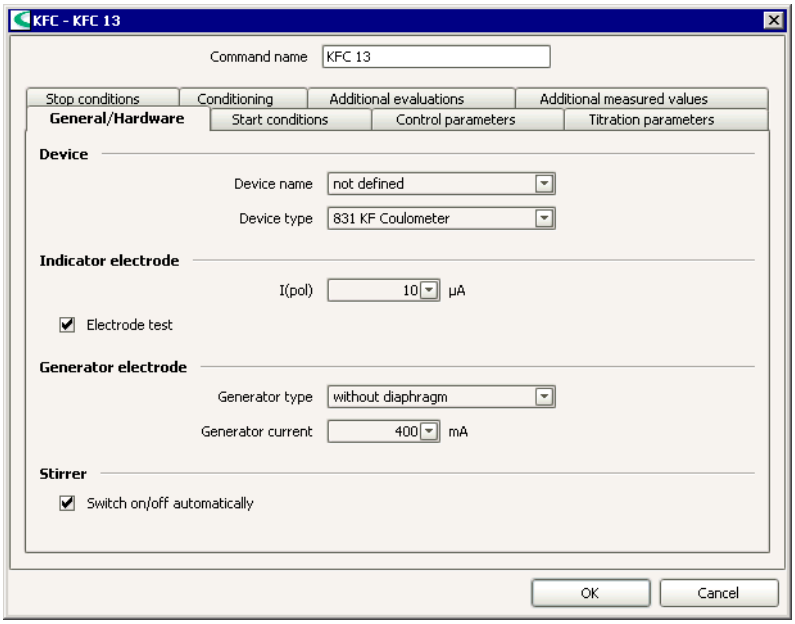
Parameters

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 parameter 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**
  Switching conditioning on/off. Definition of start drift, drift correction and drift value.
- **Additional evaluations**
  Definition of additional methods for evaluation of the titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the electrodes and the stirrer are defined on this tab.



Command name

25 characters, [KFC #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Indicator electrode

I(pol)

2, 5, [10], 20, 30 µA

Polarization current at the indicator electrode.

> ***Note***
> *On changing this parameter take care that the polarization current of the indicator electrode, the endpoint and the control range are linked to each other (details see **Control parameters**).*

Electrode test

on, [off]

Switching on/off the electrode test for polarized electrodes. The electrode test for polarized electrodes is carried out during the transition from an inactive condition to a measuring condition

Generator electrode

Generator type

[without diaphragm], with diaphragm

Selection of the generator type.

Generator current

100, 200, [400], mA, auto

Polarization current at the generator electrode. **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 **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**.*

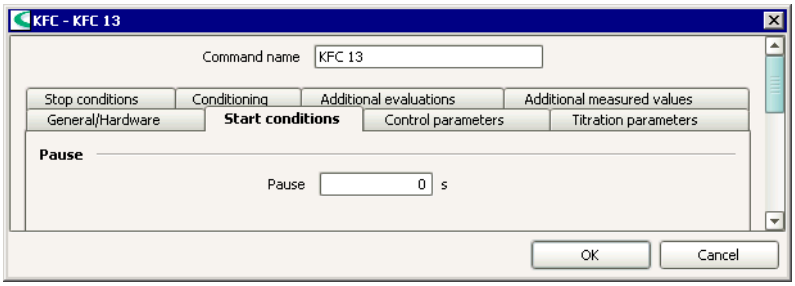
Stirrer

Switch on/off automatically

[on], off

If this option is eanbled, 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.

Start conditions



Command name

25 characters, [KFC #]

Name of the command.

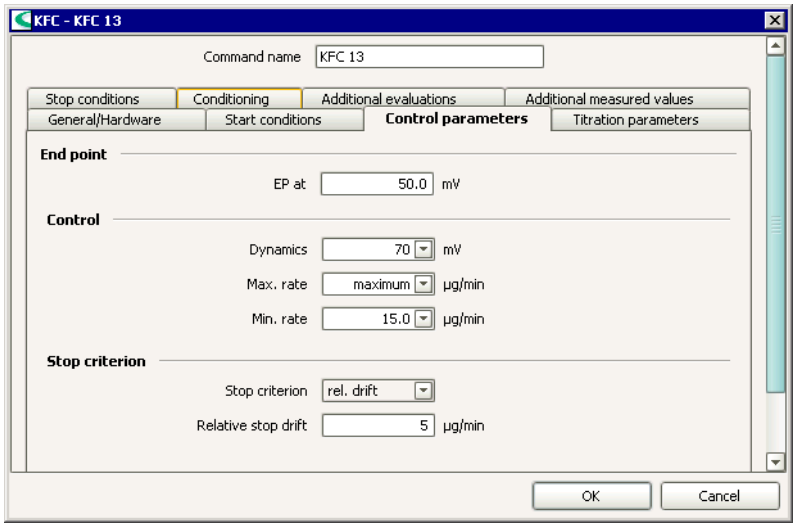
Pause

Pause

[0] ... 999999 s

Waiting time before the start of the titration.

Control parameters



Command name

25 characters, [KFC #]

Name of the command.

Endpoint

EP at

-2000.0 ... [50.0] ... 2000.0 mV

Measured value for the end point.

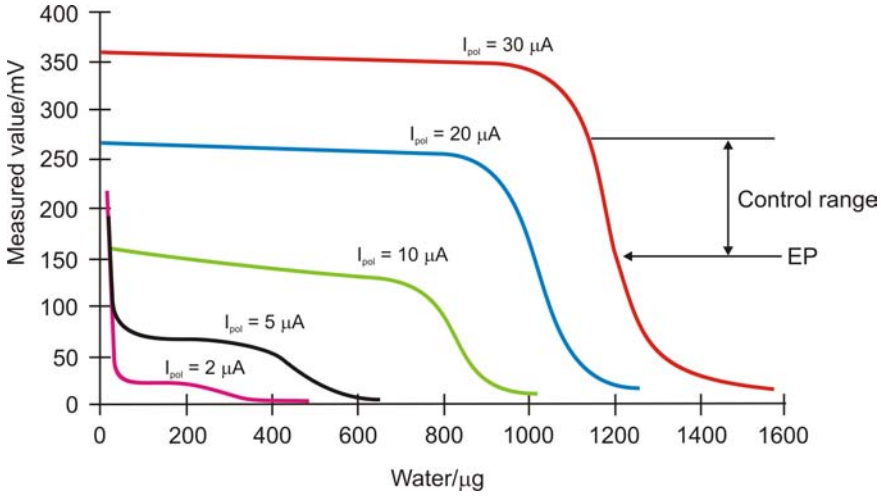
Control

Dynamics

1.0 ... [70] ... 2000 mV, off

The dynamics is entered as distance to the end point. Within the dynamics iodine will be produced with **Min. rate**. The bigger the control range the slower the titration. Outside the dynamics iodine will be produced continuously with **Max. rate**.

The standard control parameters are optimal for most applications and should not be altered. If you nevertheless need to alter the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the end point and the dynamics are linked to each other.



The diagram shows KF titration curves at different polarization currents. It is clear to see that the position of the end point 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

1.5 ... 2240 µg/min, [maximum]

Maximum rate with which iodine is produced outside the **Dynamics**.

Min. rate

0.3 ... [15.0] ... 999.9 µg/min, minimum

This parameter defines the minimum rate with which iodine is produced inside the dynamics. The smaller the rate the slower the titration and the higher the accuracy.

Stop criterion

Stop criterion

drift , [rel. drift]

Switches off titration when the end point has been reached and the stop criterion has been met.

Stop drift

1 ... [5] ... 999 µg/min

Switches off titration when the end point and stop drift have been reached. This parameter is only shown for **Stop criterion** = **drift**.

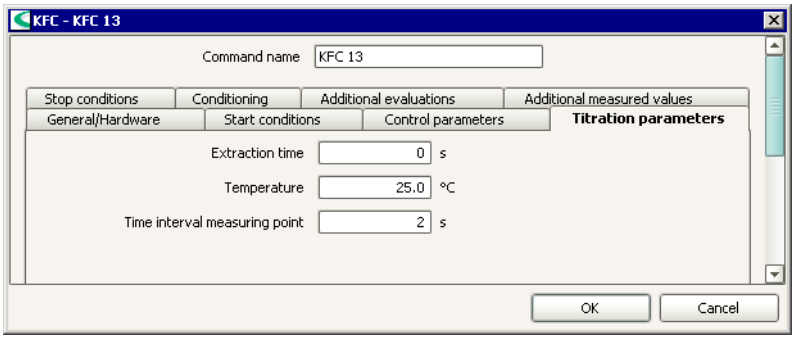
Relative stop drift

0 ... [5] ... 999 µg/min

Switches off titration when the end point and stop drift have been reached. The stop drift is calculated according to the actual drift at start of titration + entered value for relative stop drift. This parameter is only shown for **Stop criterion** = **rel. drift**

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [KFC #]

Name of the command.

Extraction time

[0] ... 999999 s

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, the entry of an extraction time is a good idea for the titration of sparingly soluble samples.

Temperature

-170.0 ... [25.0] ... 500.0 °C

Manually entered titration temperature.

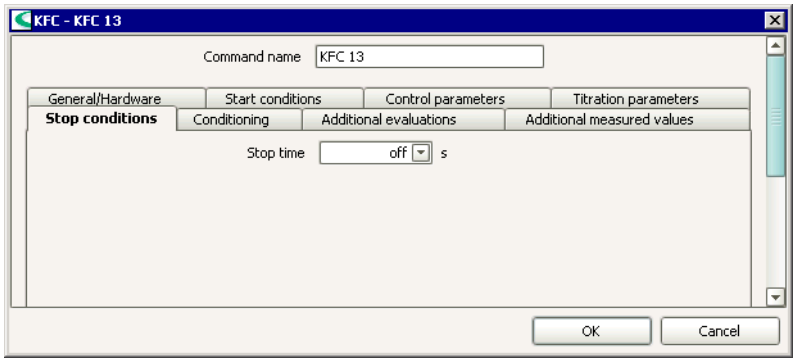
Time interval measuring point

[1] ... 999999 s

Time interval for entering a measuring point in the list of measuring points.

Stop conditions

Condition for stopping the titration.



Command name

25 characters, [KFC #]

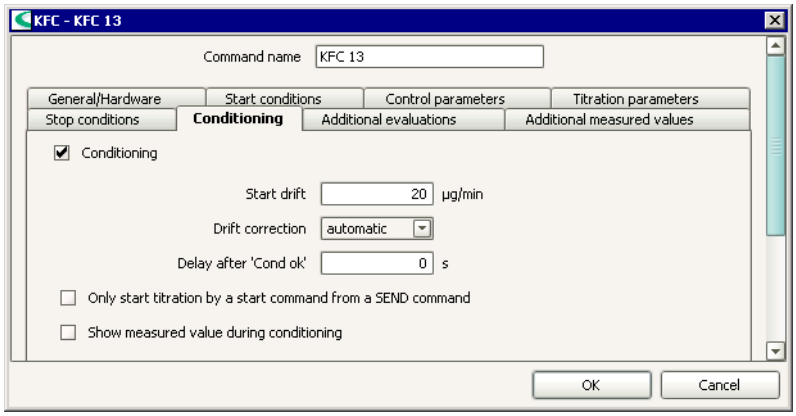
Name of the command.

Stop time

0 ... 999999 s, [off]

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

Conditioning



Command name

25 characters, [KFC #]

Name of the command.

Conditioning

[on], off

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

1 ... [20] ... 999 µg/min

The determination can only be started when the measured drift is below the entered value. The Status in the **Run** window (Single determination or Determination series) then switches to **COND READY**.

Drift correction

automatic, manual, [off]

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** x Titration time) caused by blank consumption during titration is deducted from the total consumption. With **automatic** the drift value at the start of the titration applies with **manual** the value defined under **Drift value** is applied.

Drift value

[0] ... 99.9 µL/min

Drift value for drift correction. This parameter is only shown for **Drift correction** = **manual**.

Delay after 'Cond ok'

[0] ... 999 s

Waiting period until the start of the titration during which the conditioning condition must be fulfilled.

Only start titration by a start command from a SEND command

on, [off]

If this option is set the titration is only started when the **Event message Start titration** from a **SEND** command reaches this command.

> ***Note***
> *At the time of reception of the **SEND** command conditioning must already be terminated (= **Condok**) otherwise the command to start the titration will be ignored.*

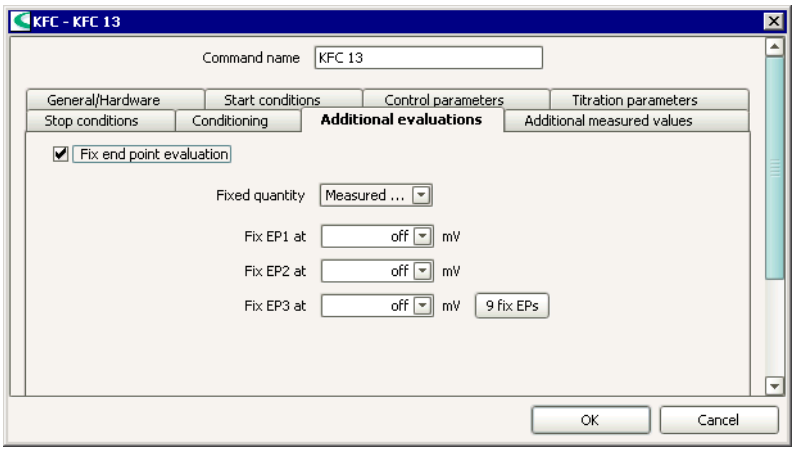
Show measured value during conditioning

on, [off]

If this option is set additionally to the drift and time the measured value is shown in the Live display.

Additional evaluations

The following additional method for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [KFC #]

Name of the command.

Fix end point evaluation

on, [off]

For a fixed measured value for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity

Measured value

Fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at

-2000.0 ... 2000.0 mV

Fix end point.

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

STAT

Command for **STAT Titrations** (**STAT**).

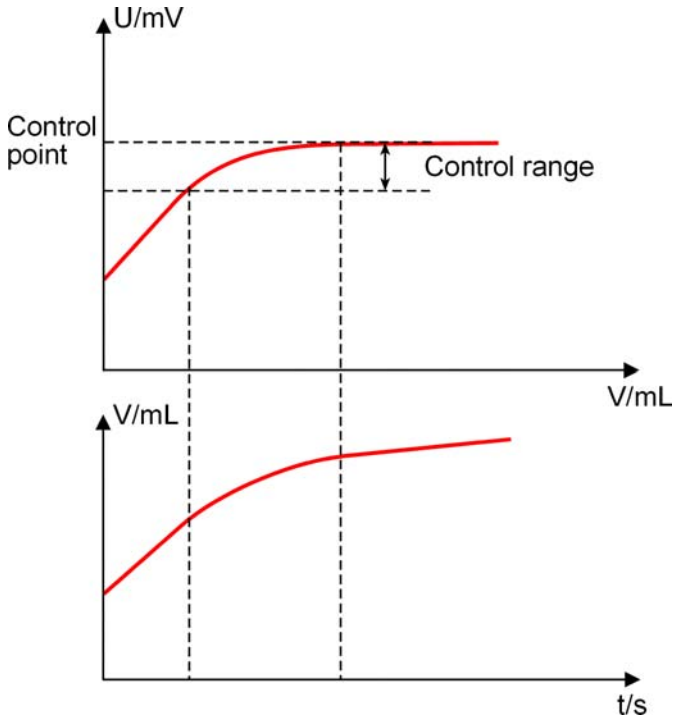
Principle

In STAT titrations reagent is added until a preset measured value has been reached (control point); this is then kept constant. The substance released by the reaction is immediately titrated with the reagent to maintain the control point. The STAT titration keeps the control point constant until the preset termination criterion has been achieved.

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 three phases during the titration:

- **Initial addition**
  During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous addition**
  In this phase addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Control range**
  In this range addition is finely controlled. Shortly before the end point is reached addition is only carried out at the **Min. rate** (*see "Control range"*).



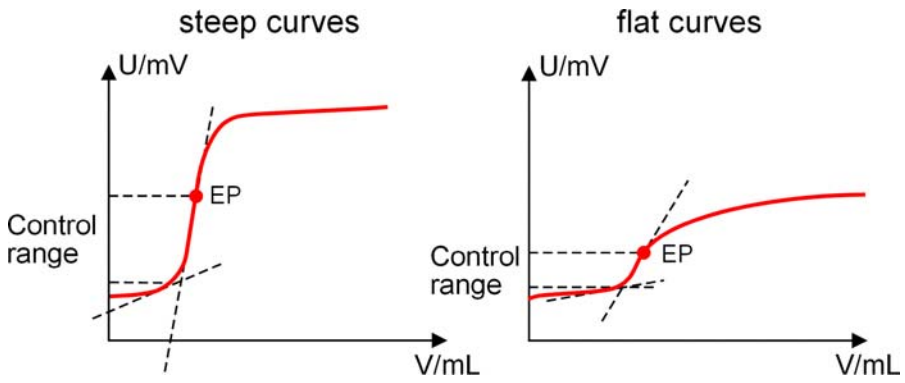
Commands

Depending on the measured value one of the following two **STAT** commands can be chosen:

- **STAT pH**
  STAT Titration with pH electrodes (measuring quantity pH).
- **STAT U**
  STAT Titration with metal electrodes (measuring quantity U).

Control range

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.



STAT pH

Command for **STAT titrations** with measured value pH.

Devices

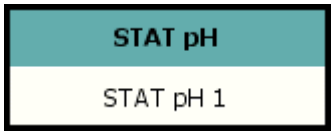
This command can be executed with the following devices which have the **STAT pH** mode:

Titrino: 718, 736, 751, 799

Titrando: 835, 836, 842, 855

Appearance

The command has the following appearance:



Parameters

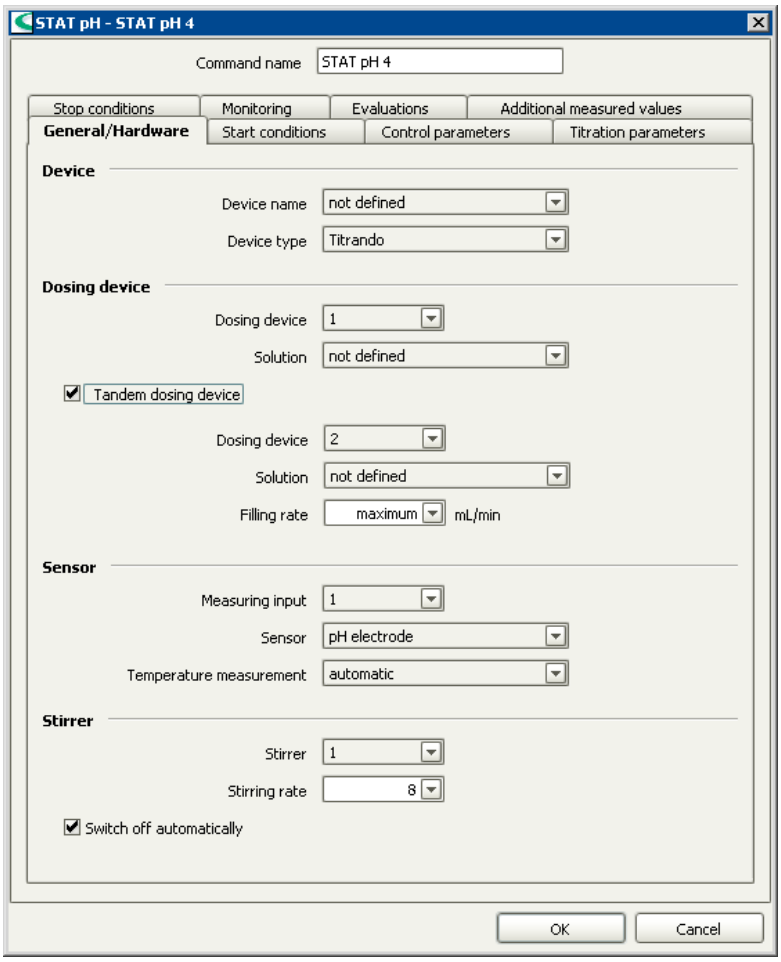
The parameters for the command **STAT pH** are configured in the following 8 tabs:

- **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**
  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 titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [STAT pH #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (835, 836, 842)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (only 736, 751, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution name, [not defined]
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Tandem dosing

on, [off] (only Titrando)
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 below).

Dosing device

1 ... [2] ... 4 (835, 836, 842)
1 ... [2] ... 3 (855)
Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Solution

24 characters, solution name, [not defined] (only Titrando)
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. If **not defined** is selected no tests will be carried out.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (only Titrando)
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 unit 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 below).

Tandem dosing

In order to ensure continuous dosing, the following points must be taken into account:

- **Keep 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) the filling rate of the larger cylinder must be at the minimum:

Filling rate 2 >= Filling rate 1 • ($V_{Dosing\ cylinder\ 2}$ / $V_{Dosing\ cylinder\ 1}$)

- **Rule for dosing rate**
  The dosing rate must not exceed 75 % of the filling rate of the smaller cylinder. This corresponds to the following values (at 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	---	ca. 130 mL/h	---
2 mL	---	5.00 mL/min	---	ca. 300 mL/h
5 mL	11.25 mL/min	12.50 mL/min	ca. 670 mL/h	ca. 750 mL/h
10 mL	22.50 mL/min	25.00 mL/min	ca. 1.3 L/h	ca. 1.5 L/h
20 mL	45.00 mL/min	50.00 mL/min	ca. 2.7 L/h	ca. 3.0 L/h
50 mL	112.50 mL/min	124.50 mL/min	ca. 6.7 L/h	ca. 7.5 L/h

Sensor

Measuring input

[1] ... 2 (835, 836, 842)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [pH electrode]
Selection of the pH sensor from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off
The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

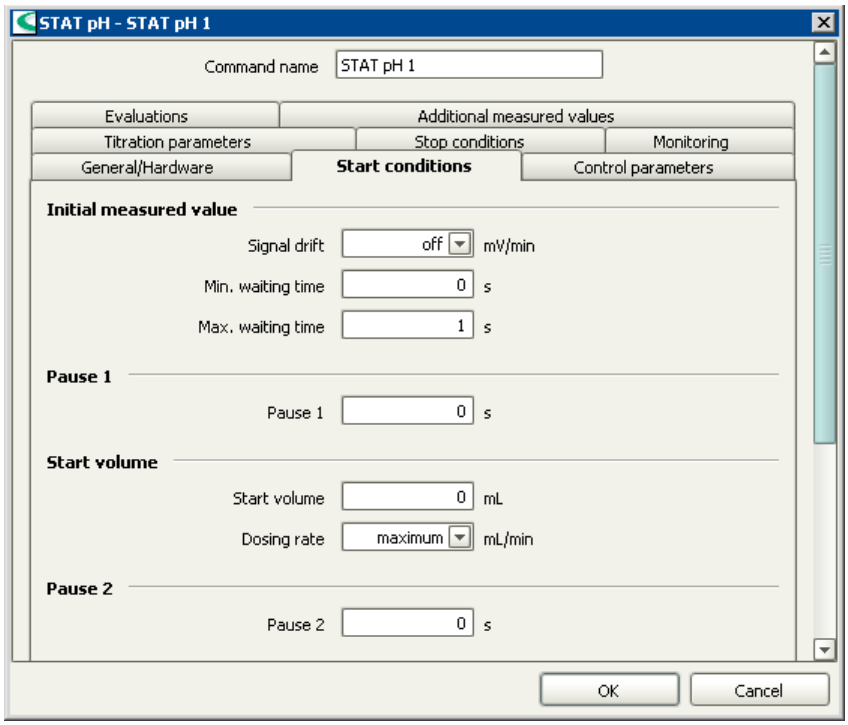
Switch on/off automatically

[on], off only 751, 799)

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.

Start conditions

The start conditions are processed in the listed sequence before the titration is started.



Command name

25 characters, [STAT pH #]

Name of the command.

Initial measured value

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Signal drift

0.1 ... 999.0 mV/min, [off] (only Titrando)

The measured value is only accepted if the drift undercuts the entered value. **off** means that the measured value is accepted after the maximum waiting time.

Min. waiting time

[0] ... 999999 s (only Titrando)

The minimum waiting time is only important for drift-controlled measurements. The measured value is accepted only after the minimum waiting time has elapsed, even if the signal drift has already been achieved. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [1] ... 999999 s (only Titrando)

If signal drift has been switched off or has not yet been achieved then the measured value will be accepted when the maximum waiting time has elapsed.

Pause 1

Pause 1

[0] ... 999999 s (only Titrando)
Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Start volume

Start volume

[0.00000] ... 9999.99 mL (Titrando)
[0.00] ... 999.99 mL (Titrino)
Volume to be added before the start of the titration with the below entered speed.

Dosing rate

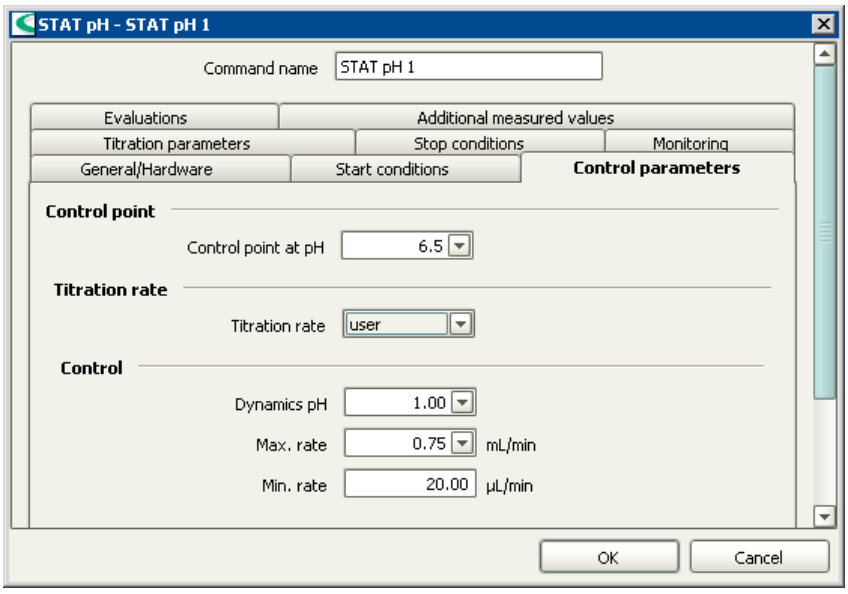
0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Pause 2

Pause 2

[0] ... 999999 s
Waiting time, e.g. until the electrode has settled down after the start or a reaction time after the addition of a start volume. The pause takes place at the end of all start conditions.

Control parameters



Command name

25 characters, [STAT pH #]
Name of the command.

Control point

Control point at pH

-20.000 ... 20.000, [off] (Titrando),
-20.00 ... 20.00, [off] (Titrino)
Definition of the pH value to be controlled.

Titration rate

Titration rate

50 µL/min, [100 µL/min], 500 µL/min, user

Three predefined sets of parameters can be selected for the titration rate: **50 µL/min**, **100 µL/min** and **500 µL/min**. For these sets the parameters for the **Control** are not displayed. In order to edit these parameters the value **user** must be selected.

Control

(only visible for **Titration rate** = **user**)

Dynamics pH

0.001 ... [1.000] ... 20.000, off (Titrando)
0.01 ... [1.00] ... 20.00, off (Titrino)

Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. rate**. The nearer the endpoint the slower the dosing takes place until the **Min. rate** has been reached. Outside the range the dosing takes place with **Max. rate**) (*see Control range*).

Max. rate

0.01 ... [0.25 (50 µL/min)] ... [0.75 (100 µL/min)] ... [2.00 (500 µL/min)] ... 166.00 mL/min, maximum (Titrando)
0.01 ... [0.25 (50 µL/min)] ... [0.75 (100 µL/min)] ... [2.00 (500 µL/min)] ... 150.00 mL/min, maximum (Titrino)

Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used. Rule of thumb for the maximum rate: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in µL/min

Min. rate

0.01 ... [5.00 (50 µL/min)] ... [10.00 (100 µL/min)] ... [40.00 (500 µL/min)] ... 9999.00 µL/min

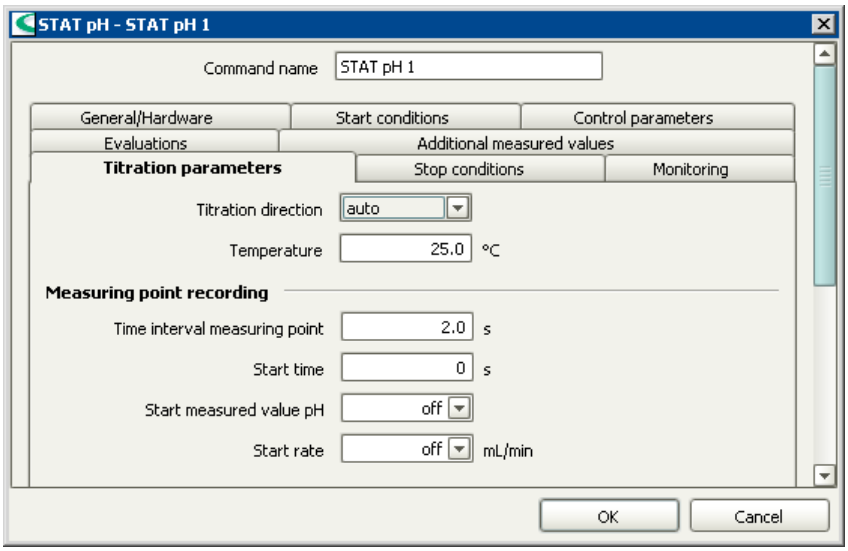
Speed of addition at the start and finish of the titration. The slower the minimum rate that is selected, the slower the titration and the higher the accuracy. the longer it takes until the control point is reached for the first time. The following rule of thumb should be considered in order to obtain as constant a dosing at the control point as possible: **Min. rate** in µL/min = Expected rate of reaction in µL/min / 10.

Note

*Outside the control range the dosing rate is mainly characterized 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 reaching the control point. The control range should be set so that the measured value remains within this range while it is kept constant. A slightly larger control range should be defined for slow reactions (e. g. pH = 3). A SET pretitration is frequently used to reach the control point before the substrate is added. This means that the STAT titration can be started with a small variation from the control point. Within the control range the dosing rate is mainly characterized by the **Min. rate**.*

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [STAT pH #]
Name of the command.

Titration direction

Selection of the titration direction.

+
Positive measured value alteration.

[-]
Negative measured value alteration.

auto
The titration direction is determined automatically from the start measured value and the set control point.

Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General/Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously.

Measuring point recording

Time interval measuring point

0.1 ... [2.0] ... 999999 s (Titrando)
1 ... [2] ... 999999 s (Titrino)
Time interval for entering a measuring point in the list of measuring points.

Start time

[0] ... 999999 s
The measured values are not entered in the list of measuring points until this time has elapsed since the start of the titration.

Start measured value pH

-20.000 ... 20.000, [off] (Titrando)
-20.00 ... 20.00, [off] (Titrino)
The measured values are not entered in the list of measuring points until this value has been reached.

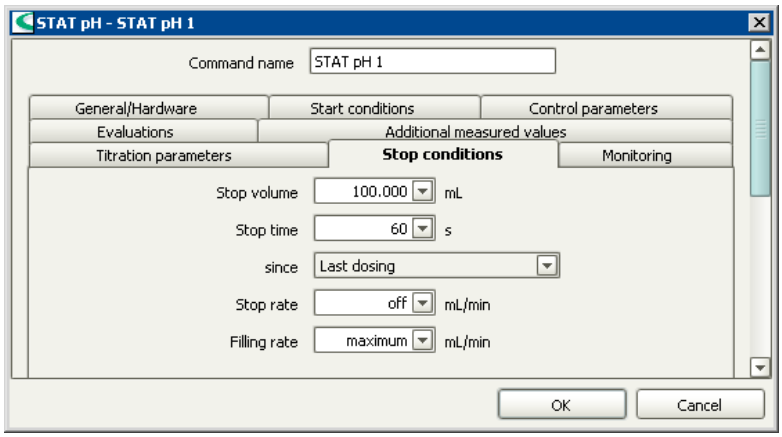
Start rate

0.01 ... 166.00 mL/min, [off] (Titrando)
0.01 ... 150.00 mL/min, [off] (Titrino)

The measured values are not entered in the list of measuring points until the dosing rate has fallen below this value. This parameter is checked 10 s after the start at the earliest.

Stop conditions

Conditions for stopping the titration. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [STAT pH #]
Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)
0.00 ... [100.00] ... 9999.99 mL, off (Titrino)
Stops when the given volume (including start conditions) has been added after the start of the titration. The stop volume should be adapted to suit the sample weight or the titration vessel size.

Stop time

0 ... 999999 s, [off] (only Titrando)
Stops when the preset time has elapsed after the start conditions have been fulfilled.

since

Specifies the beginning of the stop time (will ot be displayed if the **Stop time** is disabled):

[Start]
The stop time starts after the start conditions have been fulfilled.

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

0.01 ... 166.00 mL/min, [off] (Titrando)
0.01 ... 150.00 mL/min, [off] (Titrino)
Stops when the current titration rate is lower than the rate defined here. This parameter 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.

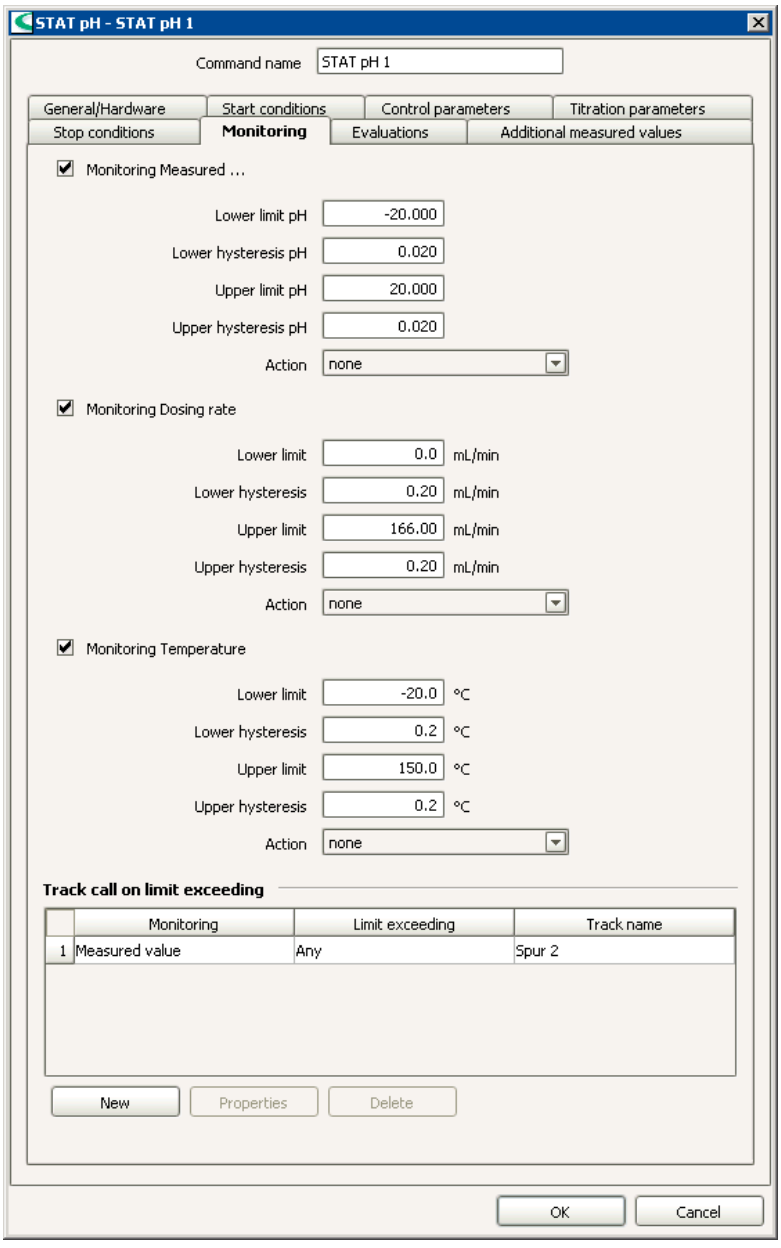
Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)

Speed with which the buret is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used.

Monitoring

The monitoring processes can be defined and switched on here.



Command name

25 characters, [STAT pH #]
Name of the command.

Monitoring Measured value

on, [off]
If this option is switched on then the measured value will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit pH

[-20.000] ... 20.000 (Titrando)
[-20.00] ... 20.00 (Titrino)

Lower limit of the measured value. When the measured value falls below this value, the action **Measured value lower limit exceeded** is triggered.

Lower hysteresis pH

0.000 ... [0.020] ... 20.000 (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the measured value. When the measured value exceeds the lower limit plus this hysteresis value, the action **Measured value lower limit ok** is triggered.

Upper limit pH

-20.000 ... [20.000] (Titrando)
-20.00 ... [20.00] (Titrino)
Upper limit of the measured value. When the measured value exceeds this value, the action **Measured value upper limit exceeded** is triggered.

Upper hysteresis pH

0.000 ... [0.020] ... 20.000 (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the measured value. When the measured value falls below the upper limit plus this hysteresis value, the action **Measured value upper limit ok** is triggered.

Action

Definition of the action to be taken when the limits of the measured value are infringed:

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 started.

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 window.

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 is resumed automatically.

[none]
No action will be taken.

Monitoring Dosing rate

on, [off]
If this option is switched on then the dosing rate will be monitored and any limit infringements 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

[0.00] ... 166.00 mL/min (Titrando)
[0.00] ... 150.00 mL/min (Titrino)
Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** is triggered.

Lower hysteresis

0.00 ... [0.20] ... 166.00 mL/min (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit plus this hysteresis value, the action **Dosing rate lower limit ok** is triggered.

Upper limit

0.00 ... [166.00] mL/min (Titrando)
0.00 ... [150.00] mL/min (Titrino)
Upper limit of the dosing rate. When the dosing rate exceeds this value, the action **Dosing rate upper limit exceeded** is triggered.

Upper hysteresis

0.00 ... [0.20] ... 166.00 mL/min (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the dosing rate. When the dosing rate falls below the upper limit plus this hysteresis value, the action **Dosing rate upper limit ok** is triggered.

Action

Definition of the action to be taken when the limits of the measured value are infringed:

Stop determination (only Titrando)
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **STAT** command is quit, then the next command is started.

Wait for [Continue]
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored dosing rate is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message window.

Wait for limit ok
Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing is resumed automatically.

[none]
No action will be taken.

> ***Note***
> *If, when monitoring the dosing rate, the **Lower limit** is infringed 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 achieved again.*

Monitoring Temperature

on, [off]
If this option is switched on then the temperature will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit

[-20.0] ... 150.0 °C (Titrando)
[-170.0] ... 500.0 °C (Titrino)
Lower limit of the temperature. When the temperature falls below this value, the action **Temperature lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the temperature. When the temperature exceeds the lower limit plus this hysteresis value, the action **Temperature lower limit ok** is triggered

Upper limit

-20.0 ... [150.0] °C (Titrando)
-170.0 ... [500.0] °C (Titrino)
Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the temperature. When the temperature falls below the upper limit plus this hysteresis value, the action **Temperature upper limit ok** is triggered

Action

Definition of the action to be taken when the limits of the temperature are infringed:

Stop determination (only Titrando)
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **STAT** command is quit, then the next command is started.

Wait for [Continue]
Reagent dosing in the current **STAT** 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 the **[Continue]** button in this message window.

Wait for limit ok
Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing is resumed automatically.

[none]
No action will be taken.

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 infringed.

New

Open the dialog window **Track call #** (*see below*) to enter parameters of a new track call.

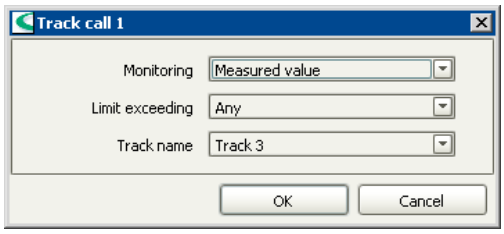
Properties

Open the dialog window **Track call #** (*see below*) to edit parameters of the selected track call.

Delete

Delete the selected track call.

Track call



Monitoring

[Measured value], Dosing rate, Temperature, Any
Selects the quantity for which a track is to be started if its limits are infringed (**Any** = any of the three quantities).

Limit exceeding

Lower limit, Upper limit, [Any], OK
Selects the limit infringement for which a track is to be started. With **Any** the track will be started for an infringement of either the lower or the upper limit, with OK the track will be started when the monitored quantity is again within the limits (including hysteresis).

Track name

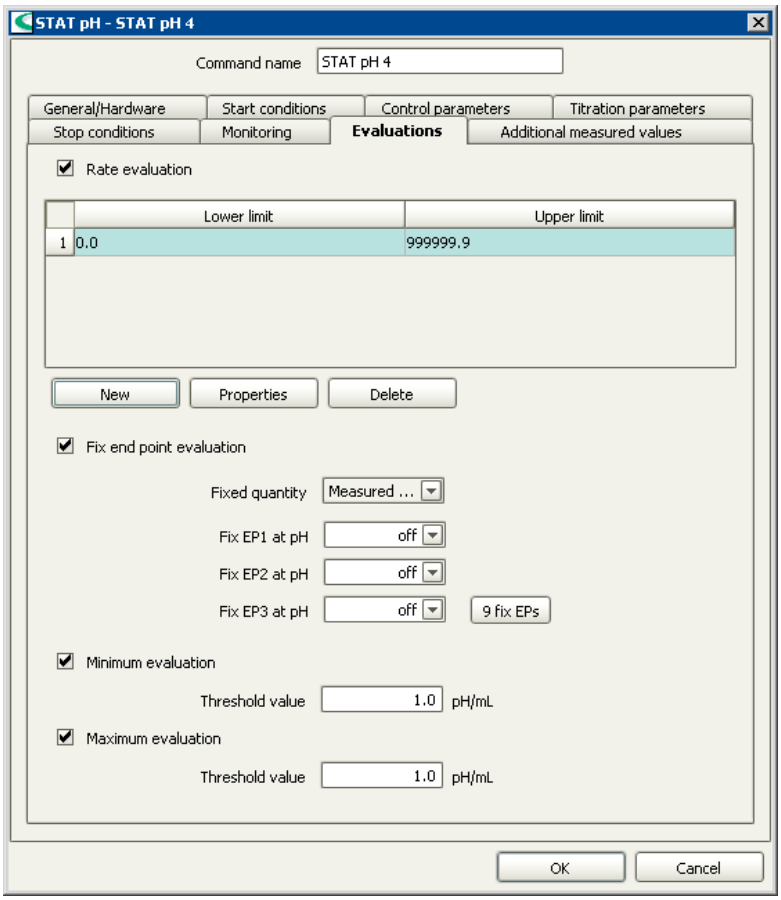
Selection of available tracks

Selects the track that is to be started automatically.

> ***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.*

Evaluations

The following methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [STAT pH #]

Name of the command.

Rate evaluation

on, [off]

With this option a maximum of 9 time windows can be defined in which the mean dosing rate can be determined by linear regression. The defined time windows are shown in the window table and can be edited with the following buttons:

Open the dialog window **Evaluation window #** (*see below*) to enter the parameters of a new time window.

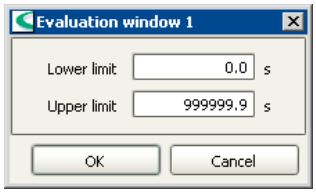
Properties

Open the dialog window **Evaluation window #** (*see below*) to edit the parameters of the selected time window.

Delete

Delete the selected time window.

Evaluation window



Evaluation windows are defined time segments in which the dosing rate is determined by linear regression.

Lower limit
[0.0] ... 99999.9 s
Lower limit of evaluation window.

Upper limit
0.0 ... [999999.9] s
Upper limit of evaluation window.

Fix end point evaluation

on, [off]
For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity
[Measured value], Time, Volume
Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at pH
-20.000 ... 20.000, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at
0.0 ... 999999.9 s, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at
0.00000 ... 9999.99 mL, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.

9 fix EPs

With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

3 fix EPs

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value

0.1 ... [1.0] ... 20.0 pH/mL

The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]

For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value

0.1 ... [1.0] ... 20.0 pH/mL

The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Additional measured values

Abbildung und Parameter: *siehe DET pH - Weitere Messwerte*

STAT U

Command for **STAT titrations** with measured value U.

Devices

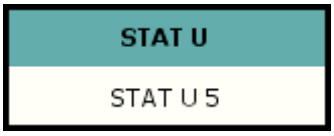
This command can be executed with the following devices which have the **STAT pH** mode:

Titrino: 718, 736, 751, 799

Titrando: 835, 836, 842, 855

Appearance

The command has the following appearance:



Parameters

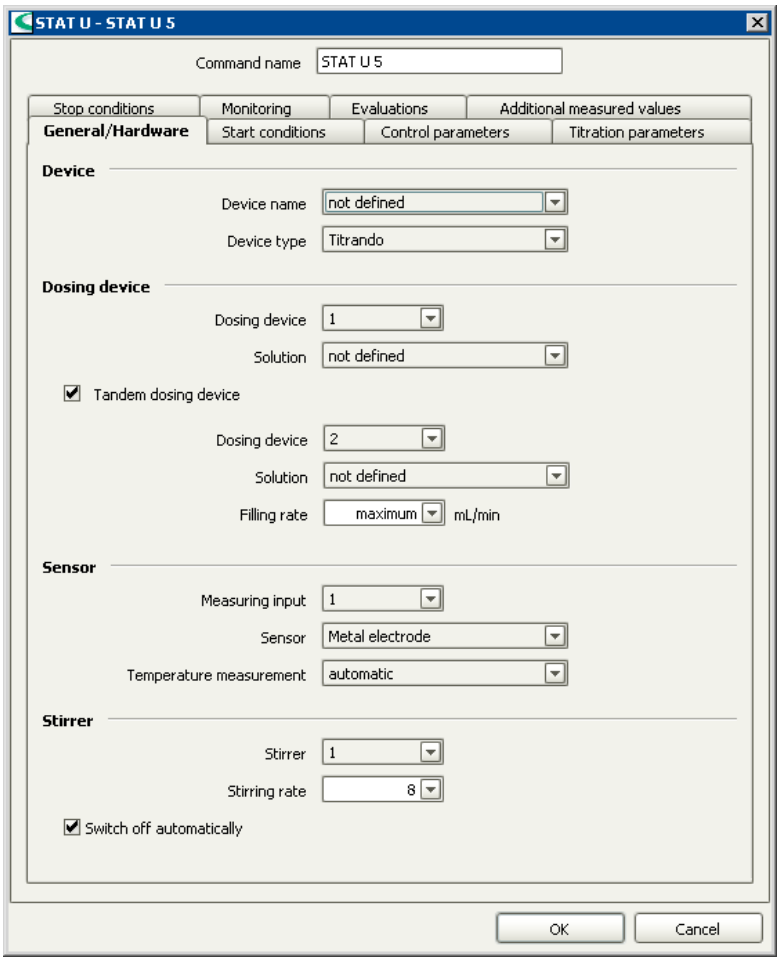
The parameters for the command **STAT U** are configured in the following 8 tabs:

- **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 titrations curves.
- **Additional measured values**
  Definition of additional measured values of other measuring commands which are saved as additional column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.



Command name

25 characters, [STAT U #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of the device from device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (835, 836, 842)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (only 736, 751, 799)
Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing.

Solution

24 characters, solution name, [not defined]

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Tandem dosing

on, [off] (only Titrando)

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 *STAT pH - General/Hardware*).

Dosing device

1 ... [2] ... 4 (835, 836, 842)
1 ... [2] ... 3 (855)
Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Solution

24 characters, solution name, [not defined] (only Titrando)

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. If **not defined** is selected no tests will be carried out.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (only Titrando)

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 unit 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 *STAT pH - General/Hardware*).

Sensor

Measuring input

[1] ... 2 (835, 836, 842)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, pH electrode, [Metal electrode], ISE electrode, Conductivity sensor
Selection of the sensor from the list of sensors defined in the sensor table. For pH and ISE electrodes, the calibration data will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off
The temperature will not be measured. The **Temperature** (*see Titration parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando)
If this option is enabled, the stirrer will be switched off automatically when the command is finished.

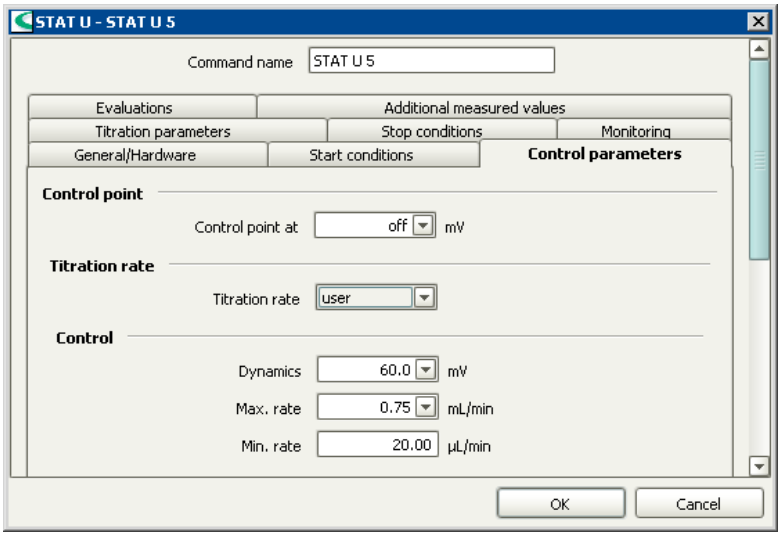
Switch on/off automatically

[on], off only 751, 799)
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.

Start conditions

Screenshot and parameters: *see STAT pH - Start conditions*

Control parameters



Command name

25 characters, [STAT U #]
Name of the command.

Control point

Control point at

-2000.0 ... 2000.0 mV, [aus] (Titrando),
-2000 ... 2000 mV, [aus] (Titrino)
Definition of the current value to be controlled.

Titration rate

Titration rate

50 µL/min, [100 µL/min], 500 µL/min, user
Three predefined sets of parameters can be selected for the titration rate: **50 µL/min**, **100 µL/min** and **500 µL/min**. For these sets the parameters for the **Control** are not displayed. In order to edit these parameters the value **user** must be selected.

Control

(only visible for **Titration rate** = **user**)

Dynamics

0.1 ... [60.0] ... 2000.0 mV, off (Titrando)
1 ... [60] ... 2000 mV, off (Titrino)
Dynamics defines the measured value range before the given endpoint. This parameter has an important influence on the titration rate and with it on the accuracy. Within the control range the steps which are added are controlled by the **Min. rate**. The nearer the endpoint the slower the dosing takes place until the **Min. rate** has been reached. Outside the range the dosing takes place with **Max. rate**) (*see Control range*).

Max. rate

0.01 ... [0.25 (50 µL/min)] ... [0.75 (100 µL/min)] ... [2.00 (500 µL/min)] ... 166.00 mL/min, maximum (Titrando)
0.01 ... [0.25 (50 µL/min)] ... [0.75 (100 µL/min)] ... [2.00 (500 µL/min)] ... 150.00 mL/min, maximum (Titrino)
Speed of addition outside the control range. The maximum dosing speed depends on the cylinder volume of the exchange unit or dosing unit used. Rule of thumb for the maximum rate: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in µL/min

Min. rate

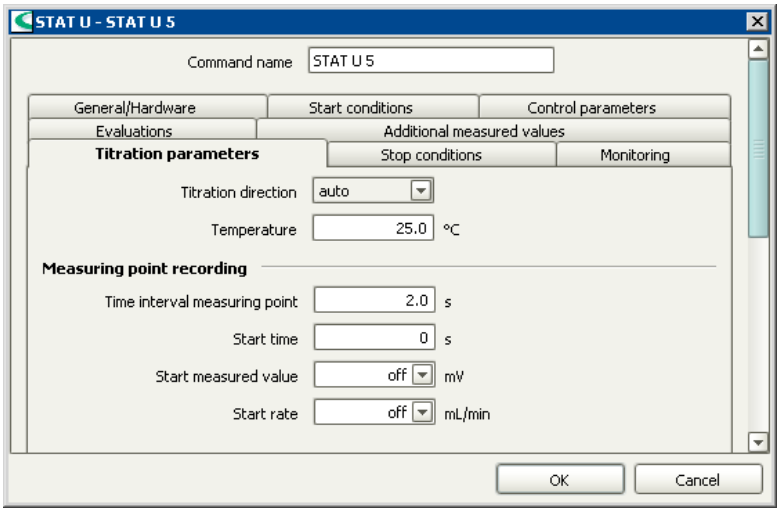
0.01 ... [5.00 (50 µL/min)] ... [10.00 (100 µL/min)] ... [40.00 (500 µL/min)] ... 9999.00 µL/min

Speed of addition at the start and finish of the titration. The slower the minimum rate that is selected, the slower the titration and the higher the accuracy. the longer it takes until the control point is reached for the first time. The following rule of thumb should be considered in order to obtain as constant a dosing at the control point as possible: **Min. rate** in µL/min = Expected rate of reaction in µL/min / 10.

> ***Note***
> *Outside the control range the dosing rate is mainly characterized by the* ***Max. rate****. The parameters* ***Max. rate*** *and* ***Dynamics*** *should be optimized together in such a way that the titration does not overshoot too much when reaching the control point. The control range should be set so that the measured value remains within this range while it is kept constant. A slightly larger control range should be defined for slow reactions (e. g. U = 180 mV). A SET pretitration is frequently used to reach the control point before the substrate is added. This means that the STAT titration can be started with a small variation from the control point. Within the control range the dosing rate is mainly characterized by the* ***Min. rate****.*

Titration parameters

Parameters defining the run of the titration.



Command name

25 characters, [STAT U #]

Name of the command.

Titration direction

Selection of the titration direction.

+

Positive measured value alteration.

[-]

Negative measured value alteration.

auto

The titration direction is determined automatically from the start measured value and the set control point.

Temperature

-20.0 ... [25.0] ... 150.0 °C (Titrando)
-170.0 ... [25.0] ... 500.0 °C (Titrino)
Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** in the tab **General/Hardware** under **Sensor** is set to **automatic** or **continuous** then the temperature will be measured continuously.

Measuring point recording

Time interval measuring point

0.1 ... [2.0] ... 999999 s (Titrando)
1 ... [2] ... 999999 s (Titrino)
Time interval for entering a measuring point in the list of measuring points.

Start time

[0] ... 999999 s
The measured values are not entered in the list of measuring points until this time has elapsed since the start of the titration.

Start measured value

-2000.0 ... 2000.0 mV, [off] (Titrando),
-2000 ... 2000 mV, [off] (Titrino)
The measured values are not entered in the list of measuring points until this value has been reached.

Start rate

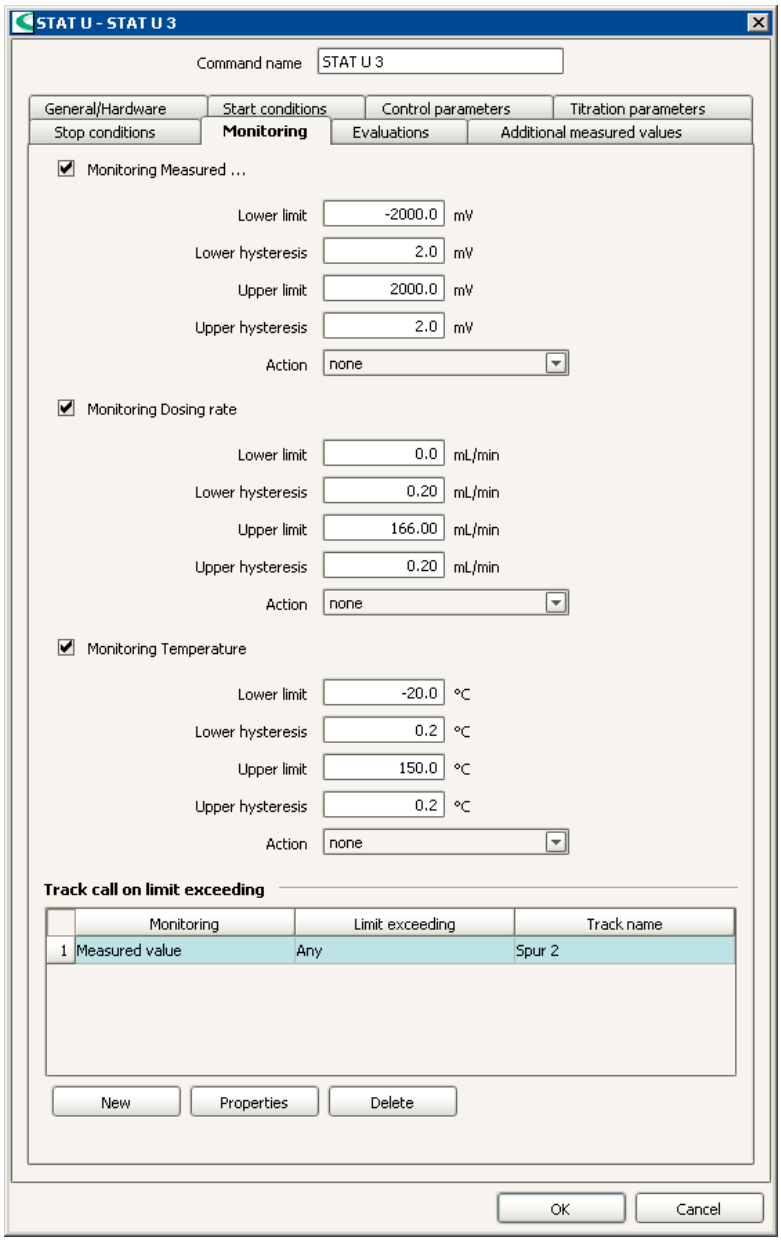
0.01 ... 166.00 mL/min, [off] (Titrando)
0.01 ... 150.00 mL/min, [off] (Titrino)
The measured values are not entered in the list of measuring points until the dosing rate has fallen below this value. This parameter is checked 10 s after the start at the earliest.

Stop conditions

Screenshot and parameters: *see STAT pH - Stop conditions*

Monitoring

The monitoring processes can be defined and switched on here.



Command name

25 characters, [STAT U #]

Name of the command.

Monitoring Measured value

on, [off]

If this option is switched on then the measured value will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit

[-2000.0] ... 2000.0 mV (Titrando)

[-2000] ... 2000 mV (Titrino)

Lower limit of the measured value. When the measured value falls below this value, the action **Measured value lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [0.2] ... 2000.0 mV (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the measured value. When the measured value exceeds the lower limit plus this hysteresis value, the action **Measured value lower limit ok** is triggered.

Upper limit

-2000.0 ... [2000.0] mV (Titrando)
-2000 ... [2000] mV (Titrino)
Upper limit of the measured value. When the measured value exceeds this value, the action **Measured value upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [0.2] ... 2000.0 mV (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the measured value. When the measured value falls below the upper limit plus this hysteresis value, the action **Measured value upper limit ok** is triggered.

Action

Definition of the action to be taken when the limits of the measured value are infringed:

Stop determination (only Titrando)
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **STAT** command is quit, then the next command is started.

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 window.

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 is resumed automatically.

[none]
No action will be taken.

Monitoring Dosing rate

on, [off]
If this option is switched on then the dosing rate will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit

[0.00] ... 166.00 mL/min (Titrando)
[0.00] ... 150.00 mL/min (Titrino)
Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** is triggered.

Lower hysteresis

0.00 ... [0.20] ... 166.00 mL/min (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit plus this hysteresis value, the action **Dosing rate lower limit value ok** is triggered.

Upper limit

0.00 ... [166.00] mL/min (Titrando)
0.00 ... [150.00] mL/min (Titrino)
Upper limit of the dosing rate. When the dosing rate exceeds this value, the action **Dosing rate upper limit exceeded** is triggered.

Upper hysteresis

0.00 ... [0.20] ... 166.00 mL/min (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the dosing rate. When the dosing rate falls below the upper limit plus this hysteresis value, the action **Dosing rate upper limit ok** is triggered.

Action

Definition of the action to be taken when the limits of the measured value are infringed:

Stop determination (only Titrando)
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **STAT** command is quit, then the next command is started.

Wait for [Continue]
Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored dosing rate is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message window.

Wait for limit ok
Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored dosing rate is again within the limits (including hysteresis) reagent dosing will be resumed automatically.

[none]
No action will be taken.

Monitoring Temperature

on, [off]
If this option is switched on then the temperature will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit

[-20.0] ... 150.0 °C (Titrando)
[-170.0] ... 500.0 °C (Titrino)
Lower limit of the temperature. When the temperature falls below this value, the action **Temperature lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the temperature. When the temperature exceeds the lower limit plus this hysteresis value, the action **Temperature lower limit ok** is triggered

Upper limit

-20.0 ... [150.0] °C (Titrando)
-170.0 ... [500.0] °C (Titrino)
Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the temperature. When the temperature falls below the upper limit plus this hysteresis value, the action **Temperature upper limit ok** is triggered

Action

Definition of the action to be taken when the limits of the temperature are infringed:

Stop determination (only Titrando)
The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **STAT** command is quit, then the next command is started.

Wait for [Continue]
Reagent dosing in the current **STAT** 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 the **[Continue]** button in this message window.

Wait for limit ok
Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing is resumed automatically.

[none]
No action will be taken.

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 infringed.

New

Open the dialog window **Track call #** (*see below*) to enter parameters of a new track call.

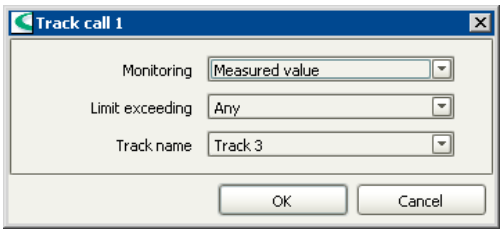
Properties

Open the dialog window **Track call #** (*see below*) to edit parameters of the selected track call.

Delete

Delete the selected track call.

Track call



Monitoring
[Measured value], Dosing rate, Temperature, Any
Selects the quantity for which a track is to be started if its limits are infringed (**Any** = any of the three quantities).

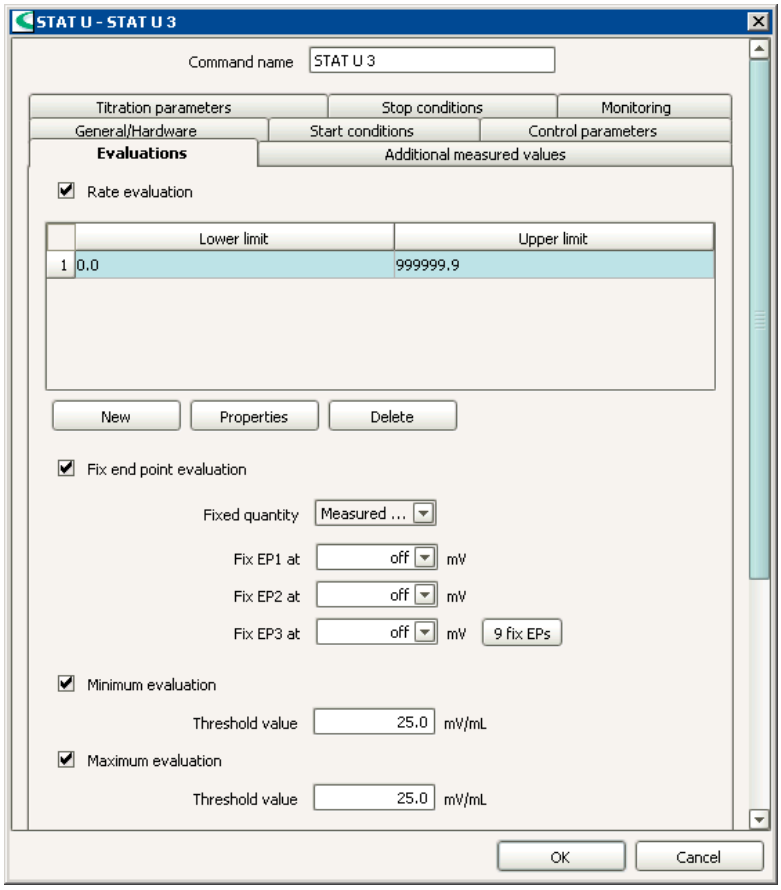
Limit exceeding
Lower limit, Upper limit, [Any], OK
Selects the limit infringement for which a track is to be started. With **Any** the track will be started for an infringement of either the lower or the upper limit, with **OK** the track will be started when the monitored quantity is again within the limits (including hysteresis).

Track name
Selection of available tracks
Selects the track that is to be started automatically.

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.

Evaluations

The following methods for evaluation of titration curves can be activated and defined here:



Command name

25 characters, [STAT U #]

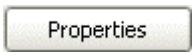
Name of the command.

Rate evaluation

on, [off]

With this option a maximum of 9 time windows can be defined in which the mean dosing rate can be determined by linear regression. The defined time windows are shown in the window table and can be edited with the following buttons:

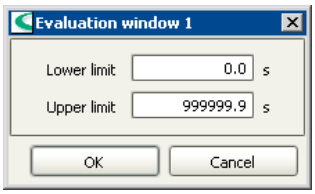
Open the dialog window **Evaluation window #** (*see below*) to enter the parameters of a new time window.



Open the dialog window **Evaluation window #** (*see below*) to edit the parameters of the selected time window.

Delete the selected time window.

Evaluation window



Evaluation windows are defined time segments in which the dosing rate is determined by linear regression.

Lower limit
[0.0] ... 99999.9 s
Lower limit of evaluation window.

Upper limit
0.0 ... [999999.9] s
Upper limit of evaluation window.

Fix end point evaluation

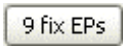
on, [off]
For a fixed quantity (measured value, volume or time) for the fix end point the associated values are interpolated from the list of measuring points.

Fixed quantity
[Measured value], Time, Volume
Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix EP# at
-2000.0 ... 2000.0 mV, [aus]
Fix end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at
0.0 ... 999999.9 s, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Time**.

Fix EP# at
0.00000 ... 9999.99 mL, [off]
Fix end point 1 ... 9 for **Fixed quantity** = **Volume**.



With this button additionally to the always shown fix EP1...3 the fix EP4...9 are displayed.

With this button instead of fix EP1...9 only the fix EP1...3 are shown.

Minimum evaluation

on, [off]
For the minimum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value
1.0 ... [25.0] ... 2000.0 mV/mL
The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated volume, time and temperature are interpolated from the list of measuring points (see *Titration commands - Evaluation - Minimum/maximum evaluation*).

Threshold value

0.1 ... [1.0] ... 20.0 pH/mL

The evaluation begins as soon as the slope of the curve exceeds the set threshold value.

Additional measured values

Abbildung und Parameter: *siehe DET pH - Weitere Messwerte*

Evaluation

pK value and half neutralization potential

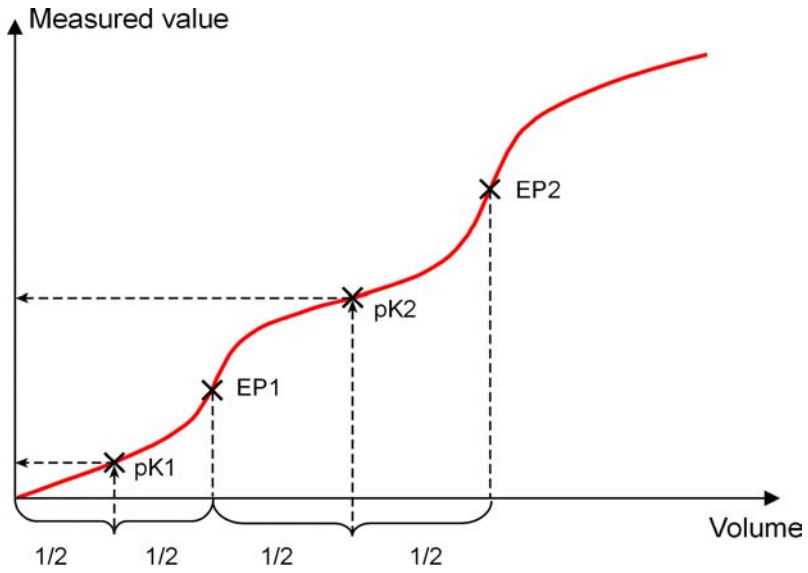
The **pK valu**e can be determined for pH titrations (DET and MET) and the **half neutralization potential** can be determined for U titrations

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 ($a_A = a_B$), then $pH=pK_a$. 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 and even then the determined pK value is only an approximation, as the ionic strengths are not taken into account. In order to obtain more accurate value, 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.

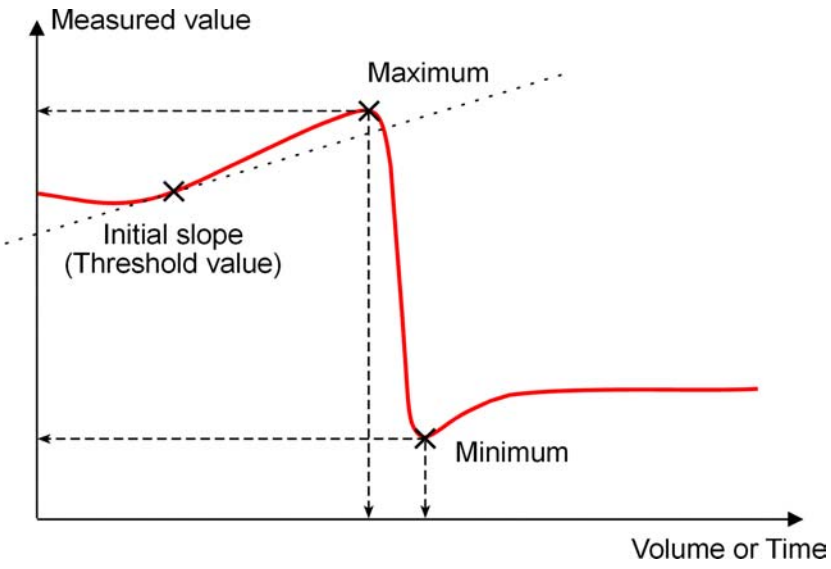


Note

If a start volume is to be added then it must be smaller than 1/2 V(EP1).

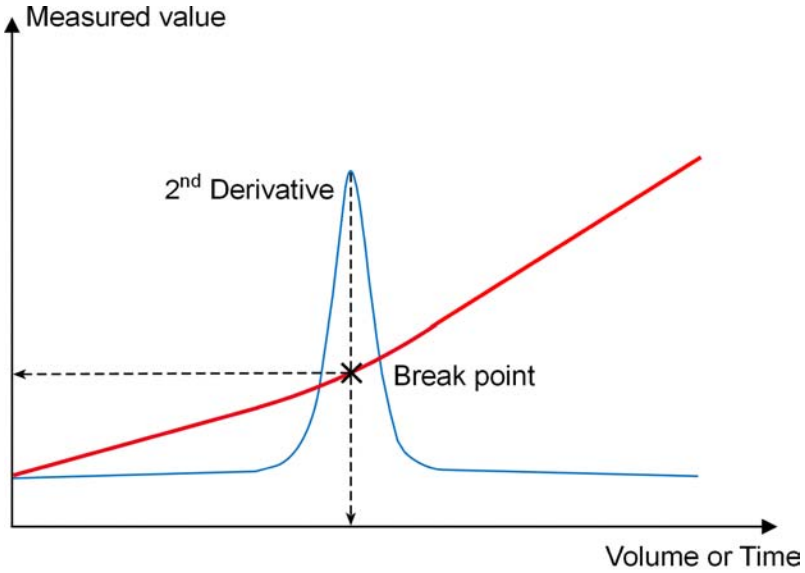
Minimum and maximum evaluation

For the minimum or maximum measured value the associated **Volume**, **Time** and **Temperature** are interpolated. The evaluation begins as soon as the slope of the curve exceeds a particular threshold value.



Break point evaluation

A break point 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.



5.6.6 Measuring commands

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**
  Voltametric measurement with selectable polarization current (measured quantity U).
- **MEAS Upol**
  Amperometric measurement with selectable polarization voltage (measured quantity I).
- **MEAS T**
  Temperature measurement.
- **MEAS T/Flow**
  Temperature and gas flow measurement.
- **MEAS Conc**
  Concentration measurement (direct measurement).
- **MEAS Cond**
  Conductivity 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.

MEAS pH

Command for potentiometric **pH measurements** with pH electrodes.

Devices

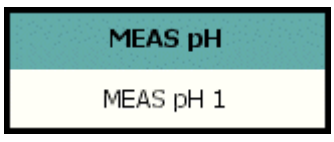
This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841

Appearance

The command has the following appearance:



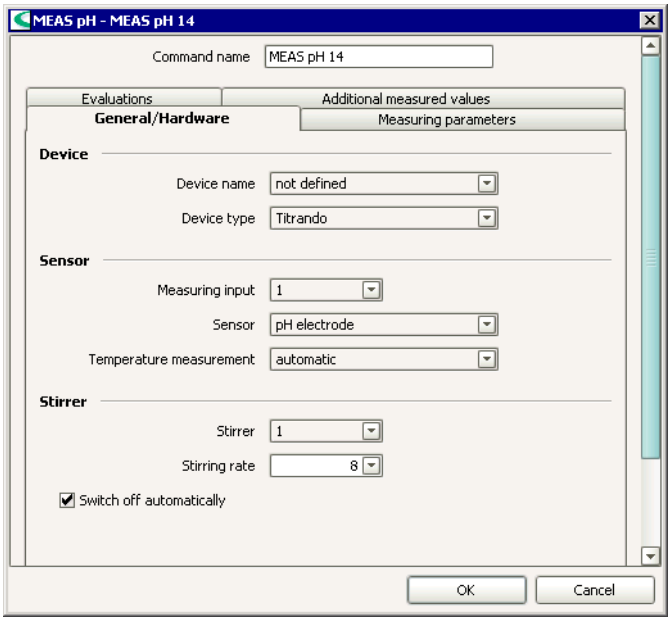
Parameters

The parameters for the command **MEAS pH** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS pH #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [pH electrode]
Selection of a pH sensor from the pH sensors configured in the sensor table.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous
A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]
If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off
The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

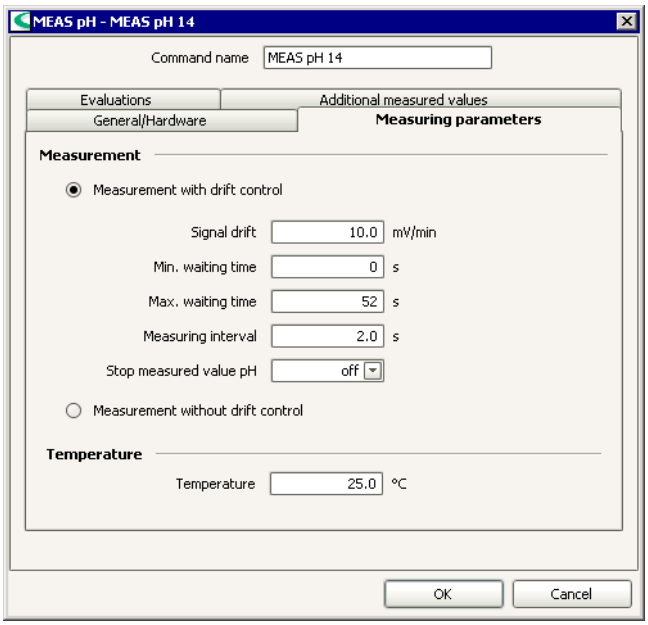
-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is enabled.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [MEAS pH #]
Name of the command.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** are selectable.

> ***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. In such a case* ***drift-controlled measurement*** *is particularly advisable, as the measured values are only accepted when equilibrium has almost been achieved.*

Measurement with drift control

[on], off
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 **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Signal drift

0.1 ... [10.0] ... 999.0 mV/min (Titrando)
0.5 ... [10.0] ... 999.0 mV/min (Titrino)
The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

[0] ... 999'999 s (Titrando only)
The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [52] ... 999'999 s (Titrando)
0 ... [52] ... 9'999 s (Titrino)

If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value pH

-20.000 ... 20.000, [off] (Titrando only)
Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Measurement without drift control

[on], off
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.

Measuring time

0 ... [120] ... 999'999 s (Titrando)
0 ... [120] ... 9'999 s (Titrino)
Maximum period of time for measurement.

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value pH

-20.000 ... 20.000, [off] (Titrando only)
Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

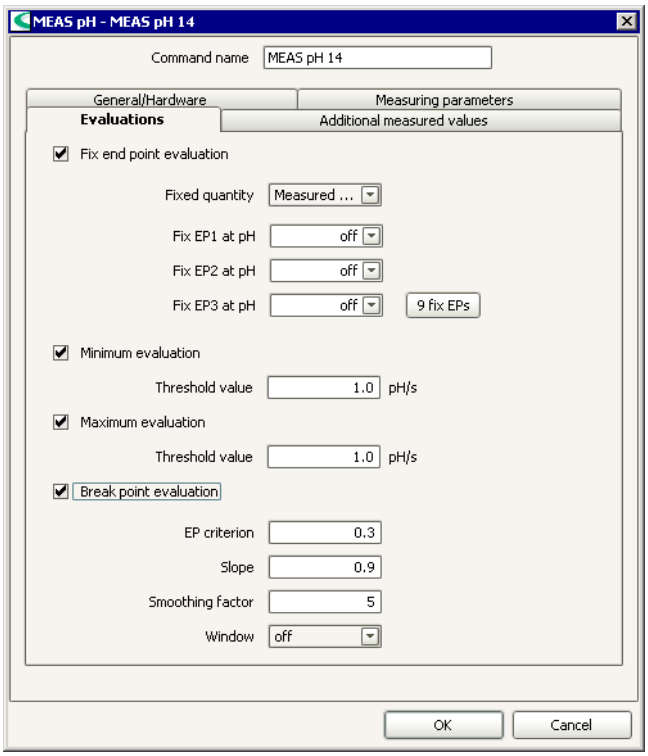
Temperature

Temperature

-20.0 ... [25.0] ... 150 °C (Titrando)
-170.0 ... [25.0] ... 500 °C (Titrino)
Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab General/Hardware is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS pH #]

Name of the command.

Fix end point evaluation

on, [off]

To a fixed quantity (**Measured value** or **Time**) the associated values for the other quantities are interpolated from the list of measuring points for the fixed end point.

Fixed quantity

[Measured value], Time

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measuring points.

Fix EP# at pH

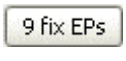
-20.000 ... 20.000, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999'999.9 s, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Time**.



The fixed end points Fix EP4...9 are displayed additionally to Fix EP1...3 by pressing this button.

Only the fixed end points Fix EP1...3 are displayed by pressing this button.

Minimum evaluation

on, [off]
For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/s
The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 pH/s
The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Break point evaluation

on, [off] (Titrando only)
A breakpoint evaluation is used to determine sharp changes of direction in the titration curve) (*see Titration commands - Evaluation - Break point evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure for the minimum sharpness of the break. 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, for a small measured value range even small changes in the measured value can be evaluated as a breakpoint.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the breakpoint. The smaller the difference, the more breakpoints will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer breakpoints will be found.

Window
Measured value, Time, [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 pH
[-20.000] ... 20.000 (for **Window** = **Measured value**)
Measured value for the lower limit of the window.

Lower limit
[0] ... 999999 s (for **Window** = **Time**)
Time for the lower limit of the window.

Upper limit pH
-20.000 ... [20.000] (for **Window** = **Measured value**)
Measured value for the upper limit of the window.

Upper limit
0 ... [999999] s (for **Window** = **Time**)
Time for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS U

Command for potentiometric **voltage measurements**.

Devices

This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841

Appearance

The command has the following appearance:

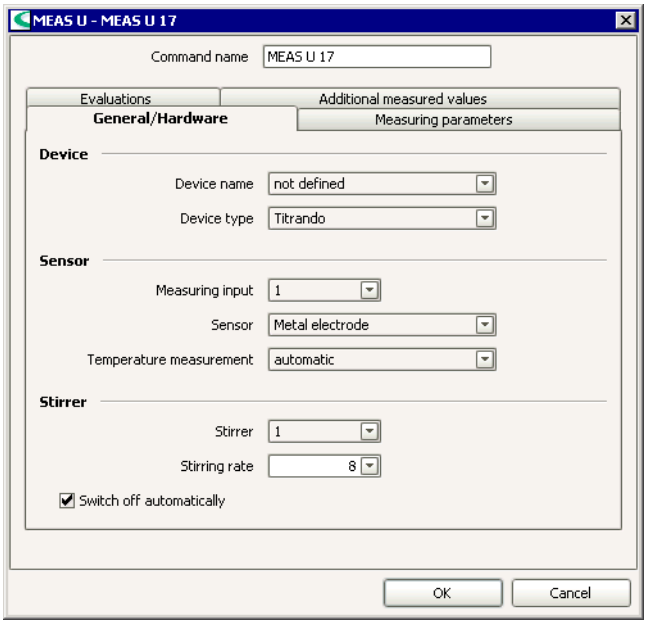
Parameters

The parameters for the command **MEAS U** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS U #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)

[1] ... 2, diff. (Titrino)

Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, pH electrode, [Metal electrode], ISE electrode, Conductivity sensor

Selection of a sensor from the sensors configured in the sensor table.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous

A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]
If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off
The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

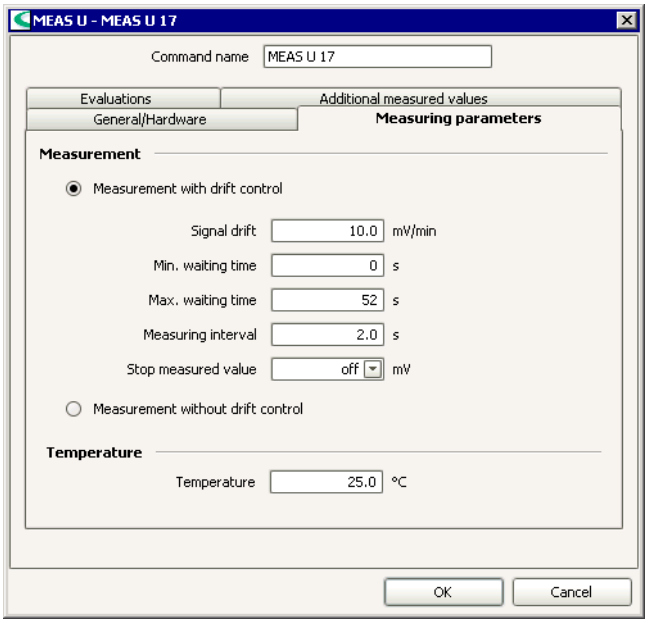
-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is activated.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [MEAS U #]
Name of the command.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** are selectable.

> ***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. In such a case* ***drift-controlled measurement*** *is particularly advisable, as the measured values are only accepted when equilibrium has almost been achieved.*

Measurement with drift control

[on], off

The measurement is carried out drift-controlled if this option is activated. The measurement is stopped as soon as the **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 deactivated.

Signal drift

0.1 ... [10.0] ... 999.0 mV/min (Titrando)
0.5 ... [10.0] ... 999.0 mV/min (Titrino)
The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

[0] ... 999'999 s (Titrando only)
The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [52] ... 999'999 s (Titrando)
0 ... [52] ... 9'999 s (Titrino)
If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-2'000.0 ... 2'000.0 mV, [off] (Titrando only)
Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Measurement without drift control

[on], off

The measurement is carried out without drift control if this option is activated. 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 deactivated.

Measuring time

0 ... [120] ... 999'999 s (Titrando)
0 ... [120] ... 9'999 s (Titrino)
Maximum period of time for measurement.

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-2'000.0 ... 2'000.0 mV, [off] (Titrando only)
Stop when the preset measured value has been reached since the start of the measurement. **off** means no stop.

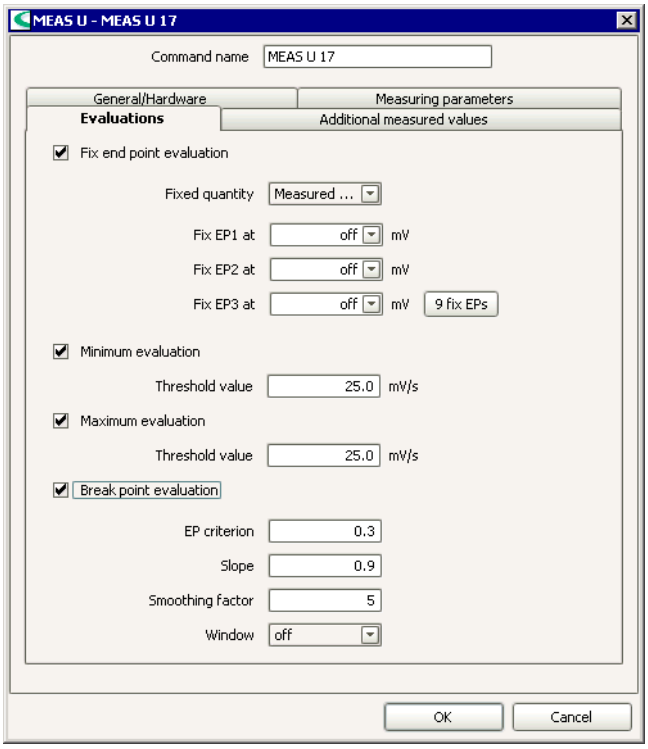
Temperature

Temperature

-20.0 ... [25.0] ... 150 °C (Titrando)
-170.0 ... [25.0] ... 500 °C (Titrino)
Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab General/Hardware is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS U #]
Name of the command.

Fix end point evaluation

on, [off]
To a fixed quantity (measured value or time) the associated values for the other quantities are interpolated from the list of measuring points for the fixed end point.

Fixed quantity

[Measured value], Time
Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measuring points.

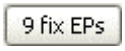
Fix EP# at

-2'000.0 ... 2'000.0 mV, [off] (Titrando)
-2'000 ... 2'000 mV, [off] (Titrino)
Fixed end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999'999.9 s, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Time**.



The fixed end points Fix EP4...9 are displayed additionally to Fix EP1...3 by pressing this button.

Only the fixed end points Fix EP1...3 are displayed by pressing this button.

Minimum evaluation

on, [off]

For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value

1.0 ... [25.0] ... 2'000.0 mV/s

The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation

on, [off]

For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value

1.0 ... [25.0] ... 2'000.0 mV/s

The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Break point evaluation

on, [off] (Titrando only)

A break point evaluation is used to determine sharp changes of direction in the titration curve) (*see Titration commands - Evaluation - Break point evaluation*).

EP criterion

0 ... [0.3] ... 1.0

Measure for the minimum sharpness of the break. 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, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope

0.0 ... [0.9] ... 10.0

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor

2 ... [5] ... 20

The higher the smoothing factor, the fewer break points will be found.

Window

Measured value, Time, [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

[-2'000.0] ... 2'000.0 mV (for **Window** = **Measured value**)
[0] ... 999'999 s (for **Window** = **Time**)
Measured value for the lower limit of the window.

Upper limit

-2'000.0 ... [2'000.0] mV (for **Window** = **Measured value**)
0 ... [999'999] s (for **Window** = **Time**)
Measured value for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS Ipol

Command for **voltametric measurements** with selectable polarization current.

Devices

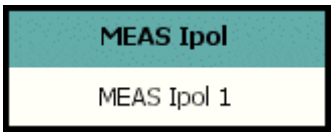
This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841

Appearance

The command has the following appearance:



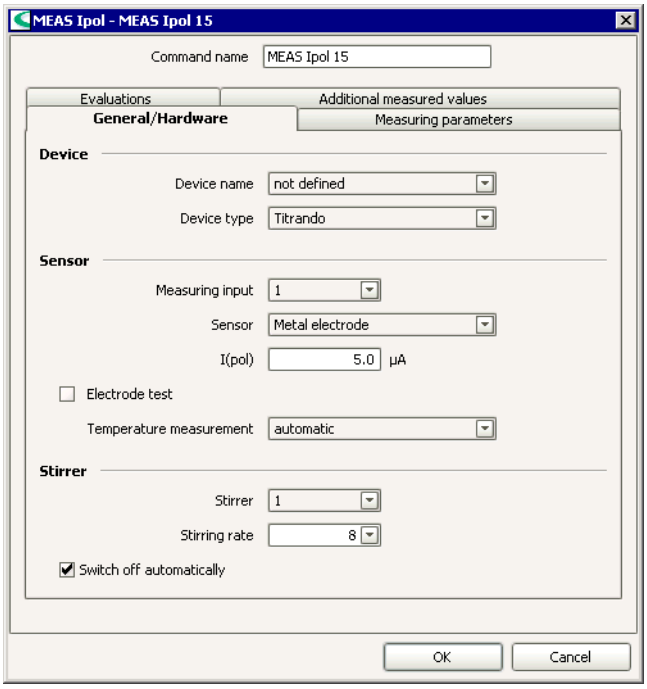
Parameters

The parameters for the command **MEAS Ipol** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS Ipol #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Metal electrode], Conductivity sensor
Selection of a sensor from the sensors configured in the sensor table.

I(pol)

-125.0 ... [5.0] ... 125.0 µA (Titrando, increment = 2.5 **µ**A)
-127 ... [5] ... 127 µA (Titrino, increment = 1 **µ**A)
The polarization current is the current applied to the polarized electrode during a voltametric measurement.

Electrode test

on, [off]
Switch on/off the electrode test for polarized electrodes. This test is carried out during the transition from an inactive condition to a measuring condition. It is checked that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous
A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]
If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off
The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is activated.

Measuring parameters

Screenshot and parameters: *see MEAS U - Measuring parameters*

Evaluations

Screenshot and parameters: *see MEAS U - Evaluations*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS Upol

Command for **amperometric measurements** with selectable polarization voltage.

Devices

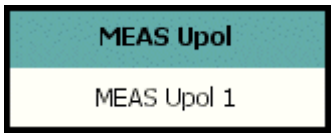
This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841

Appearance

The command has the following appearance:



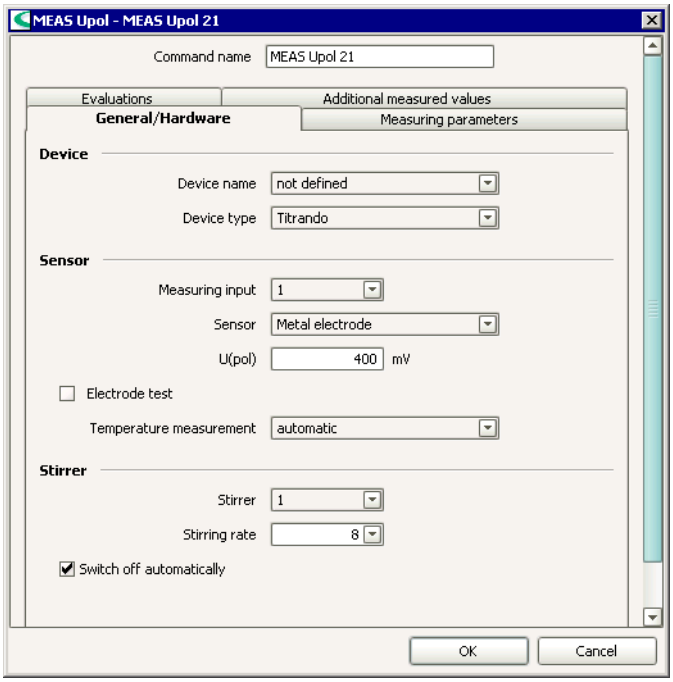
Parameters

The parameters for the command **MEAS Upol** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS Upol #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Metal electrode], Conductivity sensor
Selection of a sensor from the sensors configured in the sensor table.

U(pol)

-1'250 ... [400] ... 1'250 mV (Titrando, increment = 25 mV)
-1'270 ... [400] ... 1'270 mV (Titrino, increment = 10 mV)

The polarization voltage is the potential applied to the polarized electrode during a amperometric measurement.

Electrode test

on, [off]
Switch on/off the electrode test for polarized electrodes. This test is carried out during the transition from an inactive condition to a measuring condition. It is checked that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous
A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]
If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off
The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

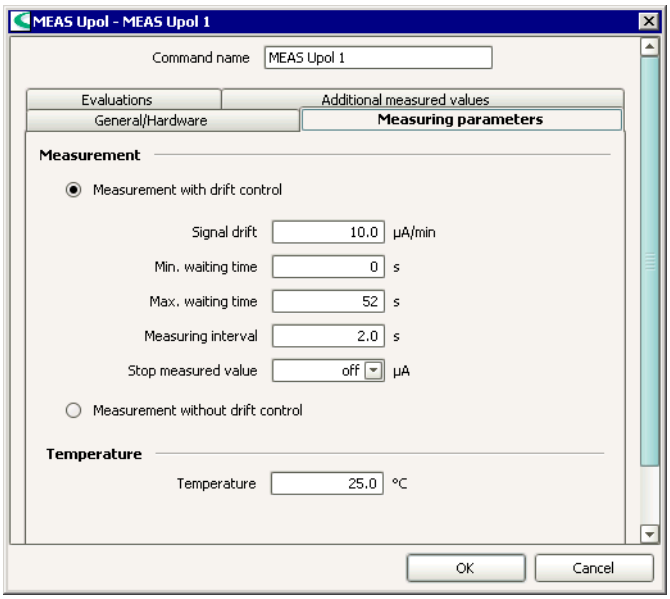
-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is activated.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [MEAS Upol #]

Name of the command.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** are selectable.

> ***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. In such a case* ***drift-controlled measurement*** *is particularly advisable, as the measured values are only accepted when equilibrium has almost been achieved.*

Measurement with drift control

[on], off

The measurement is carried out drift-controlled if this option is activated. The measurement is stopped as soon as the **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 deactivated.

Signal drift

0.01 ... [10.00] ... 99.90 µA/min (Titrando)
0.05 ... [10.0] ... 99.9 µA/min (Titrino)
The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

[0] ... 999'999 s (Titrando only)
The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [52] ... 999'999 s (Titrando)
0 ... [52] ... 9'999 s (Titrino)
If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-200.0 ... 200.0 µA, [off] (Titrando only)
Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Measurement without drift control

[on], off

The measurement is carried out without drift control if this option is activated. 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 deactivated.

Measuring time

0 ... [120] ... 999'999 s (Titrando)
0 ... [120] ... 9'999 s (Titrino)
Maximum period of time for measurement.

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-200.0 ... 200.0 µA, [off] (Titrando only)
Stop when the preset measured value has been reached since the start of the measurement. **off** means no stop.

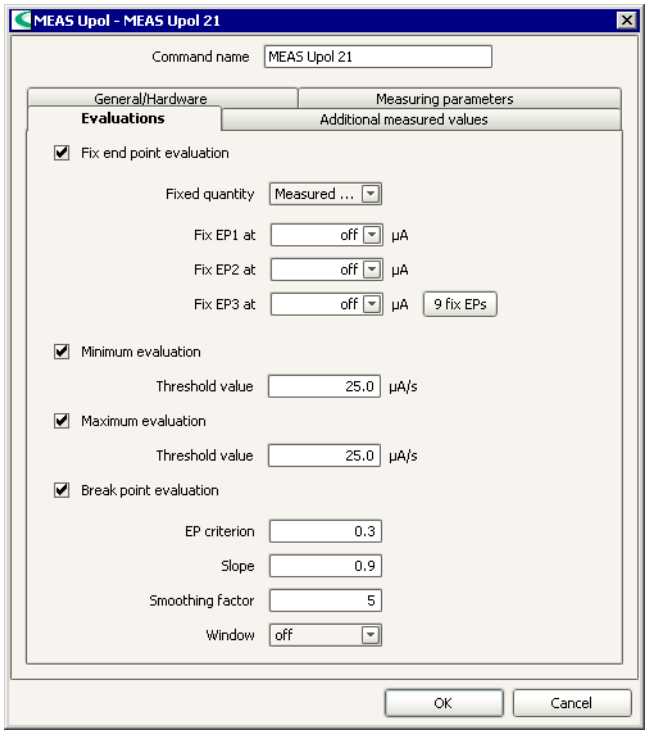
Temperature

Temperature

-20.0 ... [25.0] ... 150 °C (Titrando)
-170.0 ... [25.0] ... 500 °C (Titrino)
Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab General/Hardware is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS Upol #]
Name of the command.

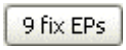
Fix end point evaluation

on, [off]
To a fixed quantity (measured value or time) the associated values for the other quantities are interpolated from the list of measuring points for the fixed end point.

Fixed quantity
[Measured value], Time
Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measuring points.

Fix EP# at
-200.0 ... 200.0 µA, [off]
Fixed end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at
0.0 ... 999'999.9 s, [off]
Fixed end point 1 ... 9 for **Fixed quantity** = **Time**.



The fixed end points Fix EP4...9 are displayed additionally to Fix EP1...3 by pressing this button.

Only the fixed end points Fix EP1...3 are displayed by pressing this button.

Minimum evaluation

on, [off]
For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.5 ... [5.0] ... 10.0 µA/s
The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.5 ... [5.0] ... 10.0 µA/s
The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Break point evaluation

on, [off] (Titrando only)
A break point evaluation is used to determine sharp changes of direction in the titration curve) (*see Titration commands - Evaluation - Break point evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure for the minimum sharpness of the break. 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, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope

0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor

2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window

Measured value, Time, [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

[-200.0] ... 200.0 µA (for **Window** = **Measured value**)
[0] ... 999'999 s (for **Window** = **Time**)
Measured value for the lower limit of the window.

Upper limit

-200.0 ... [200.0] µA (for **Window** = **Measured value**)
0 ... [999'999] s (for **Window** = **Time**)
Measured value for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS T

Command for **temperature measurements**.

Devices

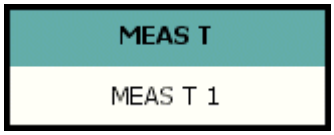
This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841

Appearance

The command has the following appearance:



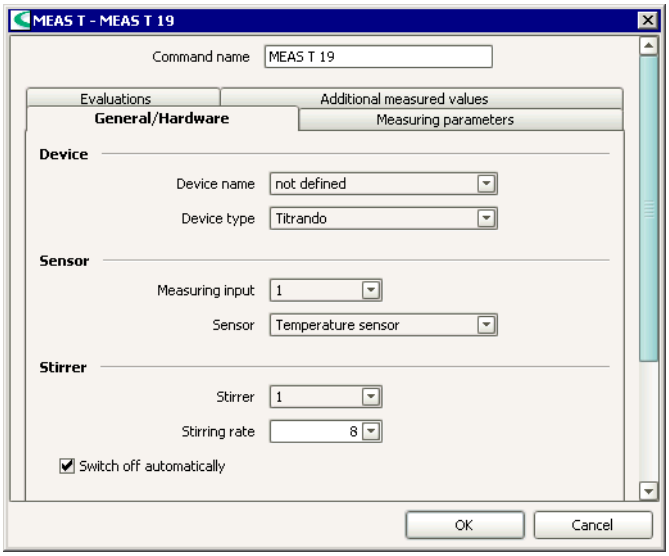
Parameters

The parameters for the command **MEAS T** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS T #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [Temperature sensor], pH electrode
Selection of a pH sensor from the pH sensors configured in the sensor table.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

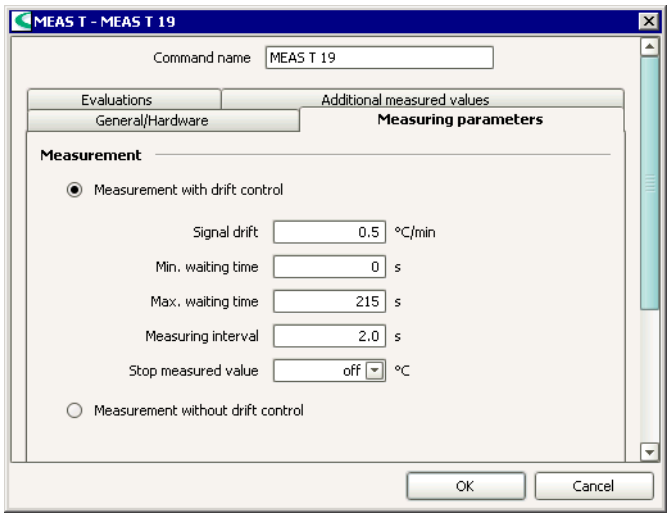
-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is activated.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [MEAS T #]
Name of the command.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** are selectable.

> ***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. In such a case* ***drift-controlled measurement*** *is particularly advisable, as the measured values are only accepted when equilibrium has almost been achieved.*

Measurement with drift control

[on], off
The measurement is carried out drift-controlled if this option is activated. The measurement is stopped as soon as the **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 deactivated.

Signal drift

0.1 ... [0.5] ... 999.9 °C/min (Titrando)
[0.5] ... 999 °C/min (Titrino)
The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

[0] ... 999'999 s (Titrando only)
The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [52] ... 999'999 s (Titrando)
0 ... [52] ... 9'999 s (Titrino)
If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-20.0 .. 150.0 °C, [off] (Titrando only)
Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Measurement without drift control

[on], off
The measurement is carried out without drift control if this option is activated. 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 deactivated.

Measuring time

0 ... [120] ... 999'999 s (Titrando)
0 ... [120] ... 9'999 s (Titrino)
Maximum period of time for measurement.

Measuring interval

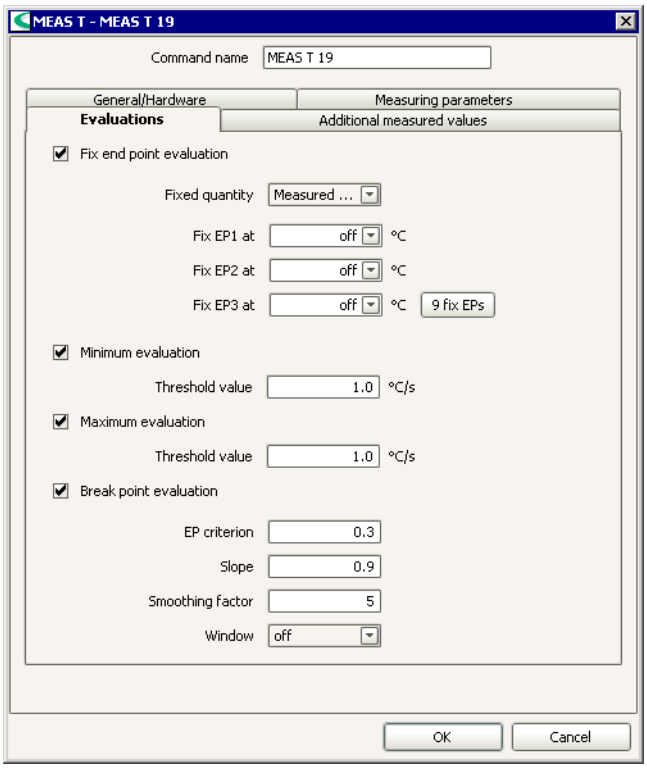
0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)
0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)
Time interval for entering a measuring point in the list of measuring points.

Stop measured value

-20.0 ... 150.0 °C, [off] (Titrando only)
Stop when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS T #]

Name of the command.

Fix end point evaluation

on, [off]

To a fixed quantity (measured value or time) the associated values for the other quantities are interpolated from the list of measuring points for the fixed end point.

Fixed quantity

[Measured value], Time

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measuring points.

Fix EP# at

-20.0 ... 150.0 °C, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Measured value**.

Fix EP# at

0.0 ... 999'999.9 s, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Time**.

The fixed end points Fix EP4...9 are displayed additionally to Fix EP1...3 by pressing this button.

Only the fixed end points Fix EP1...3 are displayed by pressing this button.

Minimum evaluation

on, [off]
For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 °C/s
The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation

on, [off]
For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 °C/s
The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Break point evaluation

on, [off] (Titrando only)
A break point evaluation is used to determine sharp changes of direction in the titration curve) (*see Titration commands - Evaluation - Break point evaluation*).

EP criterion
0 ... [0.3] ... 1.0
Measure for the minimum sharpness of the break. 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, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope
0.0 ... [0.9] ... 10.0
Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor
2 ... [5] ... 20
The higher the smoothing factor, the fewer break points will be found.

Window
Measured value, Time, [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
[-20.0] ... 150.0 °C (for **Window** = **Measured value**)
Measured value for the lower limit of the window.

[0] ... 999'999 s (for **Window** = **Time**)
Time for the lower limit of the window.

Upper limit
-20.0 ... [150.0] °C (for **Window** = **Measured value**)
Measured value for the upper limit of the window.

0 ... [999'999] s (for **Window** = **Time**)
Time for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS T/Flow

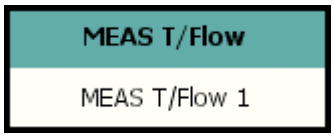
Command for **temperature and gas flow measurements**.

Devices

This command can only be executed with the 774 Oven Sample Processor.

Appearance

The command has the following appearance:



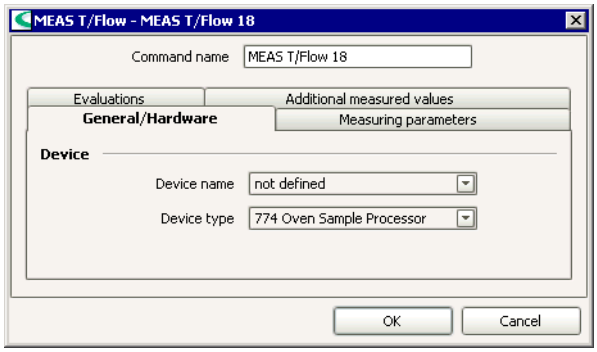
Parameters

The parameters for the command **MEAS T/Flow** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device are defined on this tab.



Command name

25 characters, [MEAS T/Flow #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a 774 Oven Sample Processor from the device table. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

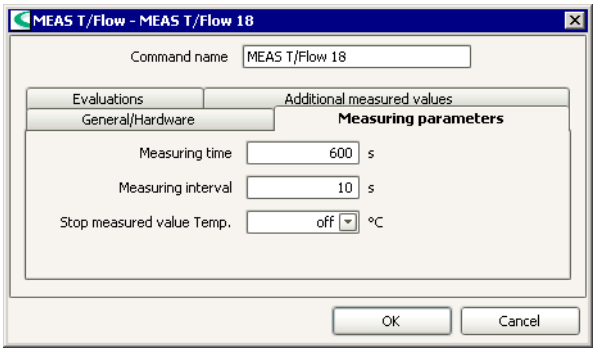
774 Oven Sample Processor

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [MEAS T/Flow #]

Name of the command.

Measuring time

0 ... [600] ... 999'999 s

Maximum period of time for measurement.

Measuring interval

1 ... [10] ... 999'999.0 s

Time interval for entering a measuring point in the list of measuring points.

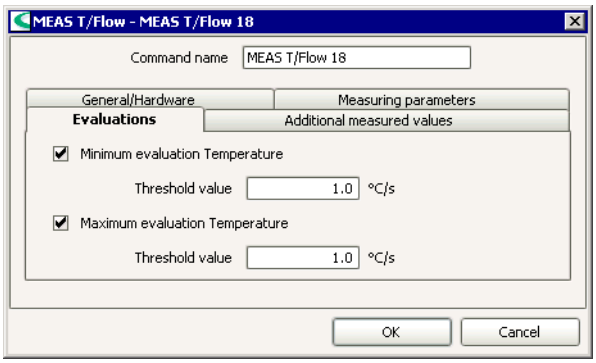
Stop measured value Temp.

50.0 ... 250.0 °C, [off]

Stop when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS T/Flow #]

Name of the command.

Minimum evaluation Temperature

on, [off]
For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 °C/s
The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation Temperature

on, [off]
For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value
0.1 ... [1.0] ... 20.0 °C/s
The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS Conc

Command for **concentration measurements** (direct measurement).

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836

Appearance

The command has the following appearance:

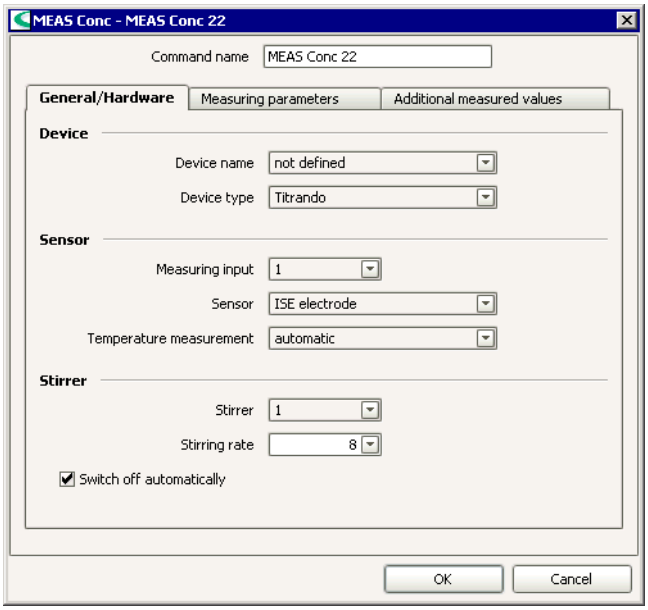
Parameters

The parameters for the command **MEAS Conc** are configured on the following 3 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [MEAS Conc #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [ISE electrode (Fluoride)]
Selection of an ISE sensor from the ISE sensors configured in the sensor table.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous
A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]
If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off
The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off
The stirrer is automatically switched off at the end of the command if this option is activated.

Measuring parameters

Screenshot and parameters: *see MEAS U - Measuring parameters*

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

MEAS Cond

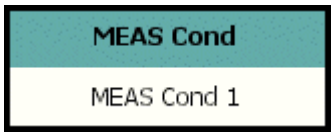
Command for **conductivity measurements**.

Devices

This command can only be executed with the 712 Conductometer.

Appearance

The command has the following appearance:



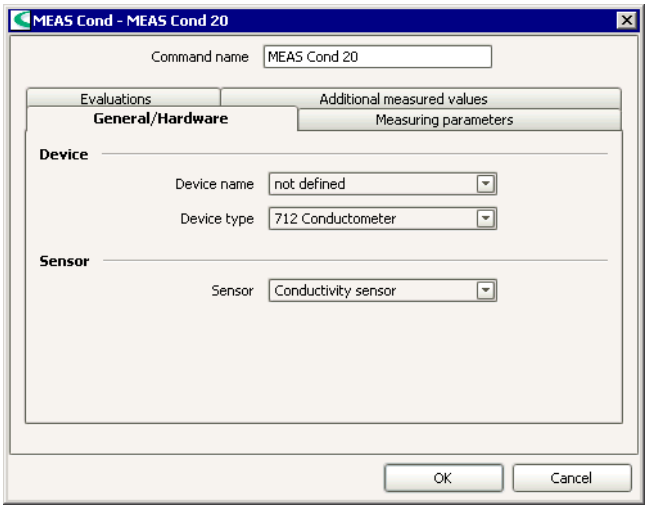
Parameters

The parameters for the command **MEAS Cond** are configured on the following 4 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.
- **Evaluations**
  Defining further methods for evaluating measurement curves.
- **Additional measured values**
  Defining further measured values which can be saved as additional columns in the list of measuring points.

General/Hardware

The general parameters for the control device and the sensor are defined on this tab.



Command name

25 characters, [MEAS Cond #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a 712 Conductometer from the device table. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

712 Conductometer

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

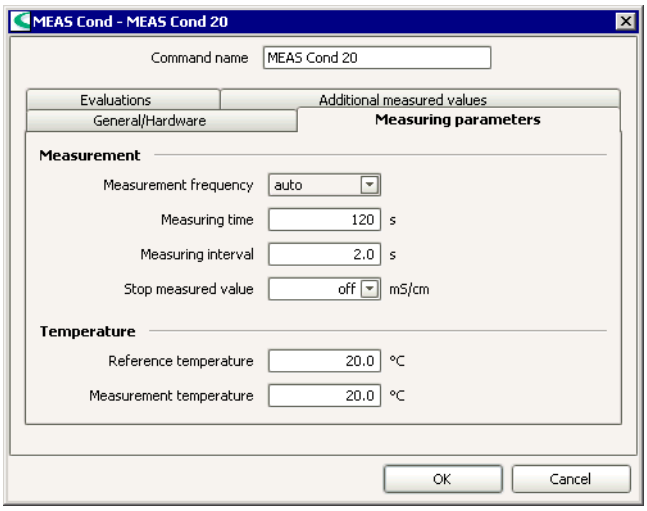
Sensor

Sensor name, [Conductivity sensor]

Selection of a conductivity sensor from the conductivity sensors configured in the sensor table.

Measuring parameters

The measuring parameters are defined on this tab.



Command name
25 characters, [MEAS Cond #]
Name of the command.

Measurement

Measurement frequency
[auto], 300 Hz, 2.4 kHz
The more suitable frequency is chosen with the setting **auto**.

Measuring time
0 ... [120] ... 999'999 s
Maximum period of time for measurement.

Measuring interval
1 ... [2] ... 999'999.0 s
Time interval for entering a measuring point in the list of measuring points.

Stop measured value
0.0000 ... 2000.0 mS/cm, [off]
Stop when the preset measured value has been reached since the start of the measurement. **off** means no stop.

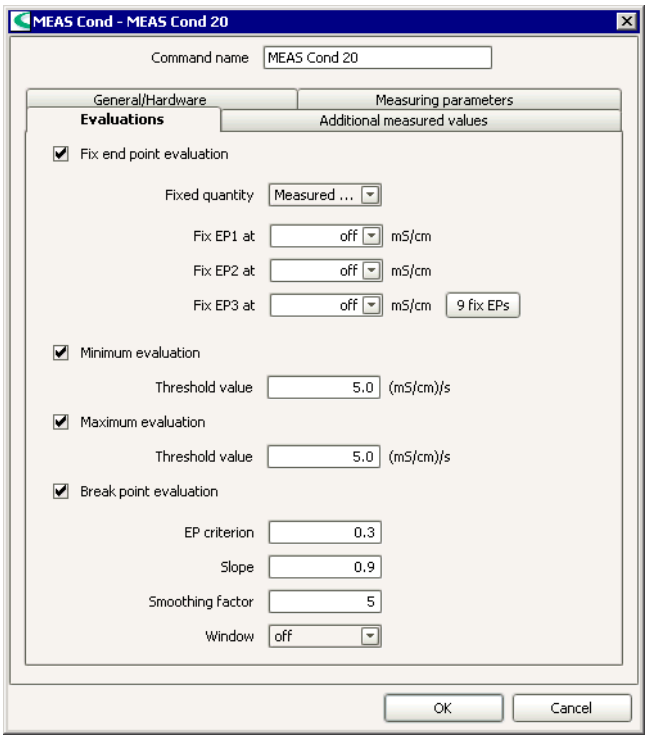
Temperature

Reference temperature
-170.0 ... [20.0] ... 500.0 °C
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).

Measurement temperature
-170.0 ... [20.0] ... 500.0 °C
Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

Evaluations

The following methods for evaluating measuring curves are defined on this tab.



Command name

25 characters, [MEAS Cond #]

Name of the command.

Fix end point evaluation

on, [off]

To a fixed quantity (measured value or time) the associated values for the other quantities are interpolated from the list of measuring points for the fixed end point.

Fixed quantity

[Measured value], Time

Selection of the fixed quantity to which the associated values for the other quantities are to be interpolated from the list of measuring points.

Fix EP# at

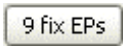
0.0000 ... 2'000.0 mS/cm, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Measured value**.

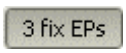
Fix EP# at

0.0 ... 999'999.9 s, [off]

Fixed end point 1 ... 9 for **Fixed quantity** = **Time**.



The fixed end points Fix EP4...9 are displayed additionally to Fix EP1...3 by pressing this button.



Only the fixed end points Fix EP1...3 are displayed by pressing this button.

Minimum evaluation

on, [off]

For the minimum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value

0.5 ... [5.0] ... 10.0 (mS/cm)/s

The evaluation of the minimum begins as soon as the slope of the curve exceeds the threshold value.

Maximum evaluation

on, [off]

For the maximum measured value the associated time and temperature are interpolated from the list of measuring points) (*see Titration commands - Evaluation - Minimum/Maximum evaluation*).

Threshold value

0.5 ... [5.0] ... 10.0 (mS/cm)/s

The evaluation of the maximum begins as soon as the slope of the curve exceeds the threshold value.

Break point evaluation

on, [off]

A break point evaluation is used to determine sharp changes of direction in the titration curve) (*see Titration commands - Evaluation - Break point evaluation*).

EP criterion

0 ... [0.3] ... 1.0

Measure for the minimum sharpness of the break. 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, for a small measured value range even small changes in the measured value can be evaluated as a break point.

Slope

0.0 ... [0.9] ... 10.0

Minimum difference between the slope before and after the break point. The smaller the difference, the more break points will be found.

Smoothing factor

2 ... [5] ... 20

The higher the smoothing factor, the fewer break points will be found.

Window

Measured value, Time, [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

[0.0000] ... 2'000.0 mS/cm (for **Window** = **Measured value**)

Measured value for the lower limit of the window.

[0] ... 999'999 s (for **Window** = **Time**)

Time for the lower limit of the window.

Upper limit

0.0000 ... [2'000.0] mS/cm (for **Window** = **Measured value**)

Measured value for the upper limit of the window.

0 ... [999'999] s (for **Window** = **Time**)

Time for the upper limit of the window.

Additional measured values

Screenshot and parameters: *see DET pH - Additional measured values*

STDADD

Commands for **standard addition**.

The following 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.

STDADD man

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, 855

Appearance

The command has the following appearance:

Parameters

The parameters for the command **STDADD man** are configured on the following 3 tabs:

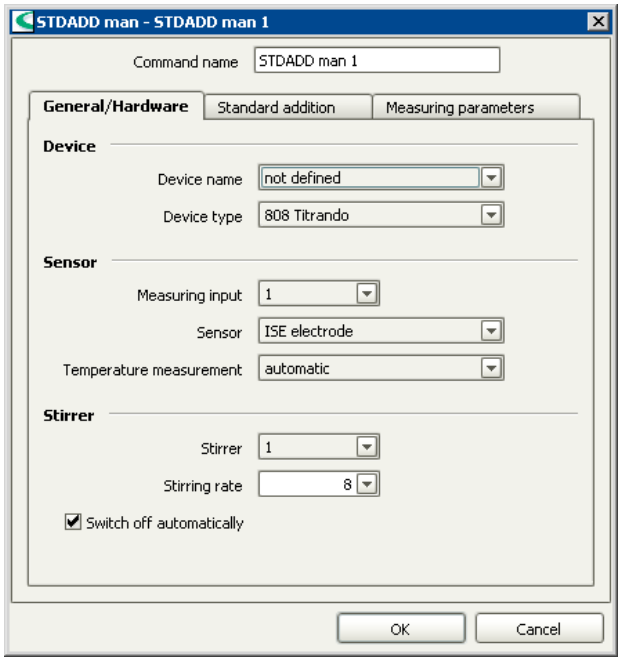
- **General/Hardware**
  Parameters for device, dosing device, sensor and stirrer.
- **Standard addition**
  Parameters for standard addition.
- **Measuring parameters**
  Parameters for the measurement.

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 .

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [STDADD man #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)

[1] (855)

Selection of the measuring input to which the sensor is connected.

Sensor

Sensorname, [ISE electrode (Fluoride)]

Selection of the ISE sensor from the list of sensors defined in the sensor table.

Temperature measurement

Type of temperature measuring:

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (see **Measuring parameters**) will be used.

off
The temperature will not be measured. The **Temperature** (see **Measuring parameters**) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

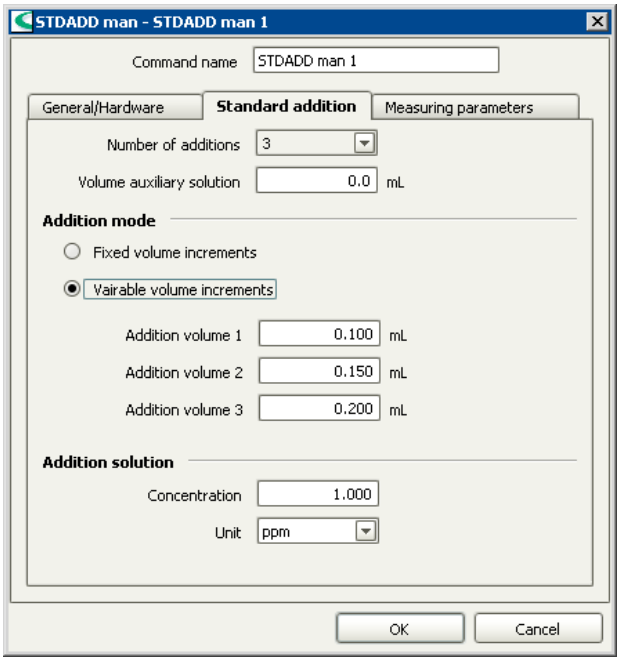
-15 ... [8] ... 15
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off
The stirrer is automatically switched off at the end of the command if this option is enabled.

Standard addition

The standard addition parameters are defined on this tab.



Command name

25 characters, [STDADD man #]
Name of the command.

Number of additions

1 ... [3] ... 19
Number of times the standard solution is to be added.

Volume auxiliary solution

[0.000] ... 9999.999 mL
Volume of the auxiliary solution (e.g. buffer) to be added to the sample before the first standard addition.

Addition mode

Fixed volume increments

[on], off

If this option is enabled a fixed volume increment muss be added for each standard addition.

Addition volume

[0.00000] ... [0.100] ... 99999.9 mL

Quantity of the fixed volume increment.

Variable volume increments

on, [off]

If this option is enabled the defined volume increment muss be added for each standard addition.

Addition volume 1...19

[0.00000] ... [0.100] ... 99999.9 mL

Quantity of the defined volume increments.

Addition solution

Concentration

0.001 ...[1.000] ... 999999.999

Concentration of addition solution.

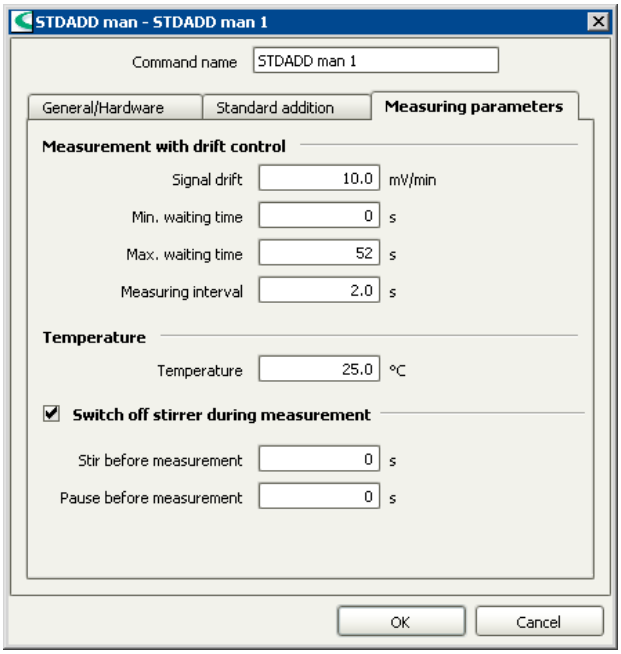
Unit

mol/L, mmol/L, µmol/L, [ppm], g/L, mg/L, µg/L, mg/mL, µg/mL, %, mEq/L

Concentration unit of addition solution.

Measuring parameters

The measuring parameters are defined on this tab.



Command name

25 characters, [STDADD man #]

Name of the command.

Measurement with drift control

The measurement is stopped as soon as the **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed.

Signal drift

0.1 ... [10.0] ... 999.0 mV/min

The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

[0] ... 999'999 s

The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [52] ... 999'999 s

If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s

Time interval for entering a measuring point in the list of measuring points.

Temperature

Temperature

-20.0 ... [25.0] ... 150 °C

Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab **General/Hardware** is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

Switch off stirrer during measurement

on, [off]

If this option is switched on then the stirrer is switched off during the measurement. In this case the two following parameters can be edited:

Stir before measurement

[0] ... 999999 s

Stirring time between end of dosing and measurement.

Pause before measurement

[0] ... 999999 s

Waiting time before the measurement during which no stirring takes place.

STDADD dos

Command for **Standard addition** with addition of the standard addition solution from a dosing device.

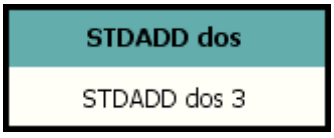
Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 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 device, dosing device, sensor and stirrer.

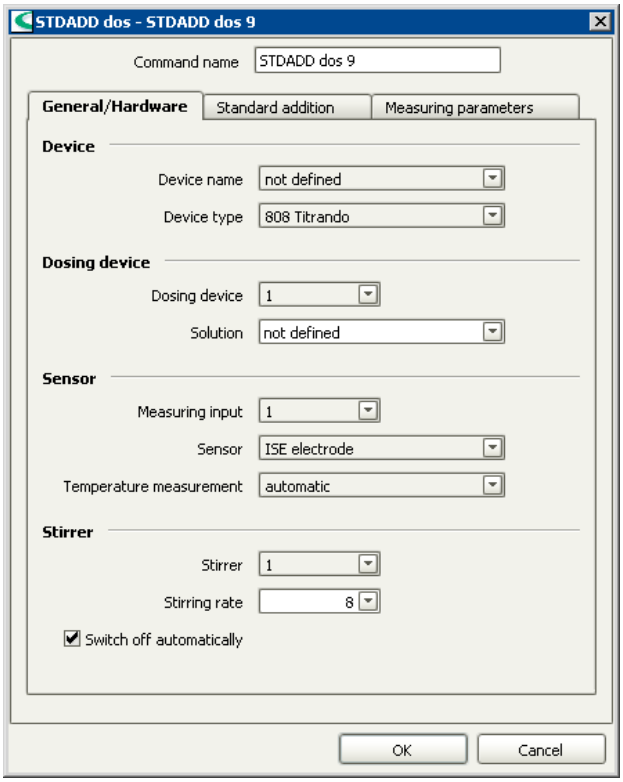
- **Standard addition**
  Parameters for standard addition.
- **Measuring parameters**
  Parameters for the measurement.

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 .

General/Hardware

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.



Command name
25 characters, [STDADD dos #]
Name of the command.

Device

Device name
Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type
Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (808, 809, 835, 836, 842)
[1] ... 3 (855)
Selection of the dosing device (exchange or dosing unit) to be used for dosing the addition solution.

Solution

24 characters, solution name, [not defined]
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected 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

[1] ... 2 (Titrando)
[1] (855)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensorname, [ISE electrode (Fluoride)]
Selection of the ISE sensor from the list of sensors defined in the sensor table.

Temperature measurement

Type of temperature measuring:

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (see **Measuring parameters**) will be used.

off
The temperature will not be measured. The **Temperature** (see **Measuring parameters**) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off
Selection of the stirrer. **off** means that no stirrer will be used.

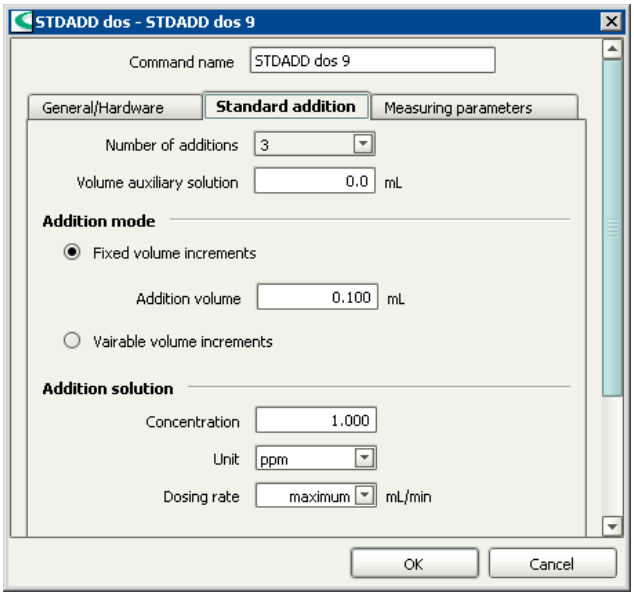
Stirring rate

-15 ... [8] ... 15
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically
[on], off
The stirrer is automatically switched off at the end of the command if this option is enabled.

Standard addition

The standard addition parameters are defined on this tab.



Command name
25 characters, [STDADD dos #]
Name of the command.

Number of additions
1 ... [3] ... 19
Number of times the standard solution is to be added.

Volume auxiliary solution
[0.000] ... 9999.999 mL
Volume of the auxiliary solution (e.g. buffer) to be added to the sample before the first standard addition.

Addition mode

Fixed volume increments
[on], off
If this option is enabled a fixed volume increment muss be added for each standard addition.

Addition volume
[0.00000] ... [0.100] ... 99999.9 mL
Quantity of the fixed volume increment.

Variable volume increments
on, [off]
If this option is enabled the defined volume increment muss be added for each standard addition.

Addition volume 1...19
[0.00000] ... [0.100] ... 99999.9 mL
Quantity of the defined volume increments.

Addition solution

(only displayed for **Solution** = **not defined**)
Concentration
0.001 ...[1.000] ... 999999.999
Concentration of addition solution.

Unit

mol/L, mmol/L, µmol/L, [ppm], g/L, mg/L, µg/L, mg/mL, µg/mL, %, mEq/L
Concentration unit of addition solution.

Dosing rate

0.01 ... 166.00 mL/min, [maximum]
Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the used exchange unit or dosing unit.

Measuring parameters

Screenshot and parameters: *see STDADD man - Measuring parameters*

STDADD auto

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, 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 device, dosing device, sensor and stirrer..
- **Standard addition**
  Parameters for standard addition.
- **Measuring parameters**
  Parameters for the measurement.

Standard addition curve

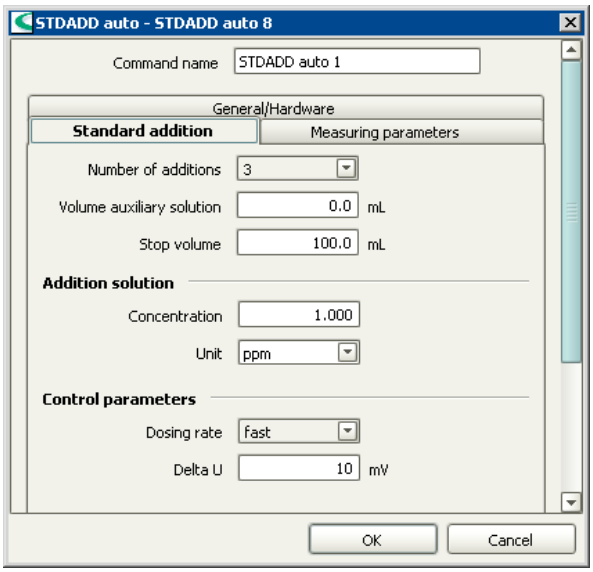
The standard addition curve with its evaluation data for a determination is shown in the program part Database in the dialog window Calibration curve which is opened with the menu item Determinations, Show calibration curve... or the symbol .

General/Hardware

Screenshot and parameters: *see STDADD dos - General/Hardware*

Standard addition

The standard addition parameters are defined on this tab.



Command name

25 characters, [STDADD auto #]

Name of the command.

Number of additions

1 ... [3] ... 19

Number of times the standard solution is to be added.

Volume auxiliary solution

[0.000] ... 9999.999 mL

Volume of auxiliary solution (e.g. buffer) that is to be added to the sample before the first standard addition.

Stop volume

0.0 ... [100.0] ... 9999.9 mL, off

Stops when the sum of the added volume increments exceeds the stop volume defined here.

Addition solution

(only displayed for **Solution** = **not defined**)

Concentration

0.001 ...[1.000] ... 999999.999

Concentration of addition solution.

Unit

mol/L, mmol/L, µmol/L, [ppm], g/L, mg/L, µg/L, mg/mL, µg/mL, %, mEq/L

Concentration unit of addition solution.

Control parameters

Dosing rate

slow, medium, [fast]

Speed at which the volume increments are to be added.

Delta U

1 ... [10] ... 999 mV

Potential difference that is to be achieved by a standard addition.

Measuring parameters

Screenshot and parameters: *see STDADD man - Measuring parameters*

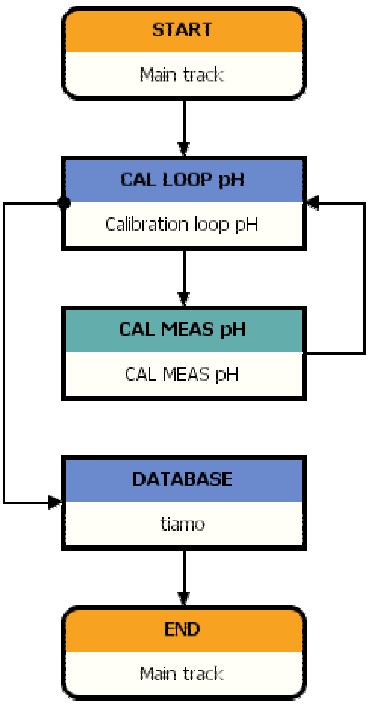
5.6.7 Calibration commands

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** whereas the measurement is done with the command **CAL MEAS**. The validity of the measurement is checked after each pass of the loop. The calibration data for the electrode are determined at the end.

The basic structure of a calibration method looks as follows:



The calibration can be carried out by manual changing of buffers/standards or by automatic changing in combination with a Sample Processor.

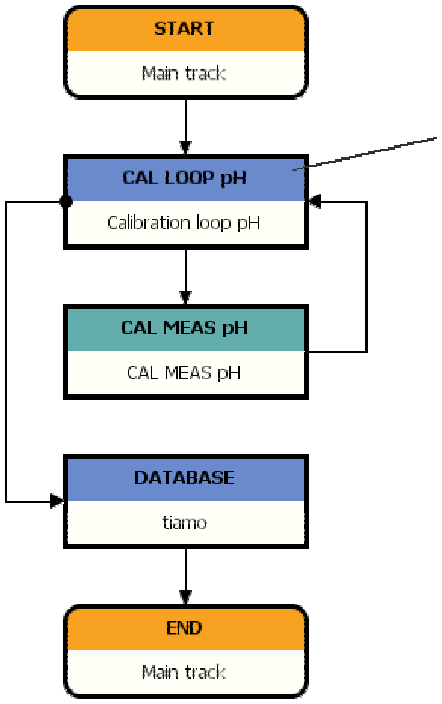
Commands

The following commands can be selected for calibration:

- **CAL LOOP pH**
  Calibration loop for calibrating pH electrodes.
- **CAL MEAS pH**
  Measuring command for calibrating pH electrodes.
- **CAL LOOP Conc**
  Calibration loop for calibrating ion selective electrodes (ISE electrodes).
- **CAL MEAS Conc**
  Measuring command for calibrating ion selective electrodes (ISE electrodes).

Calibrating with manual solution changing

The basic structure of a calibration method with manual solution exchange looks as follows:

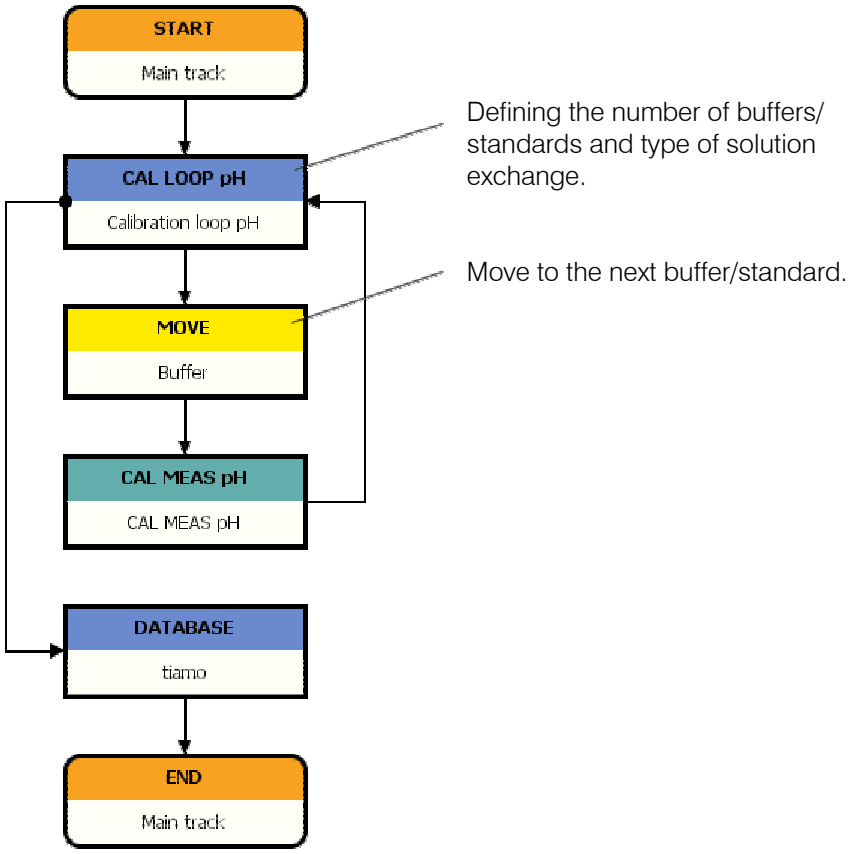


Definition of the number of buffers/standards and type of solution exchange.

The request for changing the buffer/standard must be **activated** in the command **CAL LOOP pH** or **CAL LOOP Conc** respectively. During the method run a request for changing the buffer/standard is displayed after each measurement.

Calibrating with automatic solution changing

The basic structure of a calibration method with automatic solution exchange on a Sample Processor looks as follows:



The request for changing the buffer/standard must be **deactivated** in the command **CAL LOOP pH** or **CAL LOOP Conc** respectively. No request for changing the buffer/standard is displayed during the method run.

For the automatic move to the next calibration solution on the Sample Processor a command **MOVE** must be inserted between the loop command **CAL LOOP** and the measuring command **CAL MEAS**. The positions of the calibration solutions on the sample rack are defined in the command **MOVE**. There are three possibilities:

- **Defining rack positions for calibration solutions in the method**
  A **Rack position ###** for the first calibration solution has to be defined in the command **MOVE**. The other calibration solutions must be placed on the directly following rack positions. The following settings have to be done in the command **MOVE** under the parameter **Target**:
  Move: **Rack position**
  Number: **= ### – 1 + 'Command name.LCO'** (entry with Formula editor, i.e. **= 19 + 'Calibration loop pH.LCO'** for the above sample method with the first calibration solution on rack position **20**).

- **Defining special beakers for calibration solutions in the method**
  A **Special beaker ###** for the first calibration solution has to be defined in the command **MOVE**. The other calibration solutions must be placed on the following special beaker positions. As many special beakers must be defined for the sample rack as buffers or standard solutions are required for the calibration (see Rack properties - Special beakers). The following settings have to be done in the command **MOVE**

under the parameter **Target**:
Move: **Special beaker**
Number: **= ### + 'Command name.LCO'** (entry with Formula editor, i.e. **= 5 + 'Calibration loop pH.LCO'** for the above sample method with the first calibration solution on special beaker position **6**).

- **Defining rack positions for calibration solutions in the sample data**
  A **Sample position** for the first calibration solution has to be defined in the run window. The other calibration solutions must be placed on the directly following rack positions. The following settings have to be done in the command **MOVE** under the parameter **Target**:
  Move: **Rack position**
  Number: **= 'MV.Sample position' – 1 + 'Command name.LCO'** (entry with Formula editor, i.e. **= 'MV.Sample position' – 1 + 'Calibration loop pH.LCO'** for the above sample method).

The variable **'Command name.LCO'** (index number of the calibration loop) is increased by **+1** after each pass of the loop.

> ***Note***
> *The Formula editor is opened with a right click in the input field.*

CAL LOOP pH

Loop command for **calibrating pH electrodes**. The command is used together with the command **CAL MEAS pH**.

Appearance

The command has the following appearance:

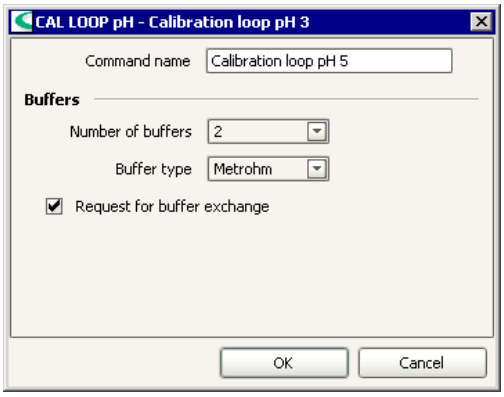
Parameters

The parameters for the command **CAL LOOP pH** are configured in the following dialog window:

- **CAL LOOP pH**

CAL LOOP pH - properties

The number of buffers and the buffer type are defined in the dialog window **CAL LOOP pH**.



Command name

25 characters, [Calibration loop pH #]

Name of the command.

Buffers

Number of buffers

1 ... [2] ... 5

Selecting the number of buffers for the pH calibration.

Buffer type

Selecting a predefined buffer series for the calibration (*details of buffer data see online help*).

[Metrohm], NIST, DIN, Fisher, Fluka Basel, Mettler, Merck, Merck CertiPUR 25°C, Beckman, Radiometer, Baker, Hamilton DURACAL, Precisa

If these buffers are used, *tiamo* recognizes the particular buffer automatically.

Custom

An own buffer series defined in the configuration under **Tools, Templates, Custom calibration buffers** can be used with **Custom**.

Special

If **Special** is selected then up to five calibration buffers can be defined directly in the dialog window of the command **CAL LOOP pH**.

> ***Note***
> *The automatic buffer recognition is inactive for the buffer type **Special**. The buffers must therefore be used in the same order as they have been defined in the command **CAL LOOP pH**.*

Buffer # pH

-20.000 ... 20.000

pH value of the special buffers. This parameter is only displayed for **Buffer type** = **Special**.

> ***Note***
> *Please note that you must enter the pH values corresponding to the measuring temperature used. During the method run a message is displayed to indicate the next buffer to be measured.*

Request for buffer exchange

[on], off

If this option is enabled, a request for manual buffer exchange is displayed after each measurement. This option must be disabled for automatic buffer exchange when calibrating with a Sample Processor.

CAL MEAS pH

Measuring command for **calibrating pH electrodes**. The command is used together with the command **CAL LOOP pH**.

Devices

This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 855

Appearance

The command has the following appearance:

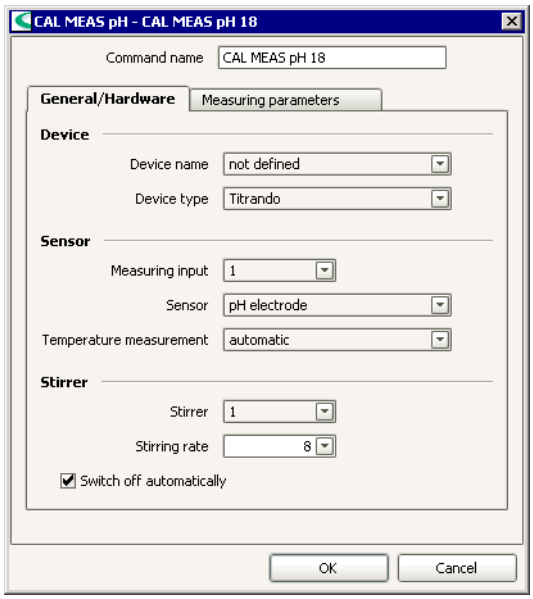
Parameters

The parameters for the command **CAL MEAS pH** are configured on the following 2 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name
25 characters, [CAL MEAS pH #]
Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando, Titrino)
[1] (855)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [pH electrode]

Selection of a pH sensor from the pH sensors configured in the sensor table.

Temperature measurement

Type of temperature measurement (Titrando only):

continuous

A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]

If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off (Titrando only)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

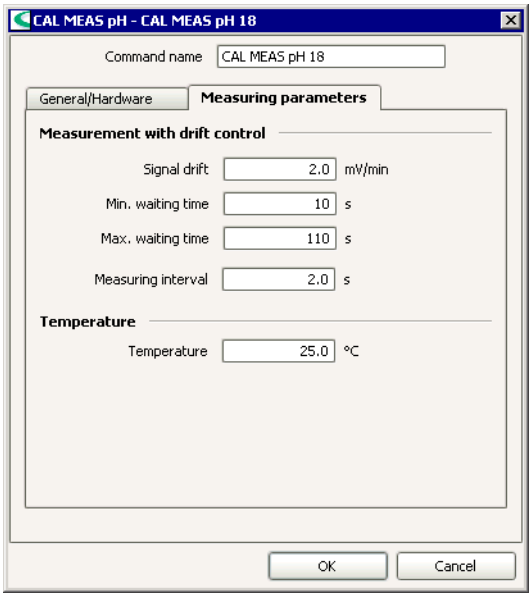
-15 ... [8] ... 15 (Titrando only)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (Titrando only)
The stirrer is automatically switched off at the end of the command if this option is enabled.

Measuring parameters

The measuring parameters for the calibration are defined on this tab.



Command name

25 characters, [CAL MEAS pH #]

Name of the command.

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 **waiting time** has elapsed.

Signal drift

0.1 ... [10.0] ... 999.0 mV/min (Titrando)

0.5 ... [10] ... 999 mV/min (Titrino)

The measured value is only accepted if the signal drift defined here has been fallen short of.

Min. waiting time

0 ... [10]...999'999 s (Titrando only)

The measured value is only accepted if the minimum waiting time has elapsed even if the signal drift has already been reached. The drift continues to be checked as the minimum waiting time is passing.

Max. waiting time

0 ... [110] ... 999'999 s (Titrando)

0 ... [110] ... 9'999 s (Titrino)

If the signal drift has not yet been reached then the measured value will be accepted when the maximum waiting time has elapsed. If no new entry for the waiting time has been made then a suitable value for the drift will be calculated automatically according to the following equation:

$$\text{Waiting time} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Measuring interval

0.1 ... [2.0] ... 999'999.0 s (Titrando, increment = 0.1 s)

0.08 ... [2.0] ... 16'200 s (Titrino, increment = 0.08 s)

Time interval for entering a measuring point in the list of measuring points.

Temperature

Temperature

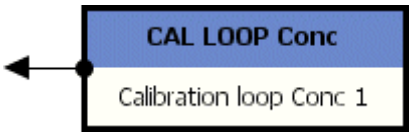
-20.0 ... [25.0] ... 150 °C (Titrando)
-170.0 ... [25.0] ... 500 °C (Titrino)
Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab General/Hardware is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

CAL LOOP Conc

Loop command for **calibrating ion-selective electrodes**. The command is used together with the command **CAL MEAS Conc**.

Appearance

The command has the following appearance:



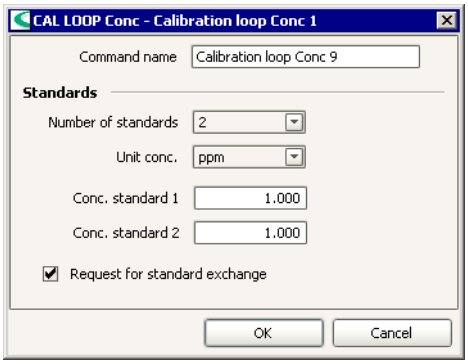
Parameters

The parameters for the command **CAL LOOP Conc** are configured in the following dialog window:

- **CAL LOOP Conc**

CAL LOOP Conc - properties

The number of standards and their concentration are defined in the dialog window **CAL LOOP Conc**.



Command name

25 characters, [Calibration loop Conc #]
Name of the command.

Standards

Number of standards

1 ... [2] ... 5
Selection of the number of standards for the concentration calibration.

Unit conc.

mol/L, mmol/L, [ppm], %, g/L, mg/L, mg/mL, µg/L, µg/mL, mg/mL
Selection of the concentration unit of the standards.

Conc. standard #

0.001 ... 999'999.999
Entry of the corresponding concentration of each standard.

Request for standard exchange

[on], off

If this option is enabled, a request for manual standard exchange is displayed after each measurement. This option must be disabled for automatic standard exchange when calibrating with a Sample Processor.

CAL MEAS Conc

Measuring command for **calibrating ion-selective electrodes**. The command is used together with the command **CAL LOOP Conc**.

Devices

This command can be executed with the following devices:

Titrando: 808, 809, 835, 836, 855

Appearance

The command has the following appearance:

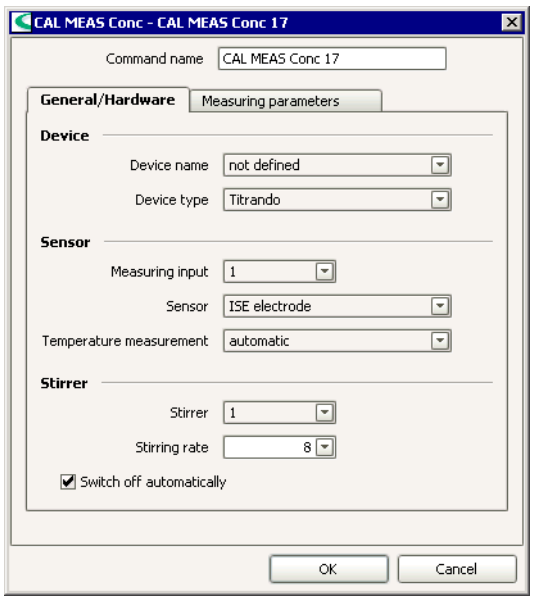
Parameters

The parameters for the command **CAL MEAS Conc** are configured on the following 2 tabs:

- **General/Hardware**
  Parameters for device, sensor and stirrer.
- **Measuring parameters**
  Parameters for the measurement.

General/Hardware

The general parameters for the control device, the sensor and the stirrer are defined on this tab.



Command name

25 characters, [CAL MEAS Conc #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] (855)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [ISE electrode]

Selection of a ISE sensor from the ISE sensors configured in the sensor table.

Temperature measurement

Type of temperature measurement:

continuous

A temperature sensor must be connected. The temperature is then measured continuously.

[automatic]

If a temperature sensor is connected, the temperature will be measured continuously. Otherwise the temperature manually entered under **Temperature** (see Measuring parameters) will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** (see Measuring parameters) will be used.

Stirrer

Stirrer

[1] ... 4, off

Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15

Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off

The stirrer is automatically switched off at the end of the command if this option is enabled.

Measuring parameters

Screenshot and parameters: *see CAL MEAS pH - Measuring parameters*

5.6.8 Dosing commands

Commands for **Dosing** with dosing units and exchange units.

The following four 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.

ADD

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:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

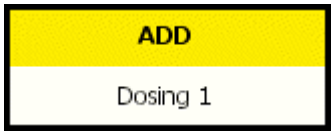
Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:



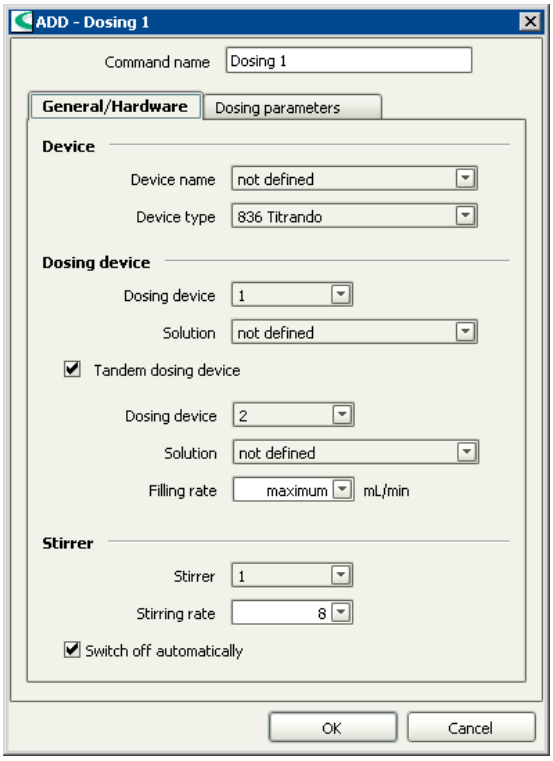
Parameters

The parameters for the command **ADD** are configured on the following 2 tabs:

- **General/Hardware**
  Parameters for the hardware.
- **Dosing parameters**
  Parameters for the dosing settings.

General/Hardware

The general parameters for the control device, the dosing device and the stirrer are defined on this tab.



Command name

25 characters, [Dosing #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando, 846)
[1] ... 3 (778, 789, 814, 815, 855)
[1] ... 12 (730, 774)
internal D0 (702, 716, 718, 719, 720, 721, 785, 794, 798)
[internal D0], external D1, external D2 (736, 751, 758, 799)
Selection of the dosing device to be used for the dosing. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

Solution

24 characters, solution name, [not defined]
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Tandem dosing

on, [off] (only Titrando, 846, 814, 815, 855)
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 *STAT pH - General/Hardware*).

Dosing device

1 ... [2] ... 4 (only Titrando, 846)
1 ... [2] ... 3 (814, 815, 855)
Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Solution

24 characters, solution name, [not defined] (only Titrando, 846, 814, 815, 855)
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. If **not defined** is selected no tests will be carried out.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (only Titrando, 846, 814, 815, 855)
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 unit 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 *STAT pH - General/Hardware*).

Stirrer

Stirrer

[1] ... 4, off (only Titrando, 846, 814, 815, 855)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

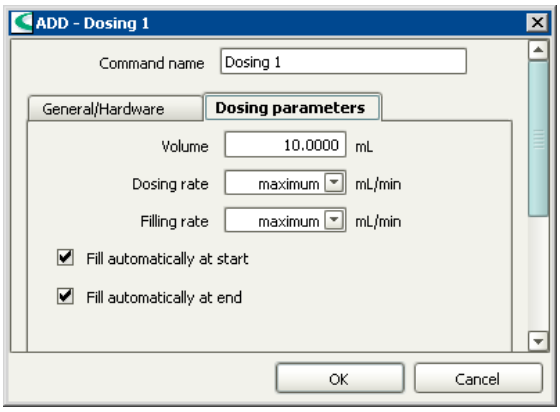
-15 ... [8] ... 15 (only Titrando, 846, 814, 815, 855)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando, 846, 814, 815, 855)
The stirrer is automatically switched off at the end of the command if this option is enabled.

Dosing parameters

The volume to be added and the dosing and filling rate are defined on this tab.



Command name

25 characters, [Dosing #]
Name of the command.

Volume

0.00000 ... [10.0000] ... 99999.9 mL (Titrando, 846, 814, 815, 855)
0.0001 ... [10.0000] ... 9999.0 mL (Titrino)
0.001 ... [10.000] ... 999.999 mL (730, 778, 789)
0.01 ... [10.000] ... 999.999 mL (774)
Volume to be added.

Dosing rate

[maximum]
0.01 ... 166.00 mL/min (Titrando, 814 815)
0.01 ... 160.00 mL/min (730, 774, 778, 789)
0.01 ... 150.00 mL/min (Titrino)
Speed at which dosing is carried out. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. In case the entered dosing rate is too high for the selected dosing device, the rate will be reduced automatically to the highest possible value.

> ***Note***
> *Lower dosing rates should be entered for solutions with higher viscosities.*

Filling rate

[maximum]
0.01 ... 166.00 mL/min (Titrando, 846, 814, 815, 855)
0.01 ... 160.00 mL/min (730, 774, 778, 789)
0.01 ... 150.00 mL/min (Titrino)
Speed 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 unit used. In case the entered filling rate is too high for the selected dosing device, the rate will be reduced automatically to the highest possible value.

> ***Note***
> *Lower filling rates should be entered for solutions with higher viscosities.*

Fill automatically at start

[on], off (only Titrando, 846, 814, 815, 855)
The buret is automatically filled before dosing if this option is enabled.

Fill automatically at end

[on], off
The buret is automatically filled after dosing if this option is enabled.

DOS

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. The measured value and the temperature can be monitored simultaneously. Three different types of dosing modes can be chosen by defining two parameters from the following: **Volume**, **Dosing rate** and **Dosing time**. 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 chosen:

- **DOS pH**
  Controlled dosing with measurement quantity pH.
- **DOS U**
  Controlled dosing with measurement quantity U.

DOS pH

Command for **controlled dosing** with measured value pH.

Devices

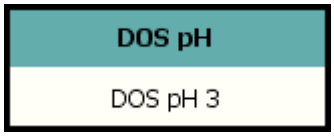
This command can be executed with the following devices which have the **DOS pH** mode:

Titrino: 718, 736, 751, 799

Titrando: 835, 836, 842, 855

Appearance

The command has the following appearance:



Parameters

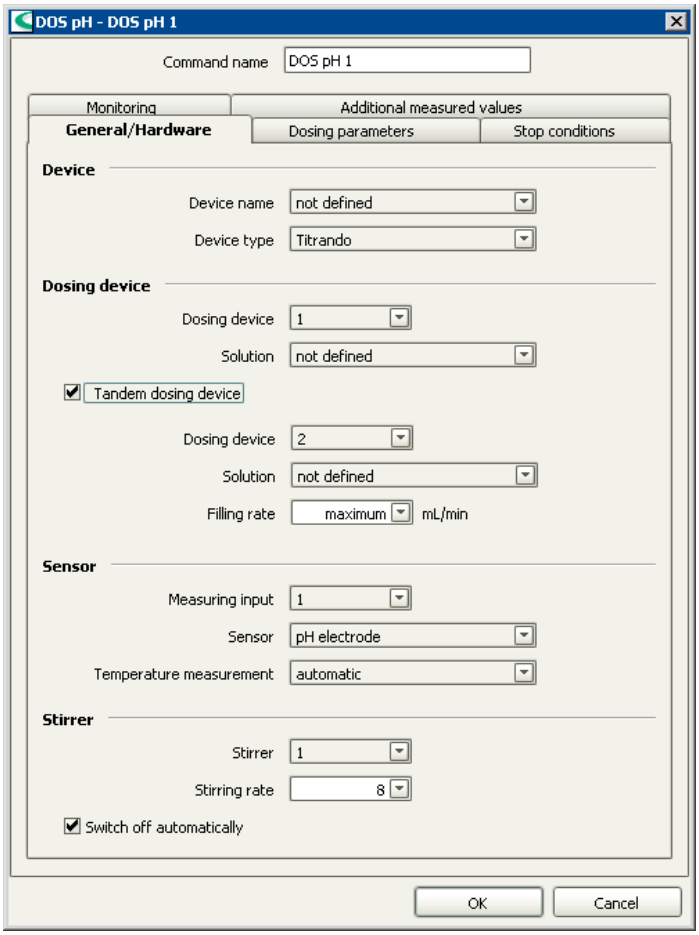
The parameters for the command **DOS pH** are configured in the following 5 tabs:

- **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 column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device and the stirrer are defined on this tab.



Command name

25 characters, [DOS pH #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (835, 836, 842)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (736, 751, 799)
Selection of the dosing device to be used for the dosing. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

Solution

24 characters, solution name, [not defined]
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Tandem dosing

on, [off] (only Titrando)
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 *STAT pH - General/Hardware*).

Dosing device

1 ... [2] ... 4 (835, 836, 842)
1 ... [2] ... 3 (855)
Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Solution

24 characters, solution name, [not defined] (only Titrando)
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. If **not defined** is selected no tests will be carried out.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (only Titrando)
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 unit 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 *STAT pH - General/Hardware*).

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, [pH electrode]
Selection of the pH sensor from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous

A temperature sensor must be connected. The temperature is measured continuously.

[automatic]

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off

The temperature will not be measured. The **Temperature** (*see Dosing parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)

Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)

Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

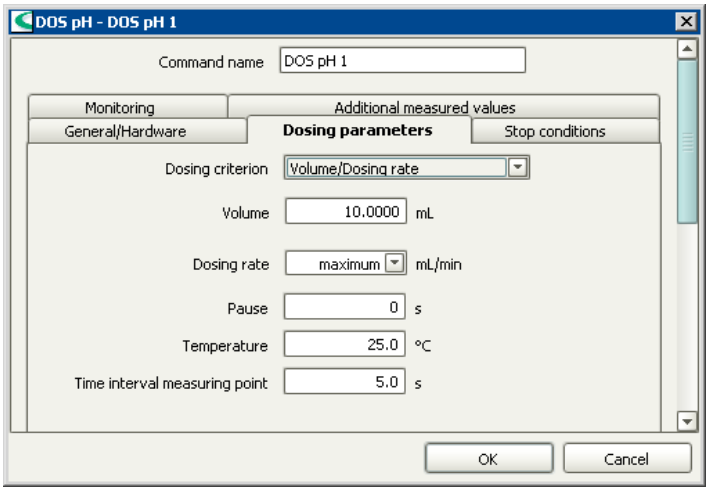
Switch off automatically

[on], off (only Titrando)

The stirrer is automatically switched off at the end of the command if this option is enabled.

Dosing parameters

The volume to be added, the dosing rate and the dosing time are defined on this tab.



Command name

25 characters, [DOS pH #]

Name of the command.

Dosing criterion

[Volume/Dosing rate], Volume/Dosing time, Dosing rate/Dosing time

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 shownDOS - monitored dosing.

Volume

0.00000 ... [10.0000] ... 99999.9 mL

Fixed volume to be added. This parameters is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time.**

Dosing rate

[maximum]

0.01 ... 166.00 mL/min (Titrando)

0.01 ... 150.00 mL/min (Titrino)

Speed at which dosing is carried out. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. In case the entered dosing rate is too high for the selected dosing device, the rate will be reduced automatically to the highest possible value. This parameters is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time.**

> ***Note***
> *Lower dosing rates should be entered for solutions with higher viscosities.*

Dosing time

0 ... [100] ... 9999999 s

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..**

Pause

[0] ... 999999 s

Waiting period before dosing is started.

Temperature

-20.0 ... [25.0] ... 150 °C (Titrando)

-170.0 ... [25.0] ... 500 °C (Titrino)

Manually entered measuring temperature. If a temperature sensor is connected and **temperature measurement** on the tab **General/Hardware** is set to **automatic** or **continuous**, the temperature is measured continuously. The value is used for the temperature adjustment during the measurement.

Time interval measuring point

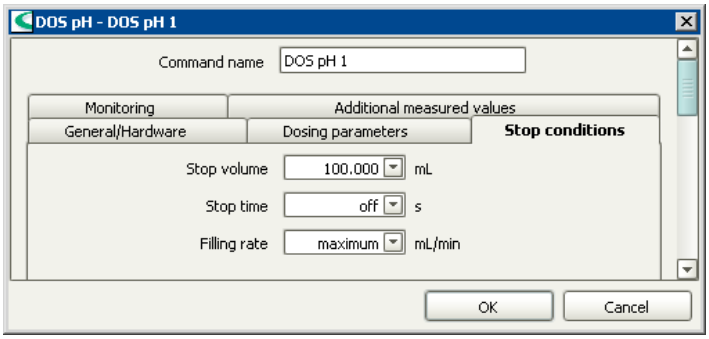
0.1 ... [5.0] ... 999'999 s (Titrando)

1 ... [5] ... 999'999 s (Titrino)

Time interval for entering a measuring point in the list of measuring points.

Stop conditions

Conditions for stopping the dosing. The stop conditions are checked at the same time and the condition which is fulfilled first stops the titration.



Command name

25 characters, [DOS pH #]

Name of the command.

Stop volume

0.00000 ... [100.000] ... 9999.99 mL, off (Titrando)

0.000 ... [100.000] ... 9999.99 mL, off (Titrino)

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.

Stop time

0 ... 999999 s, [off] (only Titrando)
Stops when the preset time has elapsed since the start of the dosing.

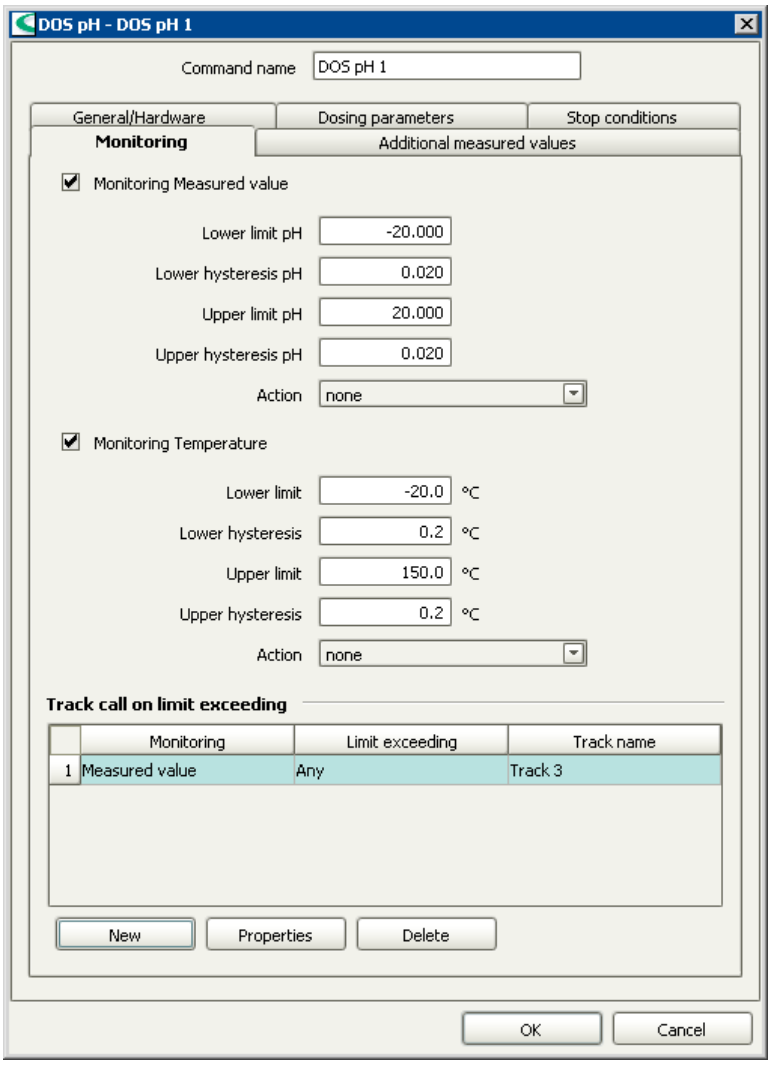
Filling rate

0.01 ... 166.00 mL/min, [maximum] (Titrando)
0.01 ... 150.00 mL/min, [maximum] (Titrino)
Speed 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 unit used. In case the entered filling rate is too high for the selected dosing device, the rate will be reduced automatically to the highest possible value.

> ***Note***
> *Lower filling rates should be entered for solutions with higher viscosities.*

Monitoring

Definition of monitoring.



Command name

25 characters, [DOS pH #]
Name of the command.

Monitoring Measured value

on, [off]
If this option is switched on then the measured value will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit pH
[-20.000] ... 20.000 (Titrando)
[-20.00] ... 20.00 (Titrino)
Lower limit of the measured value. When the measured value falls below this value, the action **Measured value lower limit exceeded** is triggered.

Lower hysteresis pH
0.000 ... [0.020] ... 20.000 (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the measured value. When the measured value exceeds the lower limit plus this hysteresis value, the action **Measured value lower limit ok** is triggered.

Upper limit pH
-20.000 ... [20.000] (Titrando)
-20.00 ... [20.00] (Titrino)
Upper limit of the measured value. When the measured value exceeds this value, the action **Measured value upper limit exceeded** is triggered.

Upper hysteresis pH
0.000 ... [0.020] ... 20.000 (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the measured value. When the measured value falls below the upper limit plus this hysteresis value, the action **Measured value upper limit ok** is triggered.

Action
Definition of the action to be taken when the limits of the measured value are infringed:

Stop determination (only Titrando)
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **DOS** command is quit, then the next command is started.

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 window.

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.

Monitoring Temperature

on, [off]
If this option is switched on then the temperature will be monitored and any limit infringements will be entered in the list of measuring points.

Lower limit
[-20.0] ... 150.0 °C (Titrando)
[-170.0] ... 500.0 °C (Titrino)
Lower limit of the temperature. When the temperature falls below this value, the action **Temperature lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the temperature. When the temperature exceeds the lower limit plus this hysteresis value, the action **Temperature lower limit ok** is triggered

Upper limit

-20.0 ... [150.0] °C (Titrando)
-170.0 ... [500.0] °C (Titrino)
Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the temperature. When the temperature falls below the upper limit plus this hysteresis value, the action **Temperature upperlimit ok** is triggered

Action

Definition of the action to be taken when the limits of the temperature are infringed:

Stop determination (only Titrando)
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **DOS** command is quit, then the next command is started.

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 the **[Continue]** button in this message window.

Wait for limit ok
Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing will be resumed automatically.

[none]
No action will be taken.

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 infringed.

New

Open the dialog window **Track call #** (*see below*) to enter parameters of a new track call.

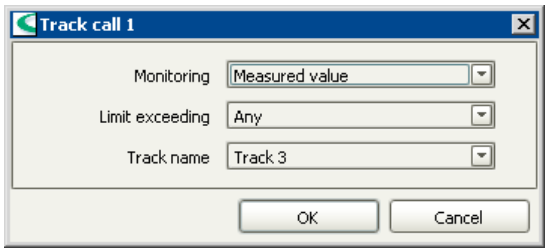
Properties

Open the dialog window **Track call #** (*see below*) to edit parameters of the selected track call.

Delete

Delete the selected track call.

Track call



Monitoring

[Measured value], Temperature, Any

Selects the parameter for which a track is to be started if the limits are infringed (**Any** = either of the two parameters).

Limit exceeding

Lower limit, Upper limit, [Any], OK

Selects the limit infringement for which a track is to be started. With **Any** the track will be started when either the upper or lower limit is infringed, with OK the track will be started when the monitored parameter is again within the limits (including hysteresis).

Track name

Selection of available tracks

Selects the track that is to be started automatically.

> ***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.*

Additional measured values

Screenshot and parameters: see DET pH - Additional measured values

DOS U

Command for **controlled dosing** with measured value U.

Devices

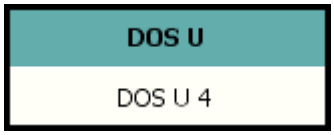
This command can be executed with the following devices which have the **DOS U** mode:

Titrino: 718, 736, 751, 799

Titrando: 835, 836, 842, 855

Appearance

The command has the following appearance:



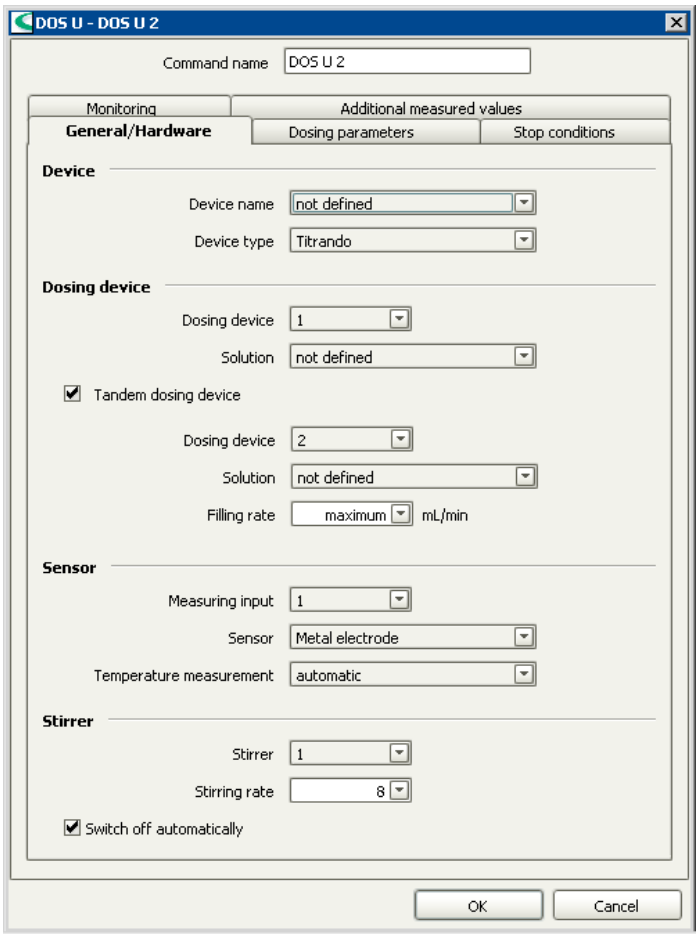
Parameters

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 column in the list of measuring points.

General/Hardware

The general parameters for the control device, the dosing device and the stirrer are defined on this tab.



Command name

25 characters, [DOS U #]
Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (835, 836, 842)
[1] ... 3 (855)
[internal D0] (Titrino)
external D1, external D2 (736, 751, 799)

Selection of the dosing device to be used for the dosing. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

Solution

24 characters, solution name, [not defined]

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Tandem dosing

on, [off] (only Titrando)

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 *STAT pH - General/Hardware*).

Dosing device

1 ... [2] ... 4 (835, 836, 842)
1 ... [2] ... 3 (855)

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Solution

24 characters, solution name, [not defined] (only Titrando)

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. If **not defined** is selected no tests will be carried out.

Filling rate

0.01 ... 166.00 mL/min, [maximum] (only Titrando)
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 unit 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 *STAT pH - General/Hardware*).

Sensor

Measuring input

[1] ... 2 (Titrando)
[1] (855)
[1] ... 2, diff. (Titrino)
Selection of the measuring input to which the sensor is connected.

Sensor

Sensor name, pH electrode, [Metal electrode], ISE electrode, Conductivity sensor
Selection of the pH sensor from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for the determination.

Temperature measurement

Type of temperature measuring (only Titrando):

continuous
A temperature sensor must be connected. The temperature is measured continuously.

[automatic]
If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the manually entered **Temperature** (tab **Titration parameters**) will used.

off
The temperature will not be measured. The **Temperature** (*see Dosing parameters*) which has been entered manually will be used.

Stirrer

Stirrer

[1] ... 4, off (only Titrando)
Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

-15 ... [8] ... 15 (only Titrando)
Setting the stirrer speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes.

Switch off automatically

[on], off (only Titrando)
The stirrer is automatically switched off at the end of the command if this option is enabled.

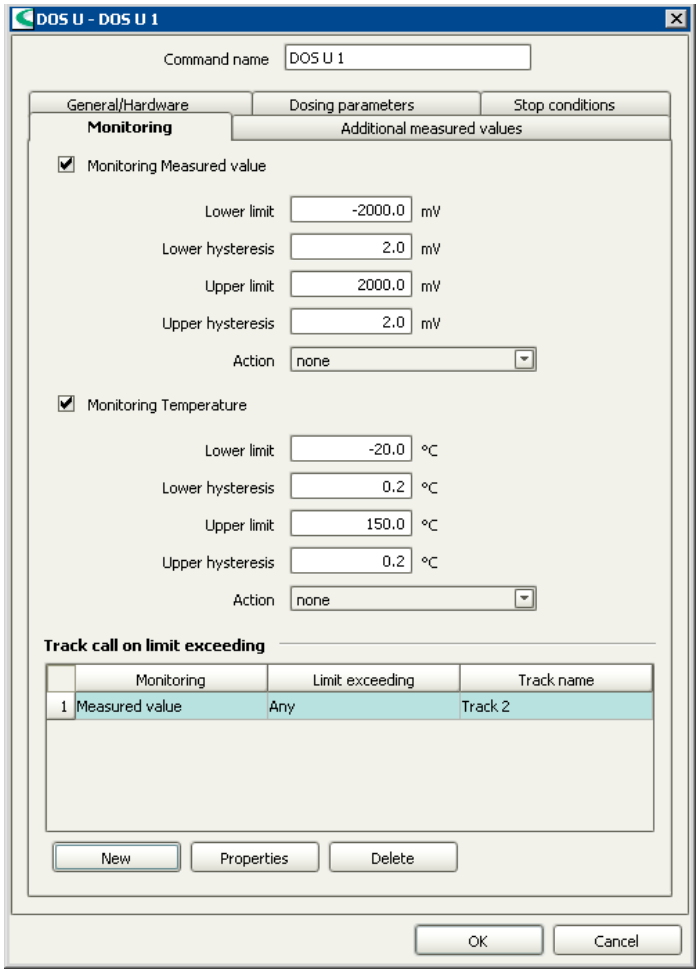
Dosing parameters

Screenshot and parameters: *see DOS pH - Dosing parameters*

Stop conditions

Screenshot and parameters: *see DOS pH - Stop conditions*

Monitoring



Command name

25 characters, [DOS U #]
Name of the command.

Monitoring Measured value

on, [off]
If this option is switched on then the measured value will be monitored and any infringements will be entered in the list of measuring points.

Lower limit

[-2000.0] ... 2000.0 mV (Titrando)
[-2000] ... 2000 mV (Titrino)
Lower limit of the measured value. When the measured value falls below this value, the action **Measured value lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [2.0] ... 2000.0 mV (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the measured value. When the measured value exceeds the lower limit plus this hysteresis value, the action **Measured value lower limit ok** is triggered.

Upper limit

-2000.0 ... [2000.0] mV (Titrando)
-2000 ... [2000] mV (Titrino)
Upper limit of the measured value. When the measured value exceeds this value, the action **Measured value upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [2.0] ... 2000.0 mV (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the measured value. When the measured value falls below the upper limit plus this hysteresis value, the action **Measured value upper limit ok** is triggered.

Action

Definition of the action to be taken when the limits of the measured value are infringed:

Stop determination (only Titrando)
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **DOS** command is quit, then the next command is started.

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 window.

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 is continued automatically.

[none]
No action will be taken.

Monitoring Temperature

on, [off]
If this option is switched on then the temperature will be monitored and any infringements will be entered in the list of measuring points.

Lower limit

[-20.0] ... 150.0 °C (Titrando)
[-170.0] ... 500.0 °C (Titrino)
Lower limit of the temperature. When the temperature falls below this value, the action **Temperature lower limit exceeded** is triggered.

Lower hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The lower hysteresis represents a tolerance range for the lower limit of the temperature. When the temperature exceeds the lower limit plus this hysteresis value, the action **Temperature lower limit ok** is triggered

Upper limit

-20.0 ... [150.0] °C (Titrando)
-170.0 ... [500.0] °C (Titrino)
Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Upper hysteresis

0.0 ... [0.2] ... 150.0 °C (only Titrando)
The upper hysteresis represents a tolerance range for the upper limit of the temperature. When the temperature falls below the upper limit plus this hysteresis value, the action **Temperature upper limit ok** is triggered

Action

Definition of the action to be taken when the limits of the temperature are infringed:

Stop determination (only Titrando)
The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command
The running **DOS** command is quit, then the next command is started.

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 the **[Continue]** button in this message window.

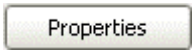
Wait for limit ok
Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing is resumed automatically.

[none]
No action will be taken.

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 infringed.

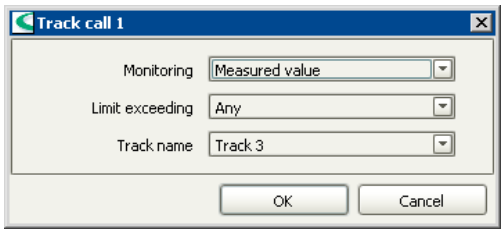
Open the dialog window **Track call #** (*see below*) to enter parameters of a new track call.



Open the dialog window **Track call #** (*see below*) to edit parameters of the selected track call.

Delete the selected track call.

Track call



Monitoring
[Measured value], Dosing rate, Temperature, Any
Selects the quantity for which a track is to be started if its limits are infringed (**Any** = any of the three quantities).

Limit exceeding
Lower limit, Upper limit, [Any], OK
Selects the limit infringement for which a track is to be started. With **Any** the track will be started for an infringement of either the lower or the upper limit, with **OK** the track will be started when the monitored quantity is again within the limits (including hysteresis).

Track name
Selection of available tracks
Selects the track that is to be started automatically.

> ***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.*

Additionan measured values

Screenshot and parameters: see DET pH - Additional measured values

LQH

Command for **extensive dosing tasks** with a Dosino (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, 855

Dosing Interface: 846

Sample Processor: 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

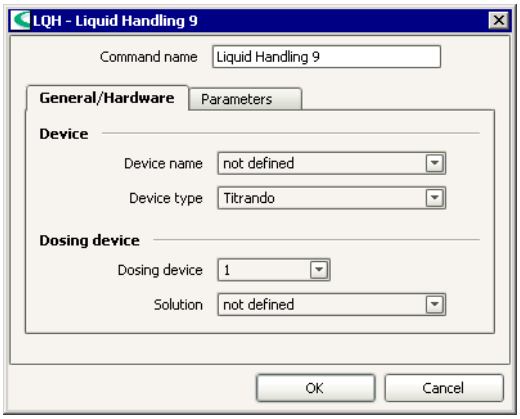
Parameters

The parameters for the command **LQH** are configured on the following 2 tabs:

- **General/Hardware**
  Parameters for the hardware.
- **Parameters**
  Parameters for the Liquid Handling tasks.

General/Hardware

The general parameters for the control device and the dosing device are defined on this tab.



Command name
25 characters, [Liquid Handling #]
Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando, 846)
[1] ... 3 (778, 789, 814, 815, 855)
Selection of the dosing device to be used for the liquid handling tasks. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

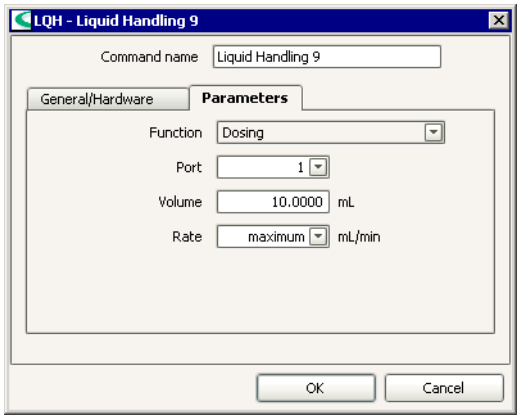
Solution

24 characters, solution name, [not defined]

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

Parameters

The liquid handling parameters are defined on this tab.



Command name

25 characters, [Liquid Handling #]

Name of the command.

Function

Selecting the liquid handling function to be carried out:

[Dosing]
The given volume is added. No automatic filling takes place either before or after.

Fill
Filling the cylinder can take place from a freely selectable port. The valve disk then remains at the selected port.

Aspirate
With this function liquid is aspirated via the given port. As with **Dosing**, the cylinder is not automatically filled either before or after the command. It should be possible for the aspirated volume to be removed with a single piston stroke.

Eject to stop
With this function the whole cylinder content is ejected via the given 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 contrary to the function **Eject to stop** the piston is lowered only to the maximum volume mark i.e. 10'000 pulses. This function should be used for pipetting sequences to empty the cylinder.

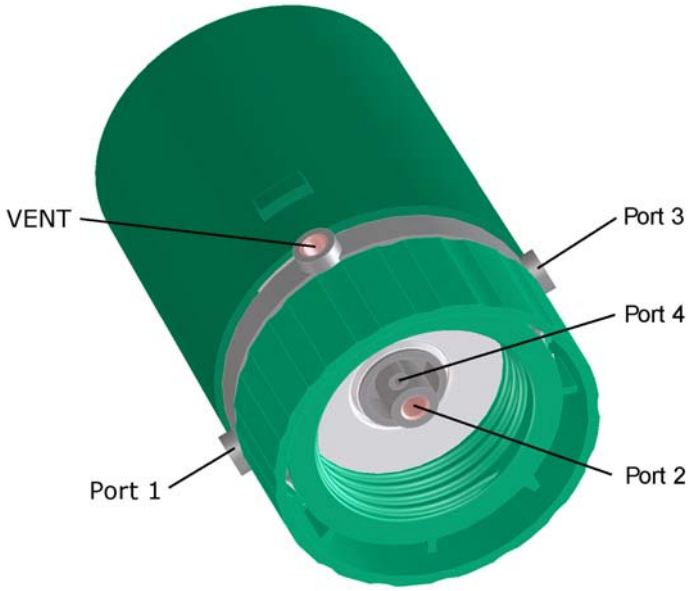
Exchange position
With this function the cylinder is filled via the given port first. Afterwards, the valve disk is switched to **port 2**, the dosing drive can then be removed from the dosing unit.

Change port
The valve disk is rotated 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 slight mechanical tolerance that can be noticed when the piston changes its direction of movement. This tolerance can be compensated with this function. A short piston movement is first made in the same direction as the previous movement; this is followed by a piston movement in the reverse direction.

Port

1 ... 4
Default values:
1: for **Dosing** , **Aspirate**
2: for **Fill**, **Exchange position**, **Change port**
4: for **Eject to stop**, **Eject to end volume**, **Compensate**
The desired port for the selected function has to be defined for each liquid handling command.



Volume

0.00000 ... [10.00000] ... 99'999.9 mL (Dosing)
0.00000 ... [10.00000] ... 50.0 mL (Aspirate)
Enter the volume to be processed. This parameter is only visible for the **Functions Dosing** and **Aspirate**.

Rate

[maximum]
0.01 ... 166.00 mL/min
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 Dosing unit used. Aspirating and ejecting the sample should be done with a rate < 10 mL/min.

PREP

Command for **rinsing cylinder and tubing** of an exchange or dosing unit.

Devices

This command can be executed with the following devices:

Titrino: 736, 751, 758, 799

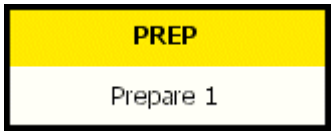
Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

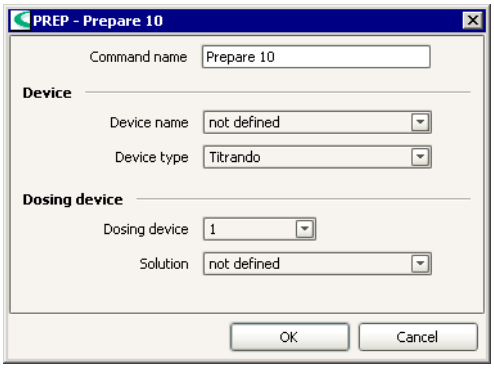


Parameters

The parameters for the command **PREP** are configured in the following dialog window:

- **PREP**

PREP - properties



Command name

25 characters, [Prepare #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando, 846)
[1] ... 3 (778, 789, 814, 815, 855)
[1] ... 12 (730, 774)
[internal D0], external D1, external D2 (736, 751, 758, 799)
Selection of the dosing device to be prepared. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

Solution

24 characters, solution name, [not defined]

Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

EMPTY

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, 855

Dosing Interface: 846

Sample Processor: 778, 789, 814, 815, 855

Appearance

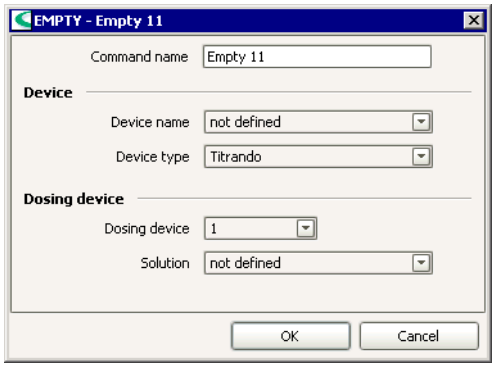
The command has the following appearance:

Parameters

The parameters for the command **EMPTY** are configured in the following dialog window:

- **EMPTY**

EMPTY - properties



Command name

25 characters, [Empty #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Dosing device

Dosing device

[1] ... 4 (Titrando, 846)
[1] ... 3 (814, 815, 855)
Selection of the dosing device (Dosinos only) to be emptied. All the dosing device connections (MSB) are displayed which are possible with the selected device type.

Solution

24 characters, solution name, [not defined]
Input or selection of the solution defined in the solution table. Additionally, **not defined** can be selected. If intelligent exchange or dosing units are used then a check will be made in the method sequence that the correct solution is present in the connected dosing device and whether the type of dosing device is correct. With non-intelligent exchange or dosing units the cylinder volume is checked. At the start of the command the validity of the titer and the expiry date of the selected solution will be checked as well as the GLP test interval for the buret. If **not defined** is selected no tests will be carried out.

5.6.9 Automation commands

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.

MOVE

Command for **moving to a rack position** (sample position or special beaker).

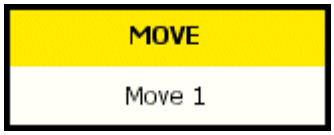
Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

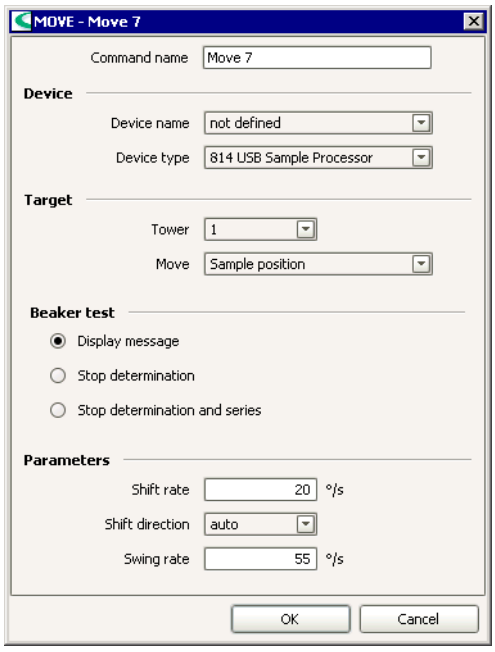


Parameters

The parameters for the command **MOVE** are configured in the following dialog window:

- **MOVE**

MOVE - properties



Command name

25 characters, [Move #]

Name of the command.

Device

Device name

Device name, [not defined]

Selecting a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Target

Tower

[1], 2
Selecting the tower of the Sample Processor for moving to the required position. Both Tower 1 and Tower 2 are always selectable even if the Sample Processor has got only one tower.

Move

Selecting the target position on the rack:

[Sample position]
Position defined in the Run window as parameter **Sample position**.

Rack position
Position on the rack.

Special beaker
Special position on the rack defined in the rack properties (see Rack properties - Special beaker).

Relative angle (only for 778, 789, 814, 815)
The sample rack can be rotated by a certain amount relatively to the current position independently from rack positions. This can be used for example to remove vial caps automatically.

Number

[1] ... 999 (for **Move** = **Rack position**)
[1] ... 16 (for **Move** = **Special beaker**, only for 778, 789, 814, 815, 855)
[1] ... 8 (for **Move** = **Special beaker**, only for 730, 774)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. This is necessary for example for the automatic calibration of electrodes. The Formula editor (see Formula editor) is opened by right clicking into the input field.

Move angle

-259.90 ... [5.00] ... 259.90 °
This parameter specifies the angle about which the sample rack should be rotated relatively to the current position. It is only visible for **Move** = **Relative angle**.

Beaker test

Selection of the action to be carried out if the **Beaker sensor** defined for the rack doesn't detect a sample at the target position. If the **Robotic arm** is defined as beaker sensor, a Swing Head must be installed and a suitable **Work position** with beaker contact must be defined for the lift. This position will be moved to automatically for beaker recognition after the command **MOVE**. This section is not visible for **Move** = **Relative angle**.

Display message

[on], off
A message is displayed and the determination is stopped.

Stop determination

on, [off]
The determination is stopped and the next determination of the series is started.

Stop determination and series

on, [off]
The determination as well as the series are stopped. An Error track will be started if there is one defined.

Parameters

Shift rate

3 ... [20] °/s
Entry of the speed at which the sample rack rotates.

Shift direction

[auto], +, –

Selection of the direction of rotation of the sample rack. The direction of rotation with the smallest angle of rotation is selected automatically with **auto**. The direction of rotation is counterclockwise with "**+**" and clockwise with "**-**".

Swing rate

10 ... [55] °/s (only for 778, 789, 814, 815)

Entry of the speed of the robotic arm when moving to a rack position or a special beaker (only with multiple row sample racks).

SWING

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.

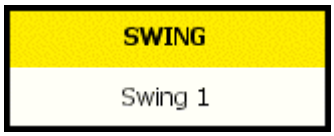
Devices

This command can be executed with the following devices:

Sample Processor: 778, 789, 814, 815, 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SWING** are configured in the following dialog window:

- **SWING**

SWING - properties

Command name

25 characters, [Swing #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Target

Tower

[1], 2

Selecting the tower of the Sample Processor for moving the robotic arm to the required position. Both Tower 1 and Tower 2 are always selectable even if the Sample Processor has got only one tower.

Swing

Selecting the target position for the robotic arm:

[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 angle (see Robotic arm properties).

Relative angle

The robotic arm can be swinged relatively to the momentary position by a certain increment. This can be used for example to remove vial caps automatically.

Number

[1] ... 4

Number of the external position being swinged to. This parameter is only visible for **Swing** = **External position**.

Swing angle

-180.0 ... [10.0] ... 180.0 °

Angle about which the robotic arm should be swinged relatively to the current position. It is only visible for **Swing** = **Relative angle**.

Parameters

Swing rate

10 ... [55] °/s

Speed of the robotic arm when swinging to an external position or a certain angle.

LIFT

Command for **moving to a Work position, Shift position, Rinse position and Special position** with a Sample Processor.

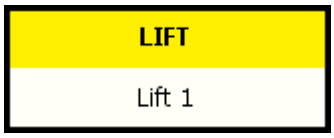
Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

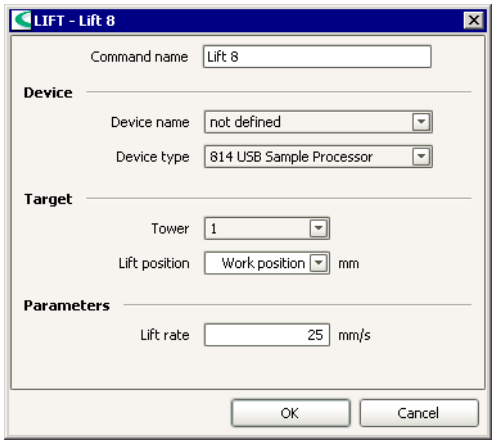


Parameters

The parameters for the command **LIFT** are configured in the following dialog window:

- **LIFT**

LIFT - Properties



Command name

25 characters, [Lift #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Target

Tower

[1], 2
Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 are always selectable even if the Sample Processor has got only one tower.

Lift position

0 ... 235 mm, [Work position], Shift position, Rinse position, Special position, Home position (730, 778, 789, 814, 815, 855)
0 ... 100 mm, [Work position], Shift position, Rinse position, Special position, Home position (774 KF Oven Sample Processor)
Input the desired lift position in mm or selecting one of the predefined lift positions **Work position, Shift position, Rinse position** or **Special position**. A lift height of 0 mm corresponds to the **Home position** where the lift is moved to the uppermost stop.

> ***Note***
> *Please make sure that none of the lift positions exceeds the maximum stroke path given in the tower properties of the device.*

Parameters

Lift rate

5 ... [25] °/s (778, 789, 814, 815, 855)
3 ... [25] °/s (730)
3 ... [12] °/s (774)
Selection of the speed for moving the lift.

PUMP

Command for **controlling pumps** connected (or built-in) to the Sample Processor.

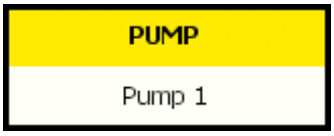
Devices

This command can be executed with the following devices:

Sample Processor: 730, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

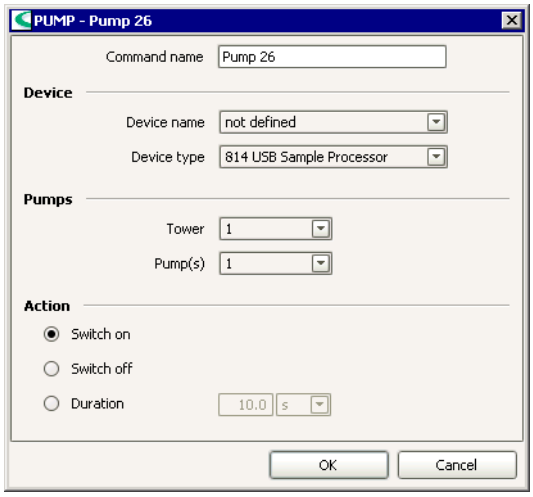


Parameters

The parameters for the command **PUMP** are configured in the following dialog window:

- **PUMP**

PUMP - properties



Command name

25 characters, [Pump #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Pumps

Tower

[1], 2

Selection of the tower at the Sample Processor at which the pumps should be controlled. Both Tower 1 and Tower 2 are always selectable even if the Sample Processor has got only one tower.

Pump(s)

[1], 2, 1+2

Selection of the pump that is to be switched. 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.

Action

Switch on

[on], off

Switch on the pump(s).

Switch off

on, [off]

Switch off the pump(s).

Duration

on, [off]; 0 ... [10.0] ... 9999.9; [s], min

Switch on the pump(s) for a particular period.

STIR

Command for **controlling a connected stirrer**.

Devices

This command can be executed with the following devices:

Titrino: 751, 758, 784, 785, 794, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Coulometer: 756, 831

Sample Processor: 730, 778, 789, 814, 815, 855

Appearance

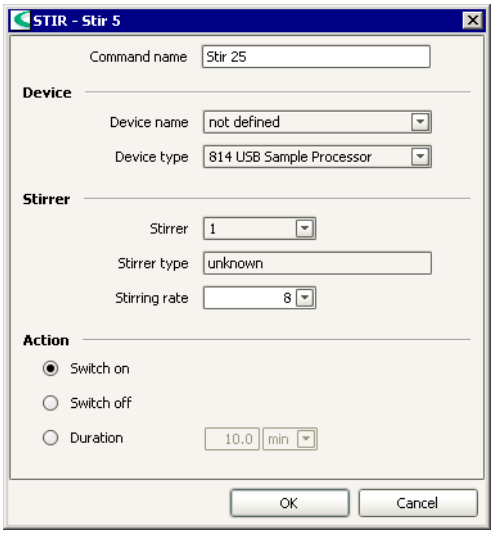
The command has the following appearance:

Parameters

The parameters for the command **STIR** are configured in the following dialog window:

- **STIR**

STIR - properties



Command name

25 characters, [Stir #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Stirrer

Stirrer

[1] ... 4 (Titrando, 730, 846)
[T1], T2 (tower stirrer), 1...3 (MSB stirrer) (778, 789)
[1]...3 (814, 815, 855)
1 (756, 831, Titrino)
Selection of the stirrer.

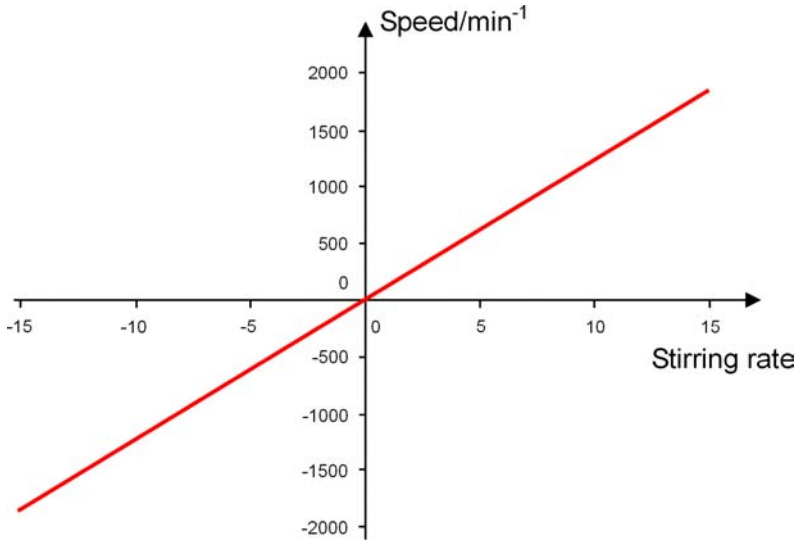
Stirrer type

801 magnetic stirrer, 802 Rod stirrer, 803 Ti Stand magnetic stirrer, 804 Ti Stand rod stirrer, unknown

Display of the stirrer type. **unknown** is displayed either with devices unable to read out the stirrer type or if no stirrer is connected.

Stirring rate

-15 ... [8] ... 15 (Titrando, 846, 814, 815, 855)
0 ... [8] ... 15 (730, 774, 778, 789)
Setting the stirrer rate and speed. The direction in which stirring takes place changes as the sign in front of the stirrer speed changes. The default setting **8** corresponds to a stirrer speed of 1000 min^{-1}.



Action

Switch on

[on], off

Switch on the stirrer. The stirrer keeps switched on after the command is finished.

Switch off

on, [off]

Switch off the stirrer.

Duration

on, [off]; 0 ... [10.0] ... 9'999.9; s, [min]

Switch on the stirrer for a particular period.

RACK

Command for **Initialization of the attached sample rack**. The rack, lift and robotic arm (if existing) are reset, the rack code is read off and the corresponding rack data are transferred to the Sample Processor.

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

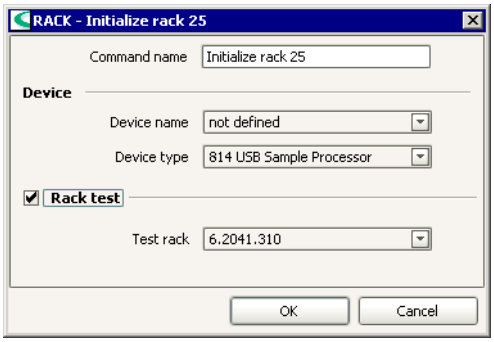
The command has the following appearance:

Parameters

The parameters for the command **RACK** are configured in the following dialog window:

- **RACK**

RACK - properties



Command name

25 characters, [Initialize rack #]
Name of the command.

Device

Device name

Device name, [not defined]
Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [814 USB Sample Processor]
Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Rack test

on, [off]
If this option is enabled, the rack attached will be checked.

Test rack
all sample racks listed in the configuration
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 Error track will be started if there is one defined.

HEATER

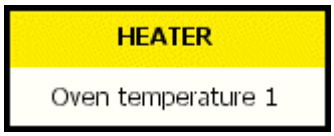
Command for **controlling the oven temperature** of the 774 Oven Sample Processor.

Devices

This command can only be executed with the 774 Oven Sample Processor.

Appearance

The command has the following appearance:

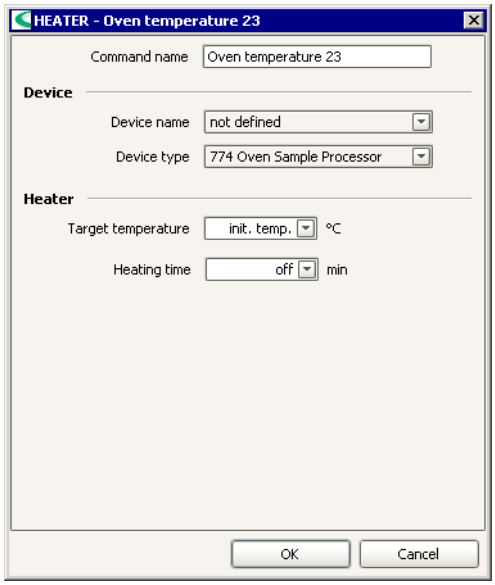


Parameters

The parameters for the command **HEATER** are configured in the following dialog window:

- **HEATER**

HEATER - properties



Command name
25 characters, [Oven temperature #]
Name of the command.

Device

Device name

Device name, [not defined]

Selection of a 774 Oven Sample Processor from the device table. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

774 Oven Sample Processor

Display of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Heater

Target temperature

50 ... 250 °C, [init.temp.], off

Temperature at which the oven has to be heated. With **init.temp.** the oven heater will be switched on simultaneously with the 774 Oven Sample Processor and the oven is heated up to this temperature. The initial temperature must be defined at the 774 Oven Sample Processor and is only displayed in the configuration of the 774 Oven Sample Processor.

> ***Note***
> *It is advisable to define an initial temperature if you work always at the same temperature.*

Heating time

1 ... 999 min, [off]

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 Instructions for Use for 774 Oven Sample Processor).

Timeout

1 ... 999 min, [off]

Should the target temperature not be reached within the defined **Heating time** this waiting time starts. This parameter is only visible if a **Heating time** has been defined.

Action if timeout expires

on, [off] (displayed only if **Timeout** ≠ **off**)

Selection of the action to be carried out if the target temperature is not reached after the expiry of the timeout.

Display message

[on], off

A message is displayed and you can choose whether you want to continue the run or cancel it.

Stop determination

on, [off]

The determination is stopped and the next determination of the series is started.

Stop determination and series

on, [off]

The determination as well as the series are stopped. An Error track will be started if there is one defined.

FLOW

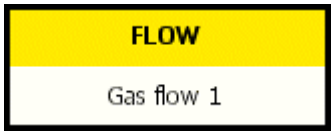
Command for **controlling the gas flow** of the 774 Oven Sample Processor.

Devices

This command can only be executed with the 774 Oven Sample Processor.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **FLOW** are configured in the following dialog window:

- **FLOW**

FLOW - properties

Command name

25 characters, [Gas flow #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a 774 Oven Sample Processor from the device table. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

774 Oven Sample Processor

Display of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Gas

Gas type

[air], nitrogen, other gas

Gas type of the carrier gas.

Gas flow factor

0.001 ... [1.000] ... 9.999

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 Instructions for Use for the 774 Oven Sample Processor.

Gas flow

Inlet

Selection of the inlet of the carrier gas:

[pump]

Use of ambient air as carrier gas.

valve

Use of gas out of a compressed gas cylinder as carrier gas.

Switch on

[on], off

Switch on the gas flow.

Switch off

on, [off]

Switch off the gas flow.

5.6.10 Result commands

Commands for the **calculation, storage and output of results**.

The following four result commands can be selected:

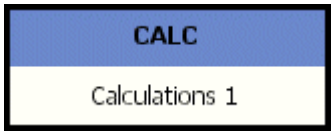
- **CALC**
  Calculation of intermediate and end results, titer values and common variables.
- **DATABASE**
  Storage of the determination data in databases.
- **EXPORT**
  Export of determination data.
- **REPORT**
  Output of a report defined by a report template.

CALC

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:



Result table

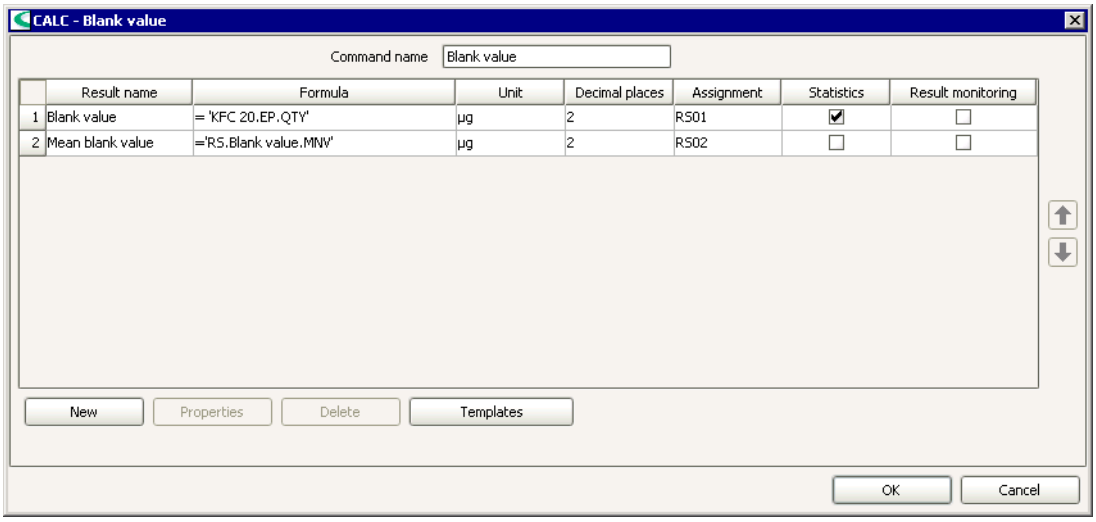
All defined results are displayed in the Result table.

Result parameters

The parameters for each result are configured on the following 3 tabs:

- **Definition**
  Entering the formula, assigning the unit and switch on/off the statistics.
- **Monitoring**
  Parameters for monitoring the result.
- **Options**
  Saving the result as common variable or as titer.

CALC - result table



Command name
25 characters, [Calculations #]
Name of the command.

Table

Up to 25 results can be defined in the CALC command. The non-editable table contains the following information of each result:

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 is switched on or off.

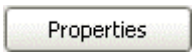
Result monitoring
Display whether the monitoring for the result is switched on or off.

Functions

Move the selected result upward (changes the sequence).

Move the selected result downward (changes the sequence).

Open the dialog window **New result** (*see below*) for adding a new result.



Open the dialog window **Result** (*see CALC - Result properties*) to edit the selected result.

Delete

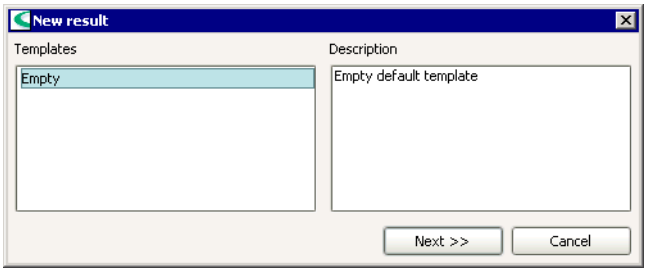
Delete the selected result.

Templates

Open the dialog window **Manage templates** (*see CALC - Resultat templates*) to delete or rename result templates.

New result

The window **New result** is opened with **[New]** in the dialog window of the CALC command. A template for the new result can be selected.



Templates

Result templates, [Empty]

Selecting a stored result template as basis for the new result. An empty template is loaded with **Empty**.

Description

Displaying the description of the selected result template.

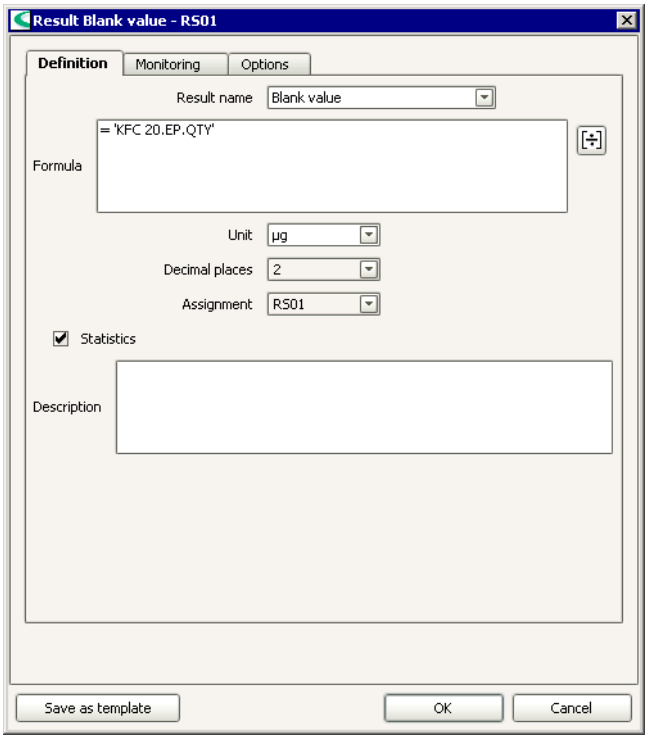
Next >>

Opening the dialog window **Result** (*see CALC - Result properties*) to edit the parameters of the new result.

CALC result properties

Result - definition

The result calculation is defined on this tab.



Result name

50 characters, [Res01 ... Res025]

Name of the result. This name will be shown in the result display as well as in the report. The result name can be used in further calculations as variable **'RS.Result name.VAL'**.

Formula

1000 characters

Display of the calculation formula of the result. The Formula editor to enter the calculation formula is opened with or by double-clicking into the window. The calculation formula defines the result type (**number**, **text** or **date/time**).

Unit

max. 16 characters, [empty], ppm, %, g/L, mg/L, mg/mL, mg/100 g, mol/L, mmol/L, mL, g, mg, µg, °C, µL, s, S/cm, mS/cm, µS/cm

The result unit is shown and saved together with the result. The unit can be used in further calculations as variable **'RS.Result name.UNI'**.

Decimal places

0 ... [2] ...5

Number of decimal places of the result. This parameter is ignored for results of the type **text** or **date/time**.

Assignment

RS01 ... RS25, [first unallocated result variable], none

Assignment of the result to one of the 25 result columns **RS01 ... RS25** in the Determination overview. The result will be entered in this column. The result won't be entered in a result column with **none**. In this case it will only be displayed in the subwindow **Results**.

Note

*The assignments **RS01 ... RS25** can be used several times in different CALC commands. In this case only the result being calculated at last 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.*

Attention

*If the same **Assignment** is reused in several CALC commands with different **Result names** only the result being calculated at last will be saved in the determination. All other results are missing or invalid when used in other formulae!*

Statistics

[on], off

Mean value, absolute and relative standard deviation are calculated for the result if this option is enabled. Statistical calculations are only carried out if the statistics is activated additionally in the **START** command and in the Run window.

Description

1000 characters

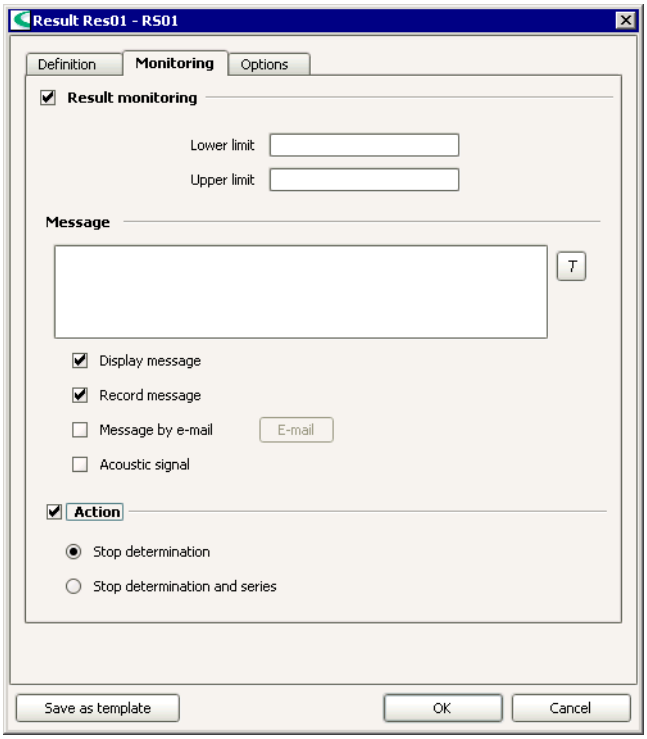
Entry of a description of the result.

Save as template

Opening the dialog window **Save result template** to save the result parameters as template for creating new results.

Result - Monitoring

The parameter for monitoring the result are defined on this tab.



Result monitoring

on, [off]
The result limits are monitored while calculating the result during the determination if this option is enabled.

Lower limit
10 digits
Lower limit for the result.

Upper limit
10 digits
Upper limit for the result.

Message

Text (unlimited)
The message defined here can be put out to different targets if the result limits are exceeded. The Text editor to enter or change the message is opened with or by double-clicking into the message field. The Formula editor can be opened out of the text editor as well.

Display message
[on], off
If this option is enabled, all active tracks are halted and the message defined above will be displayed in case the result limits are exceeded. You can choose whether you want to continue the halted tracks with **[Continue]** or - if defined - to execute the **Action** stated below.

Record message
[on], off
If this option is enabled, the message defined above will be documented in the determination in case the result limits are exceeded. The run is not halted.

Message by e-mail
on, [off]
If this option is enabled, the message defined above will be sent to the address defined under **[E-mail]** in case the result limits are exceeded.

Opening the dialog window **Send e-mail** (*see below*) for defining the e-mail parameters.

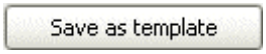
Acoustic signal
on, [off]
If this option is enabled, an acoustic signal will be emitted additionally to the message defined above in case the result limits are exceeded.

Action

on, [off]
If this option is enabled, one of the following actions is automatically executed in case the result limits are exceeded.

Stop determination
[on], off
The current determination is terminated and the next determination of the series is started.

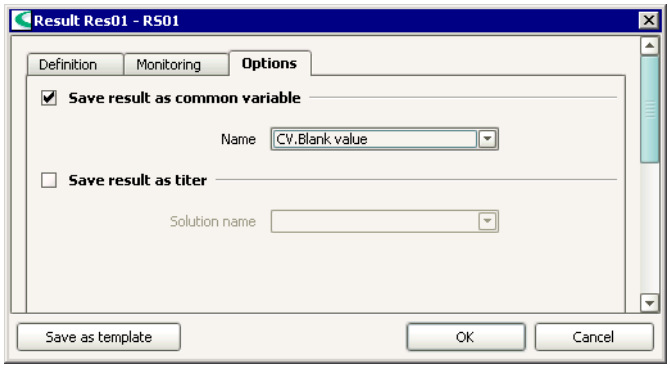
Stop determination and series
on, [off]
The current determination and the series are terminated.



Open the dialog window **Save result template** to save the result parameters as template for creating new results.

Result - options

The assignment of the result to a common variable and/or titer can be activated on this tab.



Save result as common variable

on, [off]
The result will be saved as common variable if this option is activated. The current single value will be saved always as common variable even if the statistics is activated for this result.

Name
List of all the common variables defined
The result is saved as new value for this common variable.

> ***Note***
> *As long as no common variable has been defined the combo box is empty. The creation of common variables is described in the configuration (see Configuration - Common variables).*
>
> *If common variables are used in a CALC command they will only be requested at the start of the determination. This means that it is not possible to define common variables during a determination and then use the altered value in a different formula. You should use Method variables for this.*

Save result as titer

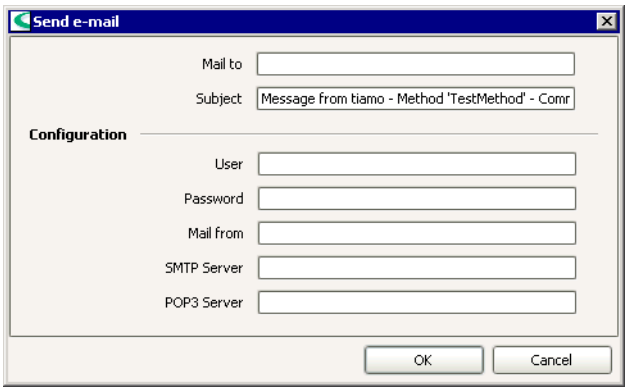
on, [off]
The result will be saved as titer if this option is activated. The current mean value will be saved as titer if the statistics is activated for this result.

Solution name
List of all the solutions defined
The result is saved as new titer for this titrant/solution.

> ***Note***
> *As long as no titrant/solution has been defined the combo box is empty. The adding of solutions is described in the configuration (see Configuration - Solutions).*

Opening the dialog window **Save result template** to save the result parameters as template for creating new results.

Send e-mail



Mail to

max. 150 characters
E-mail address of the receiver.

Subject

max. 150 characters
Subject to describe the message.

Configuration

User *

max. 150 characters
User name for the access to the mail server. This name doesn't necessarily have to be identical with the Windows user name.

Password *

max. 150 characters
Password for the access to the mail server. This password doesn't necessarily have to be identical with the Windows password.

Mail from

max. 150 characters
E-Mail address of the sender.

SMTP Server

max. 150 characters
Address for the SMTP server.

POP3 Server *

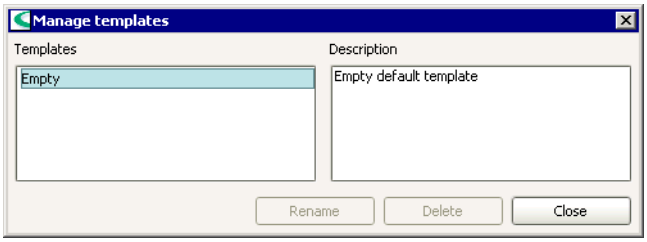
max. 150 characters
Address for the POP3 server.

> ***Note***
> *It is only obligatory to make entries in the fields marked with * when on the POP3 Server the setting **POP before SMTP** is used. If you have any questions please contact your system administrator.*

Result templates

Manage result templates

The window **Manage templates** is opened with **[Templates]** in the dialog window of the **CALC** command. A result template can be renamed or deleted.



Templates

Result templates, [Empty]

Selecting the stored result template to be renamed or deleted.

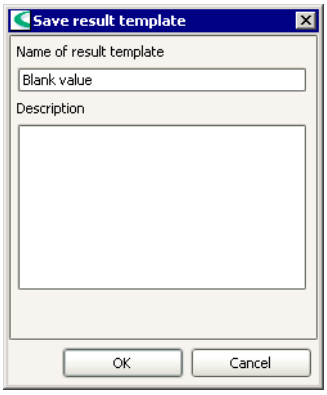
Description

Display of the description of the selected result template.

Rename the selected result template.

Delete the selected result template.

Save result template



Name of result template

100 characters, [result name]

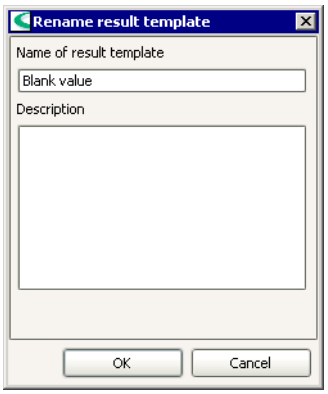
The result template is saved under this name in the configuration database.

Description

1000 characters

Description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

Rename result template



Name of result template

100 characters, [name of the result template]

The result template is stored under this name in the configuration database.

Description

1000 characters

Description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

DATABASE

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

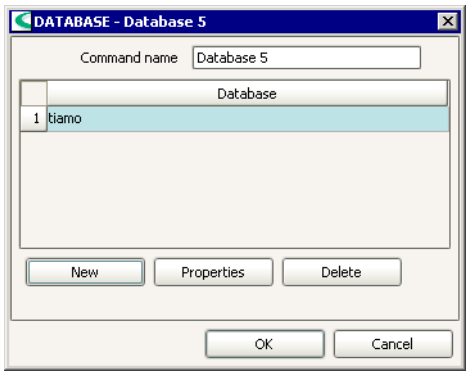
The command has the following appearance:

Parameters

The parameters for the command **DATABASE** are configured in the following dialog window:

- **DATABASE**
  All the defined databases are listed in the list of databases.

DATABASE - properties



Command name
25 characters, [Database #]
Name of the command.

List of databases

A **DATABASE** command can contain more than one database in which the determination data are stored when executing 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 are stored.

Functions

New

Open the dialog window **Database - New** for selecting a new database.

Properties

Open the dialog window **Database** for selecting another database.

Delete

Delete the selected database.

> ***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.*

REPORT

Command for the **output of determination data**.

Appearance

The command has the following appearance:

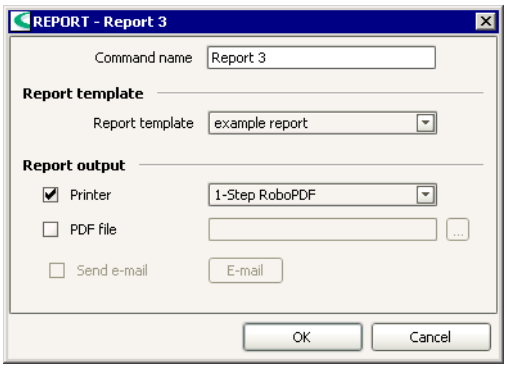
Parameters

The parameters for the command **REPORT** are configured in the following dialog window:

- **REPORT**

> ***Note***
> *A **REPORT** command has to be placed before a **DATABASE** command. Otherwise the command data (for example the report template used) are not stored and a Reprocessing won't be possible then.*

REPORT - Properties



Command name

25 characters, [Report #]
Name of the command.

Report template

Report template

Report templates
Selecting the predefined Report template which the report should be generated with.

Report output

Printer

[on], off; Printer name, [Default printer]
The report is printed to the selected printer if this option is activated. In **Default printer** is selected, the report will be printed to the default printer defined for the client.

PDF file

on, [off]

The report is stored as PDF file in the directory selected if this option is activated. A click on [...] opens the window **Save** for selection of the desired directory and entry of the root name for the PDF file.

Send e-mail

on, [off]

The PDF file is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated.

E-Mail

Opening the window **Send e-mail** (*see CALC - Result properties - Send e-mail*) for defining the e-mail parameter.

EXPORT

Command for the **export of determination data**.

Appearance

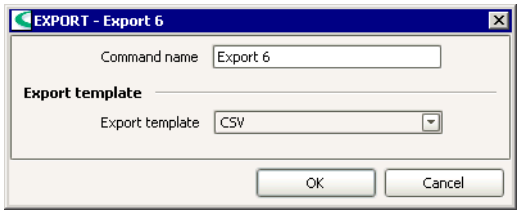
The command has the following appearance:

Parameters

The parameters for the command **EXPORT** are configured in the following dialog window:

- **EXPORT**

EXPORT - properties



Command name

25 characters, [Export #]

Name of the command.

Export template

Export template

Export templates

Selecting the predefined Export template which the determination data should be exported with.

5.6.11 Communication commands

Commands for the **communication** within the program or with external devices.

The following four communication commands can be selected:

- **CTRL**
  Setting output lines.
- **SCAN**
  Scanning input lines.
- **SEND**
  Sending event messages.
- **RECEIVE**
  Waiting for event messages or status messages.
- **TRANSFER**
  Data transfer via RS232 to external devices.

CTRL

Command for **setting remote output lines**.

Devices

This command can be executed with the following devices:

Titrino: 702*, 716*, 718*, 719*, 720*, 721*, 736*, 751, 758, 784, 785, 794*, 795, 798, 799 (* instruments with only 3 outputs)

Titrando: 808, 809, 835, 836, 841, 842, 855

Dosing Interface: 846

Coulometer: 756, 831

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

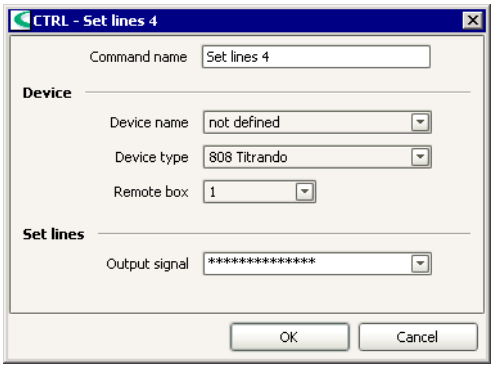
The command has the following appearance:

Parameters

The parameters for the command **CTRL** are configured in the following dialog window:

- **CTRL**

CTRL - Properties



Command name

25 characters, [Set lines #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Remote box

[1] ... 4 (only Titrando, 814, 815)

Selection of remote box at which the lines are to be set.

Set lines

Output signal

Binary pattern of exactly 14 characters (0, 1,*, p), [********], signal template**

Input of the binary pattern for the output signal or selecting a predefined Signal pattern.

The following characters can be entered:

0 = Line inactive

1 = Line active

***** = Any line condition

p = Set impulse (impulse length 200 ms. If an impulse with another length should be emitted, a corresponding template must be defined.)

The bits are always 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 output line 1 to active (= set), for example, with a connected Titrino this would be a Stop command. **********0*** resets the output line to inactive.

> ***Note***
> *It is recommend that non-relevant output lines are masked with an asterisk (*) in order that the condition of these lines are not altered.*
>
> *For Titrinos with 3 output lines only the first 3 characters are used.*

SCAN

Command for **scanning remote input lines**.

Devices

This command can be executed with the following devices:

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 855

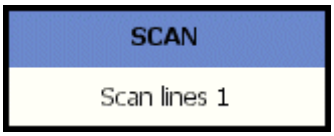
Dosing Interface: 846

Coulometer: 756, 831

Sample Processor: 730, 774, 778, 789, 814, 815, 855

Appearance

The command has the following appearance:

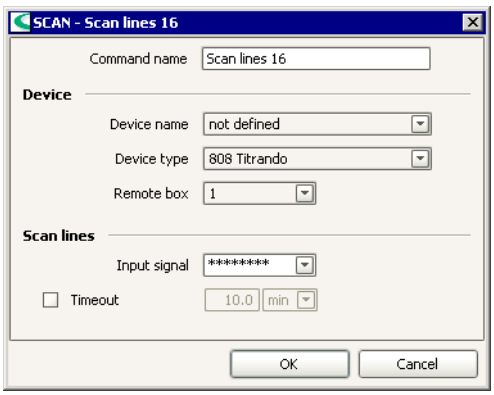


Parameters

The parameters for the command **SCAN** are configured in the following dialog window:

- **SCAN**

SCAN - Properties



Command name

25 characters, [Scan lines #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a device from the device table. Only those devices being able to execute the command are selectable. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [Titrando]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Remote box

[1] ... 4 (only Titrando, 814, 815, 855)

Selection of the remote box at which the lines are to be scanned.

Scan lines

Input signal

Binary pattern of exactly 8 characters (0, 1,*), [******], signal template**

Input of the binary pattern for the expected input signal or selecting a predefined Signal pattern.

The following characters can be entered:
0 = Line inactive
1 = Line active
***** = Any line condition

The bits are always 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 is waiting for an active input on 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 (*).*

Timeout

on, [off]

Maximum waiting time for the input signal.

SEND

Command for **sending event messages** to commands, tracks or to *tiamo*.

Appearance

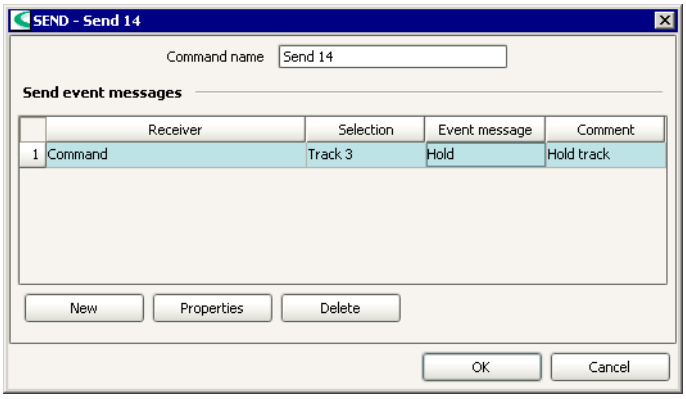
The command has the following appearance:

Parameters

The parameters for the command **SEND** are configured in the following dialog window:

- **SEND**

SEND - properties



Command name

25 characters, [Send #]

Name of the command.

Send event messages

All the Event messages listed in the table are sent simultaneously. The table is not editable directly.

New

Opening the dialog window Send event message for entering a new event message.

> ***Note***
> *10 event messages can be entered at maximum.*

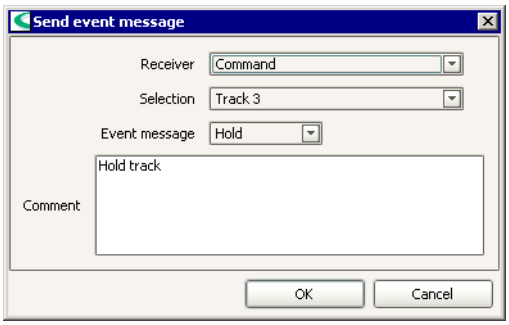
Properties

Open the dialog window Send event message to edit the selected event message.

Delete

Delete the selected event message.

SEND - event messages



Receiver

[System], Command
Selection of the type of receiver.

Selection

Command name, ['empty']
Selection of the command which a message should be sent to. All the commands defined in the method are available for **Receiver** = **Command**. For **Receiver** = **System** this parameter is not editable.

Event message

[Quit], Hold, Stop (for **Receiver** = **System**)
[Quit], Hold, Continue, Start Titration (for **Receiver** = **Command**)
Selection of the event message to be sent. The following event messages can be selected depending on the type of receiver:

Receiver	Selection	Event message	Meaning
System	-	**Hold**	Hold determination (all tracks). Corresponds to the button **[Hold]** in the dialog window Run.
System	-	**Quit**	Cancel determination (Series continues).
System	-	**Stop**	Cancel determination and series. Corresponds to the button **[Stop]** in the dialog window Run.
Command	All track commands	**Hold**	Hold selected track.
Command	All track commands	**Continue**	Continue selected track.
Command	All track commands	**Quit**	Cancel selected track. If the selected track contains a command being conditioning, conditioning is only stopped if the option **Automatic conditioning** is disabled in the command **START**.
Command	All commands	**Hold**	Hold selected command. Also valid for conditioning.
Command	All commands	**Continue**	Continue selected command. Also valid for conditioning.
Command	All commands	**Quit**	Cancel selected command. If the selected command is being conditioning, 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 tab **Conditioning** of the titration command (Example: KFT).

> ***Note***
> *In order that the event message from the **SEND command** can be handled by the **receiver command**, the receiver command must be running and able to process the message being sent. Example: A **SEND command** in track A should start a **KFT command** in track B by sending **Start titration**. The conditioning in the **KFT command** must be finished (= **Cond ok**) by the time the **SEND command** is being executed. Otherwise the titration wouldn't be started and the message **Start titration** would be distorted.*

Comment
250 characters, ['empty']
Comment about the event message.

RECEIVE

Command for **awaiting event messages or status messages** produced by commands.

Appearance

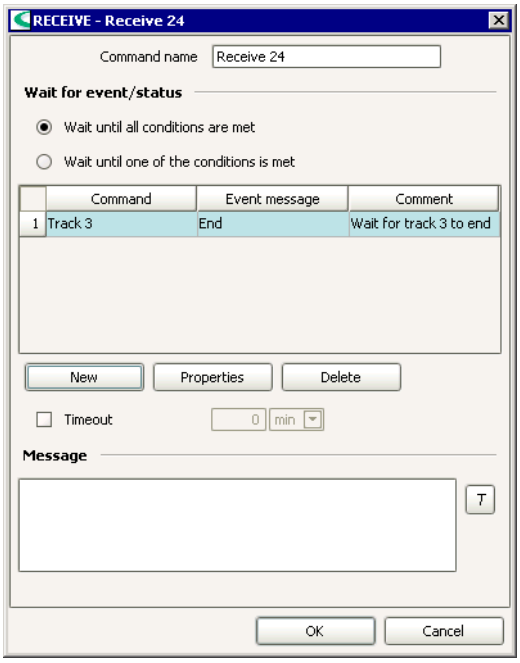
The command has the following appearance:

Parameters

The parameters for the command **RECEIVE** are configured in the following dialog window:

- **RECEIVE**

RECEIVE - properties



Command name
25 characters, [Receive #]
Name of the command.

Wait for event/status

Wait until all conditions are met

[on], off

It will be waited as long as **all** conditions listed in the table below are fulfilled.

Wait until one of the conditions is met

on, [off]

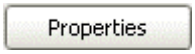
It will be waited as long as **one** condition listed in the table below is fulfilled.

Table with conditions

The table lists all conditions. It is not editable directly.

Open the dialog window **Wait for event/status** for entering a new event message being waited for.

> ***Note***
> *10 event messages can be entered at maximum.*



Open the dialog window **Wait for event/status** to edit the selected event message.

Deleting the selected event message.

Timeout

[on], off

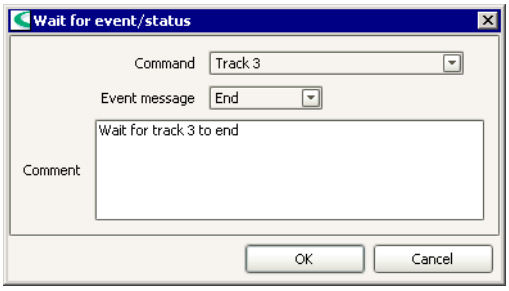
[0] ... 9999.9; [min], s

Optional entry of a maximum waiting time. In case none of the conditions defined above are fulfilled after this time period, the command is cancelled and the proximate command is started.

Message

This message is displayed in the live window while waiting for the condition defined above. The Text editor to enter or change the message is opened with or by double-clicking into the message field.

RECEIVE - event/state



Command

Command

Name of the command whose event message is waited for.

Event message

Event message, ['empty']

Selecting the event message/status to be waited for. The following event messages and status can be selected:

Event/Status	Type	Meaning	Commands
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**
Measure	Event	The measurement of the titration has been started.	**DET**, **MET**
Busy	Status	System is in condition **BUSY**, **HOLD** or **ERROR**.	All
Finished	Status	Command has been finished at least once.	All
Cond	Status	Conditioning is running (**COND BUSY** or **COND HOLD**); the **Start drift** has not yet been reached.	**SET**, **KFT**, **KFC**
Condok	Status	System is conditioned (**COND READY**); the **Start drift** has been reached.	**SET**, **KFT**, **KFC**

Note

*An **event** can only be received if the RECEIVE command has been started before the event it is waiting for whereas a **status** can be scanned anytime.*

Comment

250 characters, ['empty']

Comment about the event message.

TRANSFER

Command for **data transfer via RS232** to external devices.

Appearance

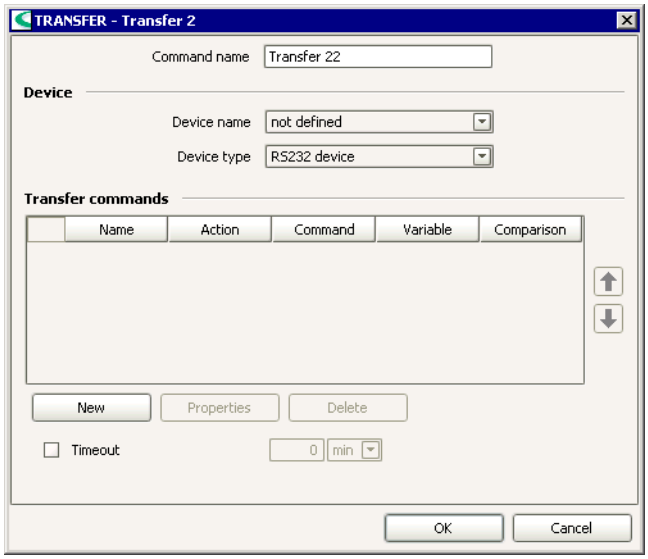
The command has the following appearance:

Parameters

The parameters for the command **TRANSFER** are configured in the following dialog window:

- **TRANSFER**

TRANSFER - properties



Command name

25 characters, [Transfer #]

Name of the command.

Device

Device name

Device name, [not defined]

Selection of a RS232 device from device table. Additionally, **not defined** can be selected. In this case, the device name must be assigned by the user at the start of the method.

Device type

Device types, [RS232 device]

Display or selection of the device type. If a device is selected under **Device name**, this parameter is not editable any more. The device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, all device types being able to execute the command can be selected independently from the devices in the device table.

Transfer commands

The non-editable table lists all defined transfer commands which are sent in the listed sequence.

Moves the selected command upward (changes the sequence).

Moves the selected command downward (changes the sequence).

New

Open the dialog window **Transfer command** for entering a new transfer command.

> ***Note***
> *10 transfer commands can be entered at maximum.*

Properties

Open the dialog window **Transfer command** to edit the selected transfer command.

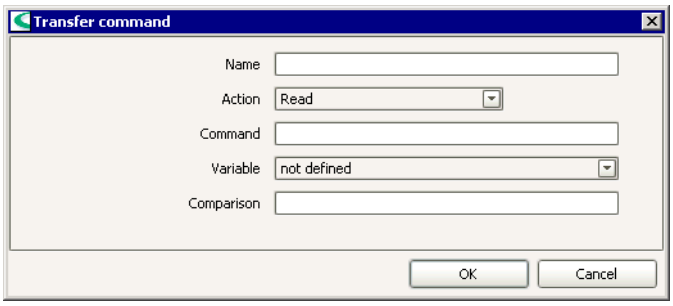
Delete

Deleting the selected transfer command.

Timeout

on, [off]
[0] ... 9999.9; [min], s
Optional entry of a maximum waiting time. In case not all transfer commands are finished after this time period, the command is cancelled and the next command is started.

TRANSFER - transfer commands



Name

50 characters, ['leer']
Freely definable name for the transfer command.

Action

[Read]
The character string defined in **Command** (optional) will be sent to the device. 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. The answer of the device must be identical to the regular expression in

Comparison. If this answer is not received within the **Timeout** defined in the command the command is cancelled.

Poll
The character string defined in **Command** (optional) will be sent to the device. The answer of the device is expected within the **Timeout** defined for the device settings and evaluated. 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 **Timeout** defined in the command the command is cancelled.

Command
250 characters, ['empty']
Character string to be sent to the device.

> ***Note***
> *All ASCII characters can be entered with its two-digit hex code after backslash (e.g. **|1B** = **Escape**).*

Variable
Method variables
Selection of an existing method variable. The received data for the **Actions Read**, **Wait for** and **Poll** will be saved in this method variable which must be defined in the **START** command and is not allowed to be assigned to a system variable.

> ***Note***
> *It is possible to create several indexed variables (e.g. **Input1**, **Input2**, …) to save the character substrings produced by regular expressions into the different variables.*
>
> ***Example***
> ***Variable** = **MV.Input1***
> ***Comparison** = **(|d+|.|d+),(|d+|.|d+)***
> *Two measured values separated by a semicolon are filtered out of the received character string and saved in the two variables **MV.Input1** and **MV.Input2**.*

Comparison
100 characters, ['empty']
Entry of a character string which should be compared to the data received by one of the **Actions Read**, **Wait for a**nd **Poll**. 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, s script languages PERL, etc.) and are standardized to a great extent. In *tiamo* **Extended Regular Expressions** according to **Java 2 Platform SE v1.4.2** can be use (details see e.g. http://en.wikipedia.org/wiki/Regular_expression).

Examples for Regular Expressions:

Expression	Meaning	Example
[abc]	OR function for single characters	receive **a** or **b** or **c**
[a-z0-9]	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
*In order to save the received data in a variable open and close brackets must be set in the field **Comparison** anyway. Therefore, to save a complete character string in a variable the expression **(.*)** must be entered in the field **Comparison**.*

5.6.12 Miscellaneous commands

These commands can be used independently from the connected devices.

The following five commands can be selected:

- **CALL**
  Calling tracks.
- **LOOP**
  Multiple execution of a command sequence.
- **WAIT**
  Interrupting the method run.
- **REQUEST**
  Requesting sample data.
- **SEQUENCE**
  Combining several commands to one command.

REQUEST

Command for **requesting sample data** during the method run. The data can either be entered manually or sent by a peripheral device (balance, barcode reader).

Appearance

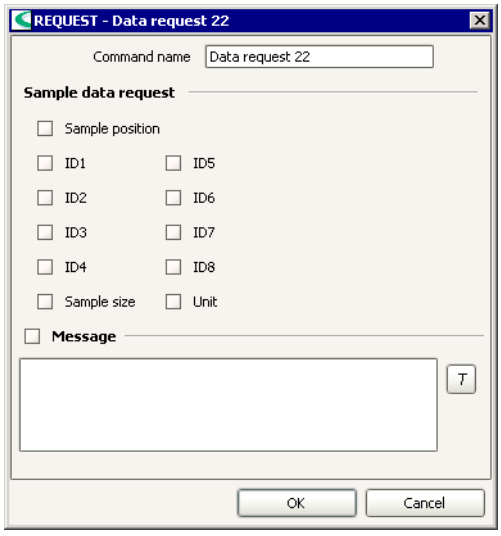
The command has the following appearance:

Parameters

The parameters for the command **REQUEST** are configured in the following dialog window:

- **REQUEST**

REQUEST - properties



Command name
25 characters, [Data request #]
Name of the command.

Sample data request

The sample data to be entered only while the determination is running can be selected here. The dialog window **Sample data request** with the sample parameters defined here will appear during the method run. The sequence is halted until the input is confirmed.

> ***Note***
> *In case the **sequence should not be stopped** (for example for back-weighing in KF titrations), the REQUEST command has to be inserted in another track than the one with the titration command. The option **Return immediately** must be activated in this track.*

Sample position
on, [off]
Switching on/off the request for the sample position.

ID1 ... ID8
on, [off]
Switching on/off the request for the sample identifications **ID1 ... ID8**. If other names were given for this variables in the **START** command, these are displayed in the dialog window **Sample data request**.

> ***Note***
> *The sample identifications **ID1 ... ID8** are by default of the type **Text**. If you wish to enter numbers for this method variables for using them in later calculations, you have to change the type to **Number** in the **START** command.*

Sample size
on, [off]
Switching on/off the request for the **Sample size**.

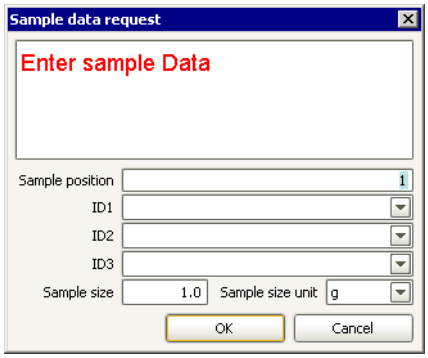
Unit
on, [off]
Switching on/off the request for the **Sample size unit**.

Message

on, [off]; Text (unlimited)
This message is displayed in the dialog window **Sample data request**. The Text editor to enter or change the message is opened with or by double-clicking into the message field.

> ***Note***
> *In case the option **Comments on modification of sample data (live)** is activated in the Security settings, the dialog window **Modification comment sample data** (see Subwindow Run - Single determination - Modification comment sample data) is displayed after entering the sample data. A **Reason** and a **Comment** must be entered for the modification.*

REQUEST - sample data request



Message

Displaying the message defined in the command **REQUEST**.

Sample position

[1] ... 999

Position of the sample on the sample rack. This number can be used for moving to a sample position with the command **MOVE** with the **Target position** = **Sample position**.

ID1 ... ID8

-1.0E-99 ... 1.0E+99 (for **Type** = **Number**)
100 characters (for **Type** = **Text**)
'YYYY-MM-DD' or **'YYYY-MM-DD hh:mm:ss'** (for **Type** = **Date/Time**)
Sample identifications.

> ***Note***
> *In case the sample identifications are invalid at the start of the method because they are entered with the **REQUEST** command during the run, the option **Check at start** in the **START** command must be switched off for these method variables.*

Sample size

[1], 10 numbers
Sample size.

Sample size unit

[g], mg, µg, mL,µL, pieces
Unit of the sample size (text only).

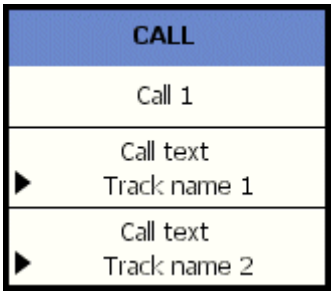
> ***Note***
> *Sample data can be read in from a **balance** or a **barcode reader**. The data import must therefore be switched on in the window Run (Single determination or Determination series) and the corresponding devices must be defined. The dialog window **Sample data request** will be closed automatically after the data have been received from these devices.*
>
> *In case the option **Comments on modification of sample data (live)** is activated in the Security settings, the dialog window **Modification comment sample data** (see Subwindow Run - Single determination - Modification comment sample data) is displayed after entering the sample data. A **Reason** and a **Comment** must be entered for the modification.*

CALL

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:



.
.
.

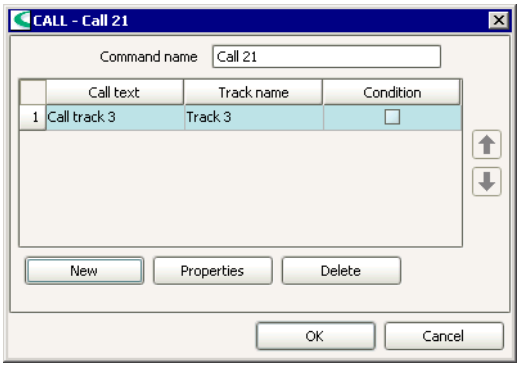
Each CALL command can contain up to 10 calls.

Parameters

The parameters for the command **CALL** are configured in the following dialog window:

- **CALL**

CALL - properties



Command name

25 characters, [Call #]

Name of the command.

Call table

All the calls listed in the table are carried out simultaneously.

> ***Note***
> *The **CALL command** is awaiting either the end of the tracks called or the acknowledgement signal of them. If it is not to be waited for the completion of a track, the option **Return immediately** must be activated in the corresponding **track command**.*

New

Open the dialog window **Call** to enter a new call.

> ***Note***
> *10 calls can be defined at maximum.*

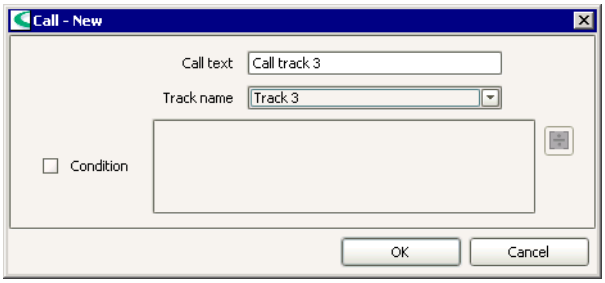
Properties

Open the dialog window **Call** to edit the selected call.

Delete

Delete the selected call.

CALL - call



Call text

50 characters, ['empty']

Text for identifying the call. This text is displayed in the command.

Track name

Track names, ['empty']

Selecting the track to be called. All the normal tracks defined in the method are selectable.

Condition

on, [off]

If this option is enabled, the call is only carried out if the condition is fulfilled.

1000 characters, ['empty']

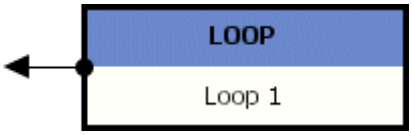
The Formula editor to enter the condition(s) is opened with or by double-clicking into the window.

LOOP

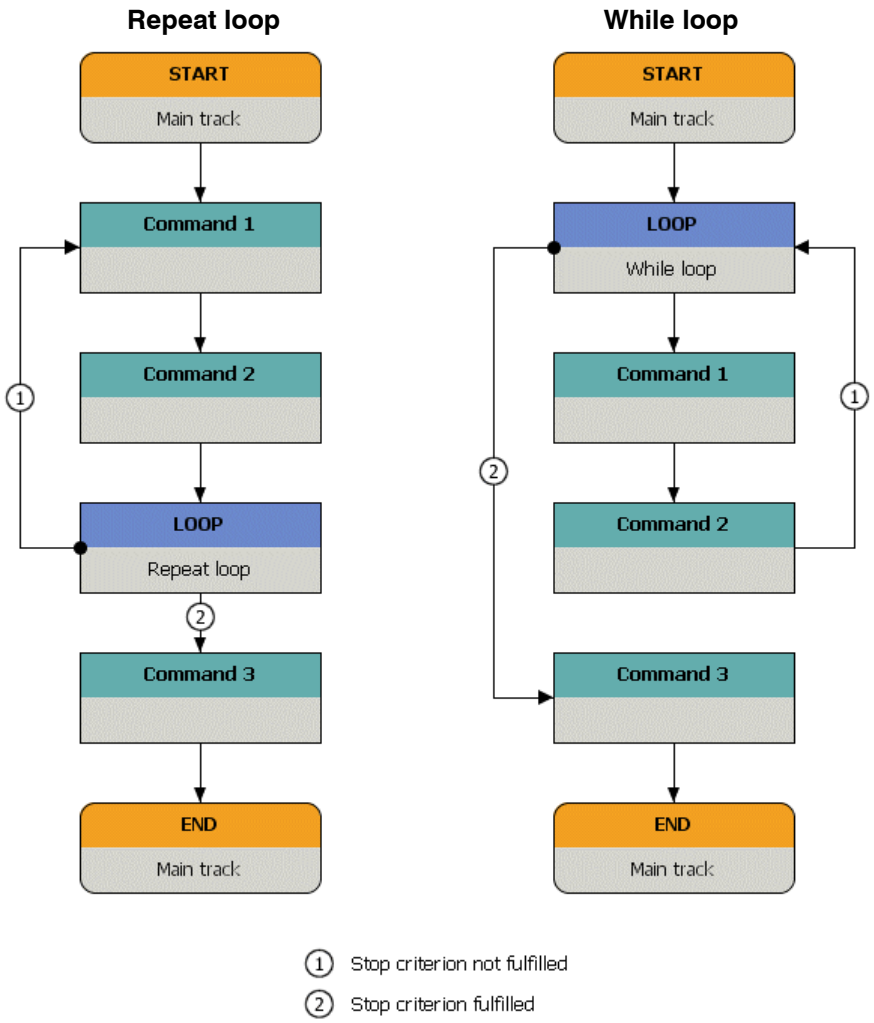
Command for the **repeated execution of a command sequence**. The loop can be terminated after fulfilling different stop criteria.

Appearance

The command has the following appearance:



A LOOP command just inserted has got an arrow on the left hand side. A loop is created by dragging this arrow to the desired command in the same track. Depending on whether the arrow has been dragged to a command before or after the loop command, **two different types of loops** are resulting:



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.

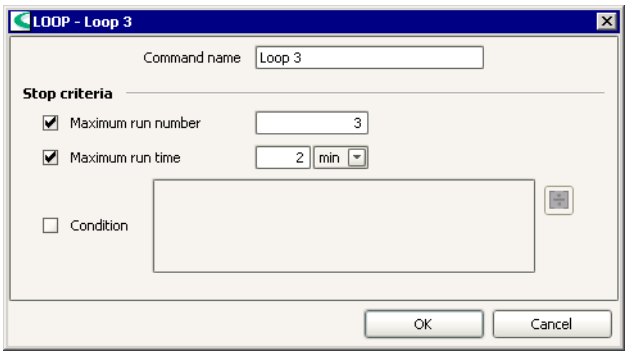
> ***Note***
> *Nested and overlapping loops are not allowed.*

Parameters

The parameters for the command **LOOP** are configured in the following dialog window:

- **LOOP**

LOOP - properties



Command name

25 characters, [Loop #]
Name of the command.

Stop criteria

Definition of three possible stop criteria. The first stop criterion to be fulfilled will stop the loop.

Maximum run number

[on], off
Switching on/off the stop criterion.

0 ... [1] ... 999
Definition of the maximum number of runs of Repeat and While loops. If the maximum number of runs is reached, the loop will be cancelled by the time the LOOP command is started again.

Maximum run time

[on], off
Switching on/off the stop criterion.

0 ... 999.9; [min], s
Definition of the maximum run time. The the run time is started by the time the LOOP command is started for the first time. That 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 cancelled by the time the LOOP command is started again.

> ***Note***
> *The run time is paused if the method is halted with **[HOLD]**.*

Condition

on, [off]
Switching on/off the stop criterion.

1000 characters, ['empty']

The Formula editor to enter the condition(s) is opened with or by double-clicking into the window. If the condition is fulfilled, the loop will be cancelled by the time the LOOP command is started.

WAIT

Command for halting the method run and for output of **messages**.

Appearance

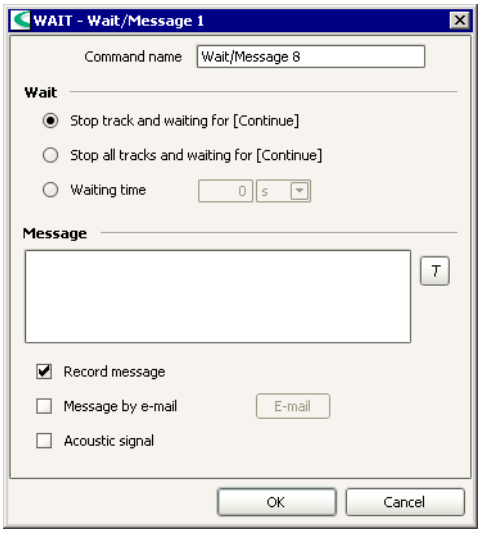
The command has the following appearance:

Parameters

The parameters for the command **WAIT** are configured in the following dialog window:

- **WAIT**

WAIT - properties



Command name

25 characters, [Wait/Message #]
Name of the command.

Wait

Stop track and waiting for [Continue]

[on], off
If this option is enabled, the track containing the WAIT command is halted and a message is displayed. The method run can only be continued with **[Continue]**.

Stop all tracks and waiting for [Continue]
on, [off]
If this option is enabled, all tracks currently running are halted and a message is displayed. The method run can only be continued with **[Continue]**.

Waiting time
on, [off]
0 ... 9999.9; [s], min
If this option is enabled, the method run will be continued automatically after this waiting time. The text defined below is displayed during the waiting time.

Message

Text (unlimited)
The message defined here is displayed while the track is halted or during the waiting time. The Text editor to enter or change the message is opened with or by double-clicking into the message field. The Formula editor can be opened out of the text editor as well.

Record message
[on], off
If this option is enabled, the message defined above will be documented in the determination.

Message by e-mail
on, [off]
If this option is enabled, the message defined above will be sent to the address defined under **[E-mail]**.

Opening the dialog window **Send e-mail** (*siehe CALC - Result properties - Send e-mail*) for defining the e-mail parameters.

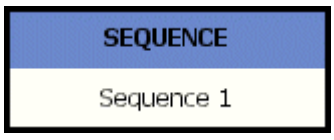
Acoustic signal
on, [off]
If this option is enabled, an acoustic signal will be emitted additionally to the message defined above.

SEQUENCE

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:

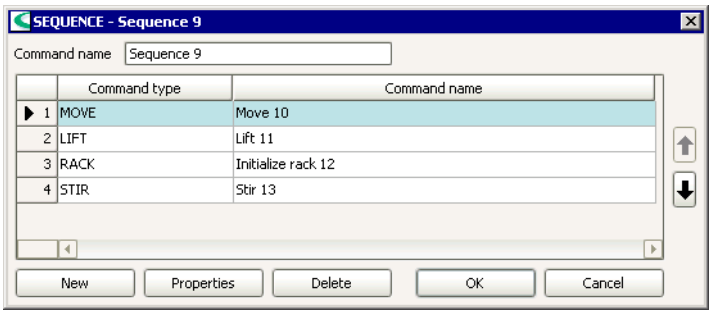


Parameters

The parameters for the command **SEQUENCE** are configured in the following dialog window:

- **SEQUENCE**

SEQUENCE - properties



Command name

25 characters, [Sequence #]

Name of the command.

Table

The commands are listed in the non-editable table with **Command type** and **Command name**.

As many commands as you like can be inserted in a SEQUENCE command. The table contains the following information about the individual commands:

Command type

Displaying the command type.

Command name

Displaying the command name.

Functions

Moves the selected command upward (changes the sequence).

Moves the selected command downward (changes the sequence).

Opening the dialog window **New command** for adding the desired command at the end of the table.

Opening the dialog window with the properties of the selected command.

Deleting the selected command.

Copy

With his context-sensitive menu item the commands selected in the table are copied to the clipboard.

Cut

With his context-sensitive menu item the commands selected in the table are cut and copied to the clipboard.

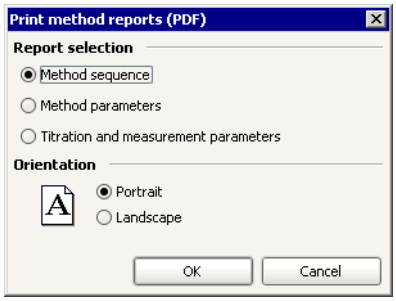
Paste

With his context-sensitive menu item the commands copied to the clipboard are inserted at the end of the table.

5.7 Method reports

5.7.1 Select method reports

The window **Print method reports (PDF)** for selection of the method reports is opened with the icon PDF or with the menu item **File, Print (PDF)...**.



Report selection

One of the following method reports can be selected:

Method sequence
[on], off
Output of the method sequence in graphic format.

Method parameters
on, [off]
Output of the entire report of all the method parameters including signatures and method history.

Titration and measurement parameters
on, [off]
Output of the report of all parameters of the titration and measuring commands.

Orientation

Portrait
[on], off
Output in portrait format.

Landscape
on, [off]
Output in landscape format.

5.7.2 Method sequence report

After selecting the report **Method sequence** in the window **Print method reports (PDF)** a graphic report of the method sequence is created in PDF format. Afterwards it is displayed in Acrobat Reader from where the report can be printed to the desired printer or saved as a PDF file.

5.7.3 Method parameters report

After selecting the report **Method parameters** in the window **Print method reports (PDF)** an extensive report of all the method parameters including signatures and method history is created in PDF format. Afterwards it is displayed in Acrobat Reader from where the report can be printed to the desired printer or saved as a PDF file.

5.7.4 Titration and measurement parameters report

After selecting the report **Titration and measurement parameters** in the window **Print method reports (PDF)** a parameter report of all the titration and measuring commands is created in PDF format. Afterwards it is displayed in Acrobat Reader from where the report can be printed to the desired printer or saved as a PDF file.

Chapter 6 Configuration

6.1 General

6.1.1 General

Definition

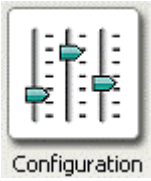
Under **configuration** is to be understood all *tiamo* method-embracing settings for devices, titrants/solutions, sensors, common variables and rack data. Configuration also includes methods, security settings, user administration, program administration, templates, and Audit Trail.

Organization

All configuration data is saved in the **configuration database**. For local server systems (*tiamo light*, *tiamo full)* this 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.

6.1.2 Desktop

Configuration symbol



By clicking on on the configuration symbol in the vertical strip 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** includes the following elements:

- Configuration-specific menu bar.
- Configuration specific toolbar.
- Main window, in which up to 5 subwindows can be shown.

6.1.3 Menu bar

The menu bar in the program part **Configuration** includes the following main menu items:

- **File**
  Export, import, save, recover 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 *tiamo* Help, show information about *tiamo*.

Menu File

Export...
Export configuration data.

Import...
Import configuration data.

Backup/Automatically
Automatically save configuration data.

Backup/Manually
Manually save configuration data.

Print (PDF)/User administration
Put out user administration data as PDF file.

Print (PDF)/Security settings
Put out security settings as PDF file.

Logout
Logout user.

Exit
End program.

Menu View

Change layout
Alter layout of loaded configuration view.

Load view
Load a saved configuration view.

Save view
Save the current configuration view.

Quick access
Opens a subwindow not contained in the current configuration view.

Toolbar
Switch toolbar display on/off.

Menu Tools

Manual Control
Opens the dialog window for the manual control of the devices.

User administration...
Manage users and groups of users with permissions, signature rights and options.

Security settings...
Options for login, password protection, Audit Trail and electronic signature.

Program administration
General settings for local/server and client/server settings.

Audit Trail...
Opens the Audit Trail.

Templates/Custom calibration buffers
Definition of own buffer series which will be automatically recognized when calibrating pH electrodes.

Templates/Input lines
Generate templates for scanning remote lines.

Templates/Output lines
Generate templates for setting remote lines.

Options...
Set program options.

Menu Help

tiamo Help
Opens *tiamo* help.

About
Shows information about program and installation.

6.1.4 Toolbar

Change layout
Alter the layout of the loaded configuration view.

Load view
Load a saved configuration view.

Save view
Save the current configuration view.

User administration...
Manage users and groups of users with permissions, signature rights and options.

Security settings...
Options for login, password protection, Audit Trail and electronic signature.

Audit Trail...
Opens the Audit Trail.

User/Logout
Logout user.

tiamo Help
Opens *tiamo* help.

6.1.5 Subwindows

Selection

The following 5 subwindows can be shown 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.
- **Sensors**
  Shows the data for all defined sensors.
- **Common variables**
  Shows the data for all defined common variables.
- **Rack data**
  Shows the data for all Metrohm sample racks.

Presentation

The subwindows can be enlarged or reduced as required by dragging the separating bars between the windows.

By clicking on the button ☐ at the top right the subwindow can be maximized so that only 1 subwindow is shown in the main window. By clicking again on the button ☐ in the maximized subwindow a jump is made to the original view with all subwindows.

Via the menu item **View, Quick access...** subwindows that are contained in the current configuration view can be shown as a single window.

6.1.6 Functions

In the program part **Configuration** the following functions can be carried out:

View

- Define the layout of the configuration view
- Load configuration view
- Save configuration view
- Rename configuration view
- Delete configuration view

User administration

- Manage user groups
- Access rights
- Signatures
- Options
- Users

Security settings

- Login / Password protection
- Audit trail / Modifications
- Electronic signature
- Default reasons

Program administration

- Backup directories
- Clents
- Licenses

Export/Import of configuration data

- Export configuration data
- Import configuration data

Backup/Recover 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 Configuration views

Definition

The **Configuration view** is understood to mean the contents and layout of the main window in the program part **Configuration**. The following items belong to a configuration view:

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

Functions

The following functions are possible for configuration views:

- **Change layout**
  Defines number, arrangement and sequence of the subwindows for the current configuration view.
- **Save view**
  Saves the current configuration view.
- **Load view**
  Loads a saved configuration view.
- **Rename view**
  Renames a saved configuration view.
- **Delete view**
  Deletes a saved configuration view.

Save automatically

If under Options on the tab card **Save** the item **Configuration settings** under **Save on closing** is switched on then the current configuration view will be saved automatically when *tiamo* is terminated.

Load automatically

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

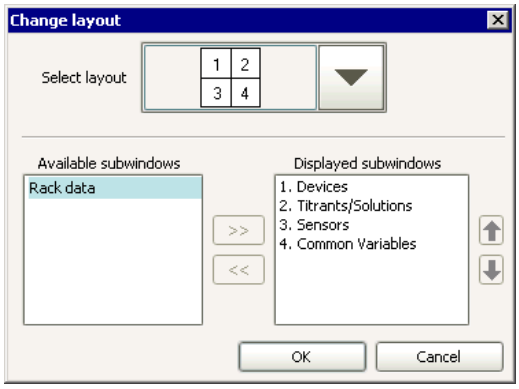
> ***Note***
> *When the program is started for the very first time a configuration view with the 4 subwindows **Devices**, **Titrants/Solutions**, **Sensors** and **Common variables** is opened as standard.*

Export/Import

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

Change layout

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



Select layout

Selection of possible combinations

Selection of a graphic symbol for the number and arrangement of the sub-windows.

Available subwindows

Selection of subwindows

Displays the subwindows that are still available for showing in the view.

Displayed subwindows

Subwindows

Displays the subwindows shown in the view.

Adds the selected subwindow to the view.

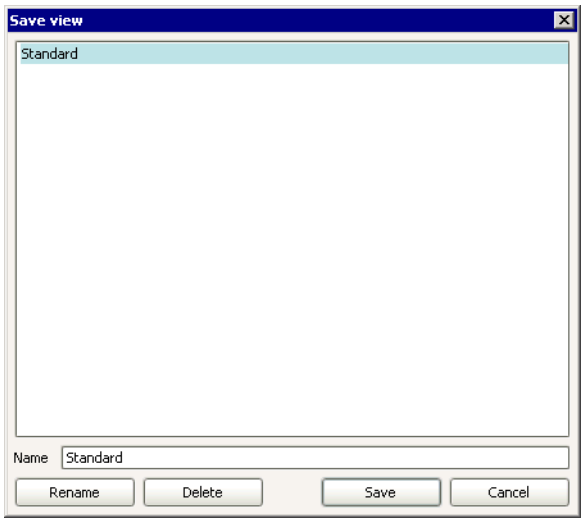
Removes the selected subwindow from the view.

Moves the selected subwindow upward (changes the sequence).

Moves the selected subwindow downward (changes the sequence).

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 selected view.

Delete

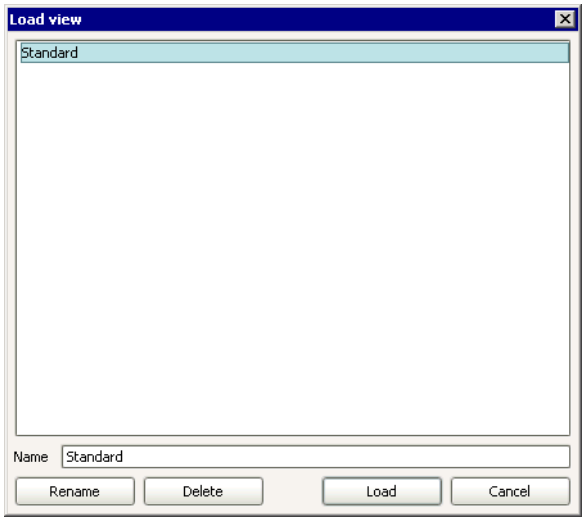
Delete selected view.

Save

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

Load view

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



Name

Name of view to be loaded.

Rename

Rename selected view .

Delete

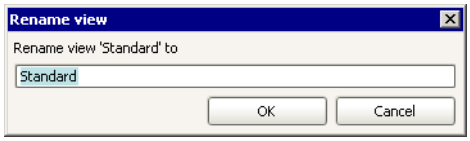
Delete selected view.

Load

Load selected view.

Rename view

In order to rename a view either the dialog window **Load view** or **Save view** must be open and the button Rename pressed. The window **Rename view** then opens.



Rename view to

50 characters, ['Old name']

Enter a new name for the view.

Delete view

In order to delete a view either the dialog window **Load view** or **Save view** must be opened and the Delete button pressed. The deletion process must then be confirmed.

6.2 Administration

6.2.1 Security settings

Overview

In the dialog window **Security settings** the parameters for login, password protection, Audit Trail and electronic signatures can be configured. These are primarily used to ensure that work is carried out in accordance with the requirements of FDA guideline 21 CFR 11.

> ***Note***
> *The version tiamo light cannot be configured to be FDA-conform. With the exception of the parameter* ***Enforce login with user name*** *on the tab* ***Login/Password protection*** *all the options are inactive.*

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**.

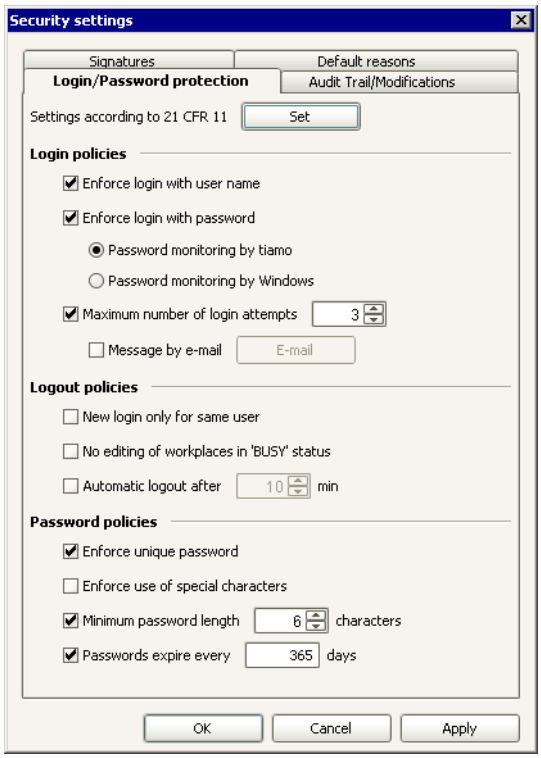
Tabs

The security settings are configured on the following 4 tabs:

- **Login/Password protection**
  Settings for login and password protection.
- **Audit Trail/Modifications**
  Switches the Audit Trail and comments on/off when methods, determinations or sample data are altered.
- **Signatures**
  Options for electronic signatures.
- **Default reasons**
  Definition of reasons for signing and altering methods, determinations and sample data.

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

Sets the parameters to default settings for FDA-conform work.

Login policies

Enforce login with user name

on, [off]; FDA-default: **on**

If this option is **switched on** then every time that the program starts the login window will appear, in which the user must enter his/her user name. If this option is **switched off** then no login will be demanded and the user name logged in under Windows will be adopted. In this case all subsequent parameters are inactive.

Enforce login with password

on, [off]; FDA-default: **on**

If this option is **switched on** then every time that the program starts the login window will appear, in which the user must enter his/her user name together with a password. If this option is **switched off** then all subsequent parameters are inactive.

Password monitoring by tiamo

on, [off]; FDA-default: **on**

If this option is **switched on** then the password will be monitored by *tiamo* according to the following parameters.

Password monitoring by Windows

on, [off]; FDA-default: **off**

If this option is **switched on** then the password will be monitored according to the parameters defined in Windows. In this case the parameters for password protection are inactive.

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

on, [off]; FDA-default: **off**

2.. [3]...5; FDA-default: **3**

If this option is **switched on** then a user will be given the status **disabled** as soon as the number of incorrect login attempts defined here has been exceeded. A user with the status **disabled** can no longer start *tiamo*. The counter for incorrect attempts is reset by *tiamo* to zero for all users at each new start.

Message by e-mail

on, [off]; FDA-default: **off**

If this option is **switched on** then an e-mail will be sent to the address defined under **<e-mail>** as soon as the defined number of incorrect login attempts has been exceeded.

E-Mail

With this button the **Send e-mail** window opens for defining the e-mail parameters.

Logout policies

New login only for the same user

on, [off]; FDA-default: **off**

If this option is **switched on** then for manual log out a renewed login is only possible for the same user. Users with Administrator rights can always log in. If this option is switched on then the subsequent option is automatically switched on and inactive.

No editing of workplaces in 'BUSY' status

on, [off]; FDA-default: **off**

If this option is **switched on** then, after a user has logged out manually, a newly logged-in user on the still open workplaces 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 emergency stop, which are always possible for all running determinations and series.

If this option is **switched off** then the newly logged-in user will have all the rights for the opened workplaces that his/her group assignment entitles him/her to (see User administration). For running determinations the new user name applies immediately (audit trail entries, save, export, etc.).

Automatic logout after

on, [off]; FDA-default: **off**

1...[10]...60 min; FDA-default: **10 min**

If this option is **switched on** 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 log out only the same user or a user with Administrator rights can log in again.

Note
The immediate termination of all determinations on all active workplaces with the emergency stop button still remains possible after an automatic log out.

Password policies

Enforce unique password

on, [off]; FDA-default: **on**

If this option is **switched on** then this ensures that a user can only use a password once.

Enforce use of special characters

on, [off]; FDA-default: **off**

If this option is **switched on** then this ensures that the password must contain at least one special character (@, #, ~ etc.).

Minimum password length

on, [off]; FDA-default: **on**

1 ... [6] ... 10 characters; FDA-default: **6 characters**

If this option is **switched on** then this ensures that the password must contain at least the given number of characters.

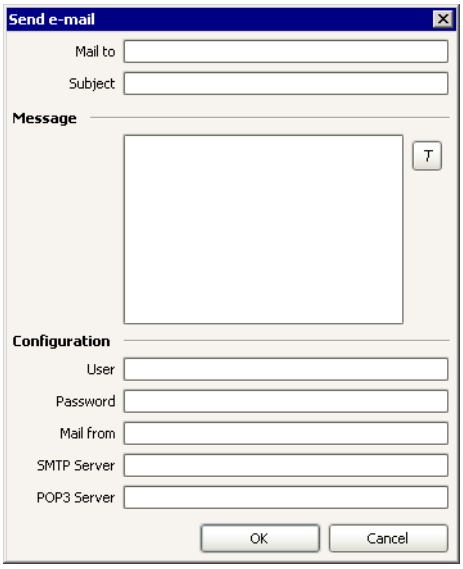
Passwords expire every

on, [off]; FDA default: **on**

1 ... [365] ... 999 days; FDA-default: **365 days**

If this option is **switched on** 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 the validity period has been expired, the user can only log in if he changes the password.

Send e-mail



Mail to

150 characters

E-mail address of receiver.

Subject

150 characters

Title for describing the message.

Message

Message

Text (unlimited)

The message defined here will be transmitted as an e-mail if the maximum permitted number of incorrect attempts at login is exceeded. With or a double-click on the text field the Text editor is started, with which the message can be entered and edited.

Configuration

User *

150 characters
Name of the user for access to mail server. The name must not agree with the Windows user name.

Password *

150 characters
Password for access to mail server. This password must not agree with the Windows password.

Mail from

150 characters
e-mail address of sender.

SMTP server

150 characters
Address of SMTP mail server.

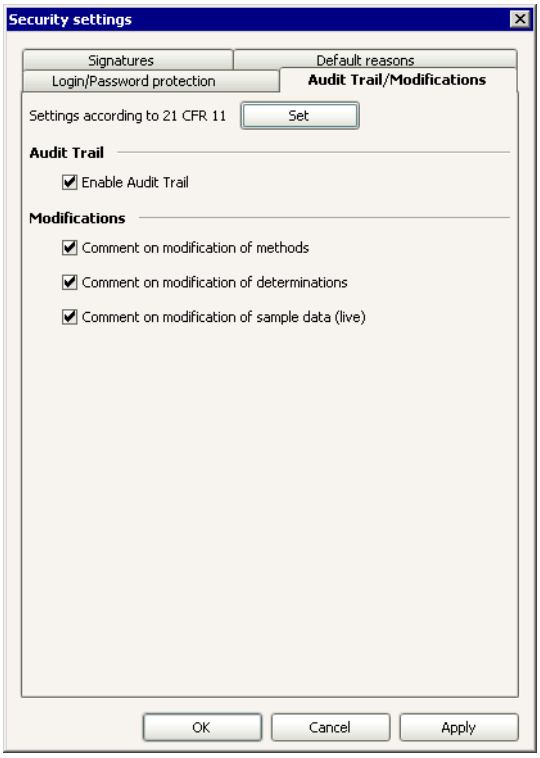
POP3 server *

150 characters
Address of POP3 mail server.

> ***Note***
> *It is only obligatory to make entries in the fields marked with * when on the POP3 Server the setting **POP before SMTP** is used. If you have any questions please contact your system administrator.*

Audit Trail/Modifications

On the tab **Audit trail/Modifications** Audit Trail recording is switched on and off. When a method, determination or sample data is altered, you can also define whether or not a reason must be given for the alteration together with comments.



Settings according to 21 CFR 11

Sets the parameters to default settings for FDA-conform work.

Audit Trail

Enable Audit Trail

on, [off]; FDA-default: **on**

If this option is **switched on** then all program actions will be automatically recorded; these are defined as Audit Trail actions.

Modifications

Comment on modification of methods

on, [off]; FDA-default: **on**

If this option is **switched on** then each time that a method is altered 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.

Comment on modification of determinations

on, [off]; FDA-default: **on**

If this option is **switched on** then each time that a determination is altered 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 comment are also recorded in the Audit Trail.

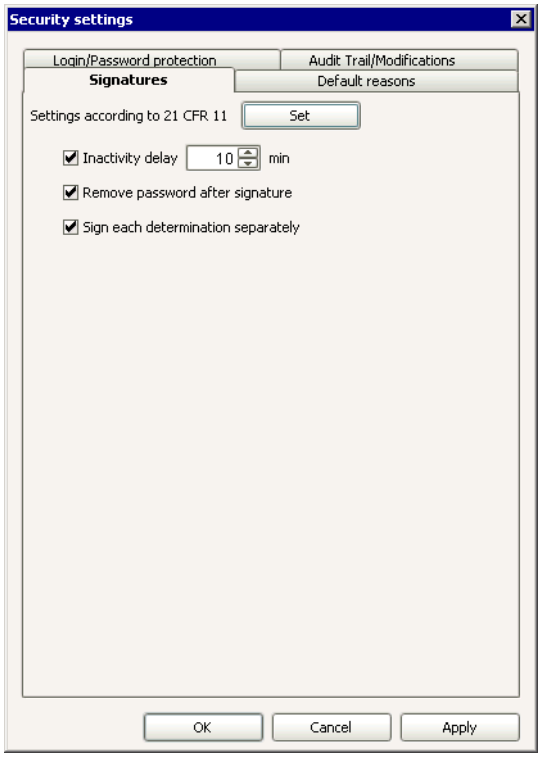
Comment on modification of sample data (live)

on, [off]; FDA-default: **on**

If this option is **switched on** then each time that sample data is altered an modification reason and 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 comment are also recorded in the Audit Trail.

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 standard settings for FDA-conform work.

Inactivity delay

on, [off]; FDA-default: **on**

1 ... [10] ... 60 min; FDA-default: **10 min**

If this option is **switched on** then the dialog window for signing will be automatically closed when the entered time limit has expired.

Remove password after signature

on, [off]; FDA-default: **on**

If this option is **switched on** then the password must be entered again after each signature.

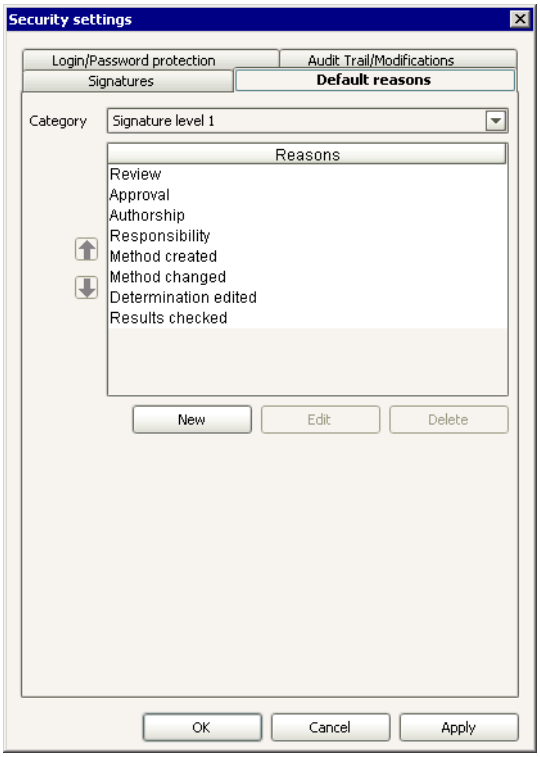
Sign each determination separately

on, [off]; FDA-default: **on**

If this option is **switched on** then each determination contained in the determination overview must be signed individually.

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 altered.



Category

[Signature level 1], Signature level 2, Modification of methods, Modification of determinations, Modification of sample data

Selection of the category for which the reasons are to be defined.

Reasons

50 characters

Shows the reasons defined for the selected category.

Move text upward (alters sequence).

Move text downward (alters sequence).

Add a new reason.

Edit the selected reason.

Delete the selected reason.

6.2.2 User administration

Overview

In the dialog window **User administration User groups** and their **Users** can be managed. For each user group rights of access can be defined for menu items and functions, signature rights and standard views for the individual program parts. For client/server systems the user administration is globally valid for all connected clients (central user administration).

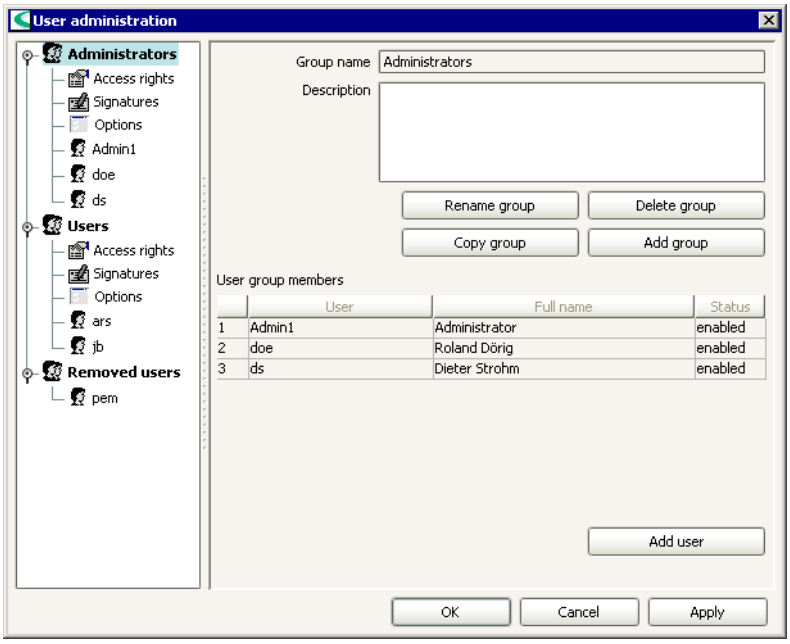
During installation the three user groups **Administrators** (with the user **Admin1**), **Users** and **Removed users** (each without any users) are automatically generated. All groups can be renamed; the **Administrators** group is the only group that cannot be deleted.

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 put out as PDF file using the menu item **File/Print (PDF)/User administration**.

Arrangement

The dialog window **User administration** is divided into two parts whose size can be altered with the mouse. In the left-hand part the **User groups** with their assigned **Users** are listed in tree-form, the right-hand side shows details of the selected items.



Each user group, with the exception of the **Removed users** group, contains the following items:

- **Access rights**
  Assign rights of access to the four program parts and their menu bars.
- **Signatures**
  Assign signature rights for methods and determinations.
- **Options**
  Define 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:

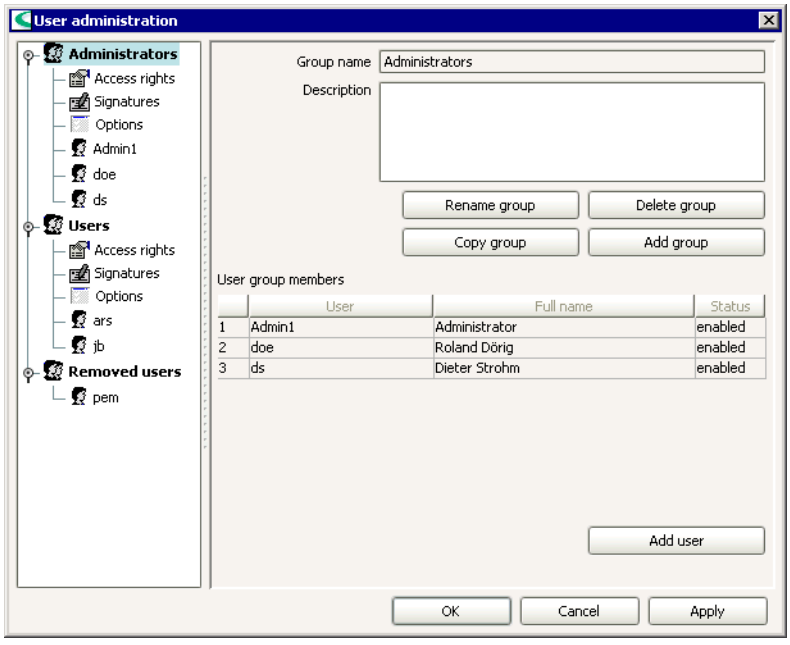
- Add user group
- Copy user group
- Rename user group
- Delete user group
- Define access rights for user group
- Define signature rights for user group
- Define options for user group
- Add user
- Set start password for new user
- Set user to disabled
- Set user to enabled
- Remove user

User groups

User group information

If a user group is selected in the left-hand side of the dialog window **User administration** 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

256 characters

Description of the user group.

Rename selected user group.

Delete group

Delete selected user group.

Copy group

Copy selected user group.

Add group

Add 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 not sorted.

User

Short name of the user.

Full name

Full name of the user.

Status

Current user status.

enabled

The user can log in as usual.

disabled

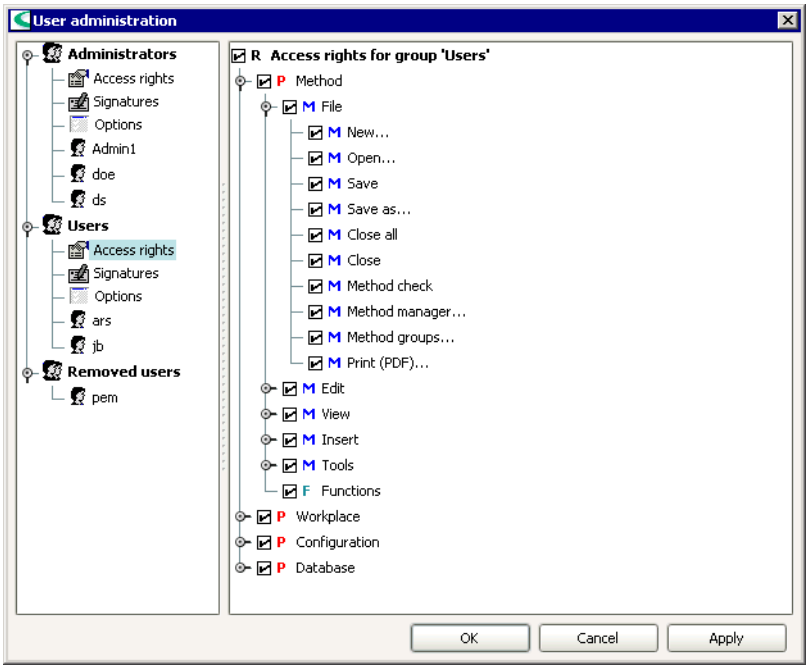
The user can no longer log in. The Administrator must first assign him/her the status **enabled** and provide a new Start password.

Add user

Add new user to user group.

Access rights

If in the left-hand part of the dialog window **User administration** the item **Access rights** is marked for a user group then in the right-hand side of the window the access rights of this group for program parts, menu items and functions will be shown in tree-form and can be altered 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 inactive for the particular user, i.e. shown in gray.



Meaning of the symbols:

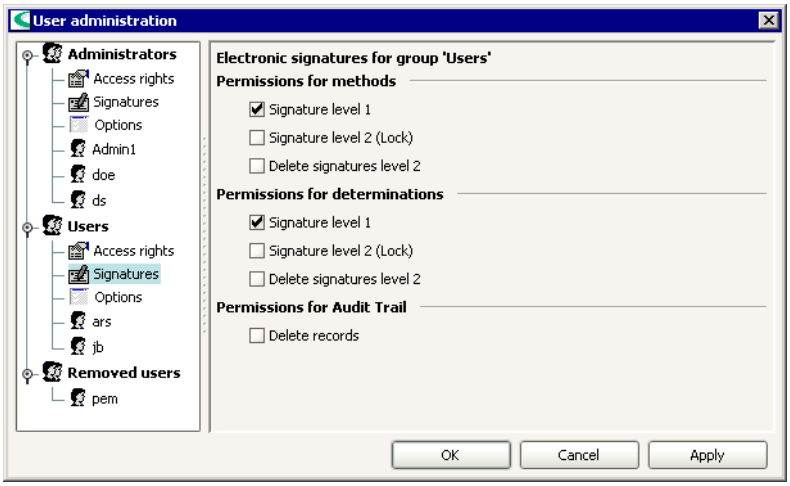
	Enlarge view	P	Program part
	Diminish view	M	Menu item
	Full access to function(s)	F	Function
	Limited access to function(s)		
	No access to function(s)		

> ***Note***
> *For the **Administrators** group all rights of access are switched on as standard and cannot be altered.*

Signatures

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 altered there.

> ***Note***
> *For the version tiamo light these rights cannot be edited as no signatures are possible.*



Permissions for methods

Signature level 1

[off], on

If this option is **switched on** then users in this user group can electronically sign methods at level 1.

Signature level 2 (lock)

[off], on

If this option is **switched on** then users in this user group can electronically sign methods at level 2 and at the same time lock them against further alterations.

Delete signatures level 2

[off], on

If this option is **switched on** then users in this user group can delete all signatures at level 2. This means that the method can be edited again.

Permissions for determinations

Signature level 1

[off], on

If this option is **switched on** then users in this user group can electronically sign determinations at level 1.

Signature level 2 (lock)

[off], on

If this option is **switched on** then users in this user group can electronically sign determinations at level 2 and at the same time lock them against further alterations.

Delete signatures level 2

[off], on

If this option is **switched on** then users in this user group can delete all signatures at level 2. This means that the determination can be edited again.

Permissions for Audit Trail

Delete records

[off], on

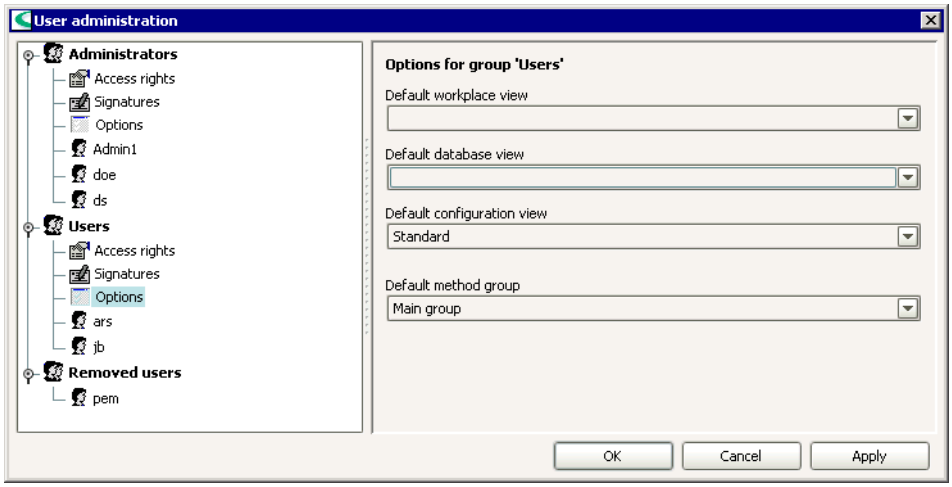
If this option is **switched on** then users in this user group can confirm the deletion of audit trail entries with their signature.

Note

*In the **Administrators** group all signature rights are switched on as standard, but they can also be switched off.*

Options

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 altered there.



Default workplace view

Selection of the defined workplace views

Selection of the View that will open in the program part **Workplace** as standard when the user logs in.

Default database view

Selection of the defined database views

Selection of the View that will open in the program part **Database** as standard when the user logs in.

Default configuration view

Selection of the defined configuration views

Selection of the View that will open in the program part **Configuration** as standard when the user logs in.

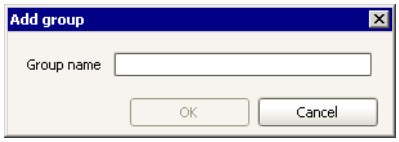
Default method group

Selection of the method group to be opened as standard for opening and saving methods.

Add user 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 button

pressed. This opens the dialog window **Add group**.



Group name

24 characters

Name of new group.

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.

Copy user group

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** then opened or the button Copy group pressed. This opens the dialog window **Copy group**.

Group name
24 characters
Name of new group.

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.

Rename user group

In order to rename a selected user group either the context-sensitive menu item **Rename group** must be opened or the button Rename group pressed. This opens the dialog window **Rename group**.

Group name
24 characters
Enter the new group name.

Delete user group

In order to delete a selected user group either the context-sensitive menu item **Delete group** must be opened or the button Delete group pressed. The group is then deleted.

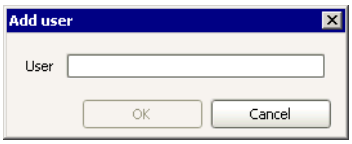
> ***Note***
> *It is only possible to delete a user group when the group no longer contains any users.*

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 button Add user.

In both cases this opens the dialog window **Add user**.



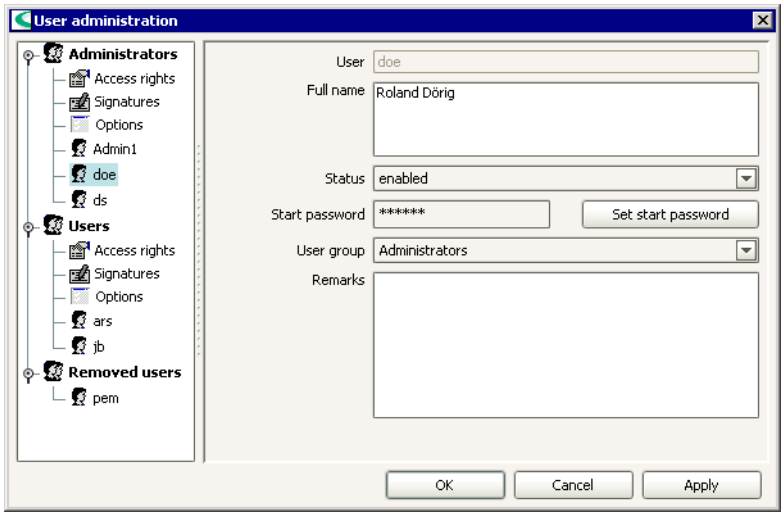
User

24 characters
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.

Users

User information

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

24 characters
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 altered.

Full name

256 characters
Full name of the user.

Status

Shows the current status of the user. Only users of the group **Administrators** can alter the status.

enabled
Users with the status **enabled** can log in in the usual way. An exception is the first log in 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.

disabled
Users with the status **disabled** can no longer log in. They are automatically given this status as soon as the number of incorrect log in 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 **enabled** or **disabled** to **removed** then the user is automatically moved to the group **Removed users**. If a removed user is subsequently again given the status **enabled** or **disabled** then a dialog window appears for selecting the group to which the user is to be assigned.

Start password

24 characters

With 6 *-characters the invisible **Start password** is shown, which must be entered the first time that a new user logs in or that a user must enter after a change in status from **disabled** or **removed** to **enabled**. When adding a new user or after a change in status to **enabled** the Administrator must issue a new start password. When the user has logged in with the start password and then entered a new password then the start password is deleted again.

Opens the dialog window **Start password**. This button is only active for users with the status **enabled**. If a user has forgotten his/her password then the Administrator can issue a new start password here.

User group

Selection of the defined user group

Current user group. The Administrator can alter the group to which the user belongs. The user is automatically moved to the new group. A user can also be moved to a new group with Drag&Drop.

Remarks

Possibility of entering additional user information (e.g. position, address).

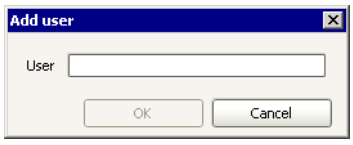
Add user

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 button

.

In both cases this opens the dialog window **Add user**.



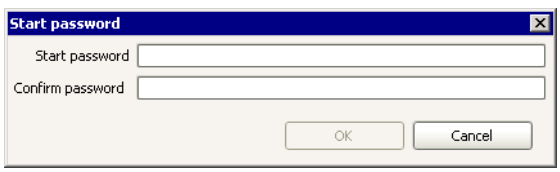
User

24 characters

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.

Set start password

With this button in the dialog window **User administration** a start password can be issued for the selected user. It is only active for newly added users or for those that have achieved the active status again. The dialog window **Start password** opens:



Start password

25 characters

Enter a new start password. Password options are not used for the start password.

Confirm password
25 characters
Confirms the start password.

6.2.3 Program administration

Overview

Under **Tools, Program administration** backup directories and licenses can be managed.

Tabs

The parameters for program administration are defined on the 3 following tabs:

- **Backup directories**
  List of 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.

Backup directories

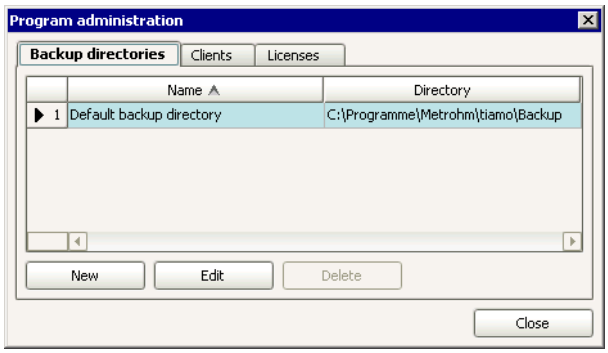


Table with the defined backup directories. With a click on the column title the table can be sorted according to the selected column in increasing or decreasing sequence. The directory **Default backup directory** is generated during installation.

Note
The following buttons are only active when tiamo is running on the server, they are inactive for the individual clients.

New

Add a new backup directory.

Edit

Edit the selected backup directory.

Delete

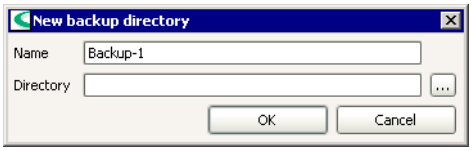
Delete the selected backup directory.

Note
*The **Default backup directory** cannot be deleted.*

Create new backup directory

New

Pressing this button on the tab **Backup directories** in the dialog window **Program administration** opens the dialog window **New backup directory**.



Name

50 characters, [Backup-#]
Name for the backup directory.

Directory

1000 characters

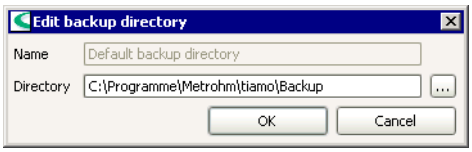
Entry or selection (with ...) of the path for the backup directory.

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

Edit backup directory

Edit

With this button on the tab **Backup directories** in the dialog window **Program administration** the dialog window **Edit backup directory** opens.



Name

50 characters, [Backup-#]
Name for the backup directory.

> ***Note***
> *The **Default backup directory** generated during installation cannot be renamed.*

Directory

1000 characters

Entry or selection (with ...) of the path for the backup directory.

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

Clients

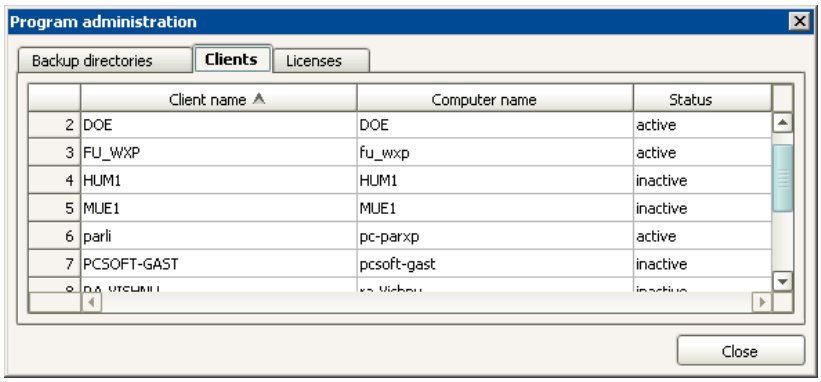


Table with information about the computers on which *tiamo* is installed. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in increasing or decreasing sequence.

Client name
Shows the name for the client that has been entered for the client/server installation.

omputer name
Shows the name of the computer on which the client has been installed.

Status
Shows whether *tiamo* has been startet (**active**) or not (**inactive**).

> ***Hinweis***
> *The content ot the tab **Clients** can be displayed even if tiamo is not running using the shortcut* Clients *in the directory **.. \ Metrohm \ tiamo \ bin** (only available on the server).*

Licenses

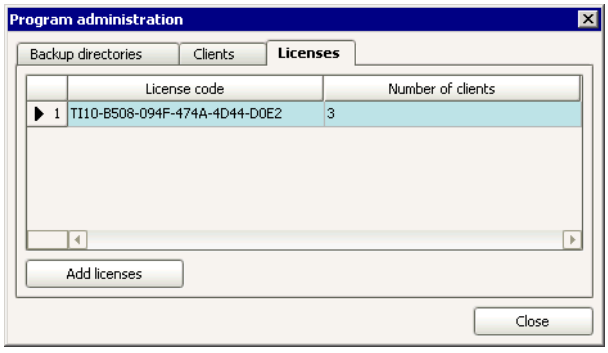


Table with the licenses that are installed on the server (for *tiamo multi*) or local server (for *tiamo light* and *tiamo full*). The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in increasing or decreasing sequence.

> ***Note***
> *In client/server systems this tab is only visible on the server.*

License code
Shows the entered license code.

Number of clients

Shows the number of clients to have been enabled with the license code.

Adds new, additional licenses. The dialog window **Add licenses** opens.

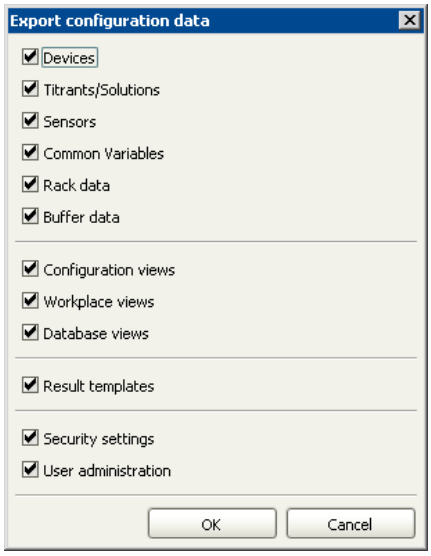
License code

Entry of the license code.

6.3 Configuration data

6.3.1 Export/Import

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
Exports configuration data for devices.

Titrants/Solutions
[on], off
Exports configuration data for titrants and solutions.

Sensors
[on], off
Exports configuration data for sensors.

Common Variables
[on], off
Exports configuration data for common variables.

Rack data
[on], off
Exports configuration data for sample changer racks.

Buffer data
[on], off
Exports configuration data for custom buffers.

Configuration views
[on], off
Exports saved configuration views.

Workplace views
[on], off
Exports saved workplace views.

Database views
[on], off
Exports saved database views.

Result templates
[on], off
Exports saved result templates.

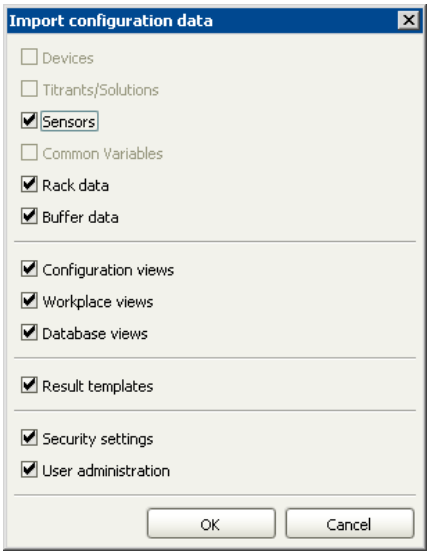
Security settings
[on], off
Exports saved security settings.

User administration
[on], off
Exports saved user administration.

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**.

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
Imports configuration data for devices.

Titrants/Solutions
[on], off
Imports configuration data for titrants and solutions.

Sensors
[on], off
Imports configuration data for sensors.

Common Variables
[on], off
Imports configuration data for common variables.

Rack data
[on], off
Imports configuration data for sample changer racks.

Buffer data
[on], off
Imports configuration data for custom buffers.

Configuration views
[on], off
Imports saved configuration views.

Workplace views
[on], off
Imports saved workplace views.

Database views
[on], off
Imports saved database views.

Result templates
[on], off
Imports saved result templates.

Security settings
[on], off
Imports saved security settings.

User administration
[on], off
Imports saved user administration.

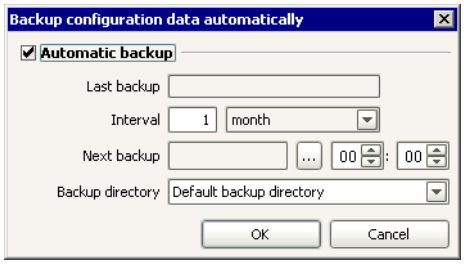
OK

The selected data is imported.

6.3.2 Backup/Restore

Backup configuration data automatically

With **File, Backup, Automatically** the dialog window **Backup configuration data automatically** opens:



Automatic backup

on, [off]
If this option is **switched on** then the configuration database will be saved automatically in the defined backup directory at the required time interval. The whole configuration database (including method groups and methods) is saved.
If this option is **switched off** then the following parameters cannot be edited.

Last backup
Shows the date and time of the last configuration data backup.

Interval

[1 month], 1 ... 999 day(s), week(s), month(s), year(s)

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**.

Next backup

Date, [Last backup + 1 month]

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

With [...] the window **Next backup** opens for selecting the date (*see General program functions - Edit - Select date*).

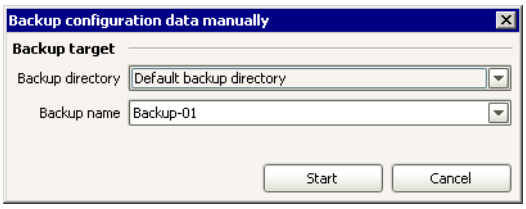
Backup directory

Selection of a predefined backup directory (*see Configuration - Administration - Program administration - Backup directories*).

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

Backup configuration data manually

With **File, Backup, Manually** the dialog window **Backup configuration data manually** opens:



Backup target

Backup directory

Selection of a predefined backup directory (*see Configuration - Administration - Program administration - Backup directories*).

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

Backup name

50 characters, [Backup-##]

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

> ***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 on restroring.*

Start

Start manual backup of complete configuration database (including method groups and methods).

Restore configuration data

Proceed as follows to restore a configuration database that has been backuped manually or automatically:

1 - Close *tiamo*

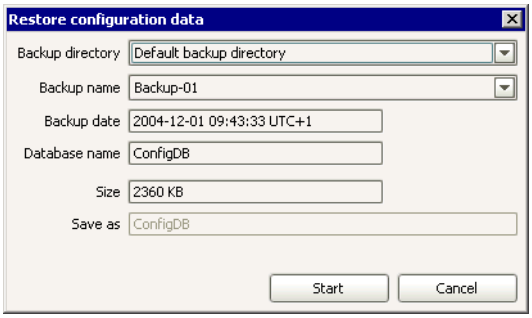
- tiamo light, tiamo full
  Close tiamo.
- *tiamo multi*
  Make sure that tiamo is closed on all clients connected to the server and on the server itself.

2 - Start restore program

- *tiamo light, tiamo full*
  Start **ConfigRestore.exe** in the program directory **...\tiamo\bin**.
- *tiamo multi*
  Start **ConfigRestore.exe** in the program directory **...\tiamo\bin** on the server.

3 - Select backup file and start restoring

The dialog window **Restore configuration data** opens:



Backup directory

Select backup directory, [Default backup directory]
Selection of a directory predefined in the Program administration that contains the backed up configuration database.

Backup name

Select backup files
Selection of a backup file.

Backup date

Shows the time at which the configuration database was backed up. This information is not available if the backup file is on a network drive.

Database name

Shows the name of the configuration database. This information is not available if the backup file is on a network drive.

Size

Shows the size of the configuration database in KB.

Save as

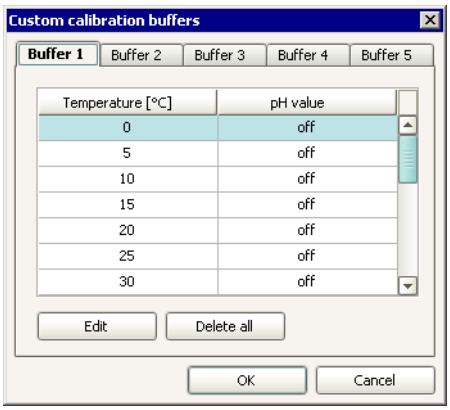
50 characters, [New database ##]
Name under which the configuration database will be recovered.

Start database recovery. 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

Custom calibration buffers

With the menu item **Tools, Templates, Custom calibration buffers** the dialog window **Custom calibration buffers** opens in which you can define 5 of your own calibration buffers for pH calibration with automatic buffer recognition. 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 steps. The table can neither be edited nor sorted.

Edit

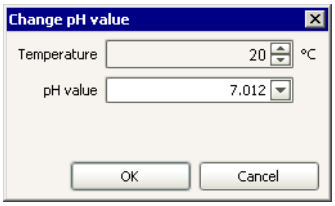
The dialog window **Change pH value** opens (see below).

Delete all

All the pH values of the selected buffer will be set to **off**.

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

0 ... 95 °C

Selects the temperature for which the pH value is to be edited.

pH value

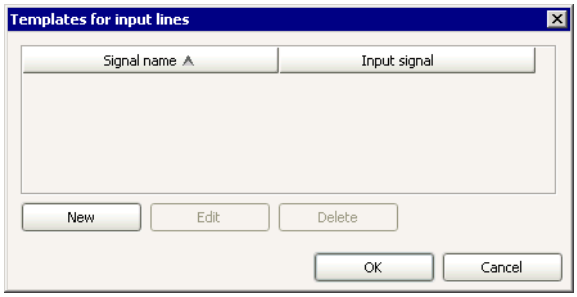
-20.000 ... 20.000, [off]

pH value of the buffer for the selected temperature.

> ***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.*

Templates for input lines

With the menu item **Tools, Templates, Input lines** the dialog window **Templates for input lines** opens in which the client-specific bit-pattern for scanning remote input signals can be defined, these can be selected with the command **SCAN** and in Manual Control.



Template table

The table with the defined templates cannot be edited, however, with a mouse click on the column title it can be sorted according to the selected column in either an increasing or decreasing sequence.

New

Generates a new template (see below).

Edit

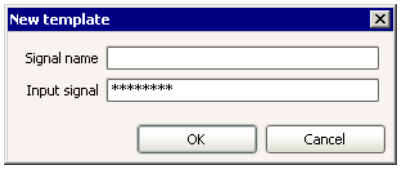
Edits the selected template (see below).

Delete

Deletes the selected template.

Generate new template or 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 respectively.



Signal name

25 characters

Name of the template for the input signal.

Input signal

Bit-pattern with 8 characters (0, 1, *), [******]**

Entry of the bit-pattern for the input signal with exactly 8 characters.
The following characters can be entered
0 = line inactive,
1 = line active, and
***** = any line condition.

The input lines and bits are numbered from right to left:

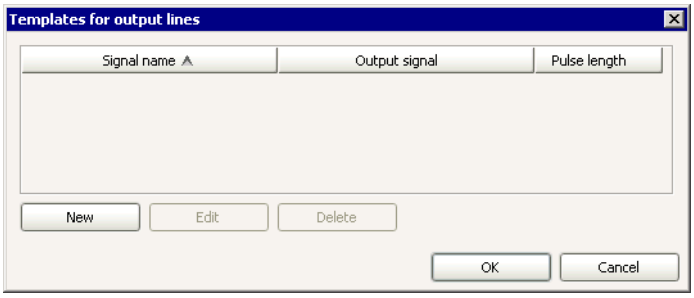
Input	7 6 5 4 3 2 1 0
Bit	7 6 5 4 3 2 1 0

Example: *******1 expects an active input line 0 (**1** = set). This line will be set, e.g. by a Titrino when a titration has been finished and the Titrino can again receive a start signal.

> ***Note***
> *Input lines that are not of interest, or for which no defined condition can be predicted, should be masked with an asterisk *****.*

Templates for output lines

With the menu item **Tools, Templates, Output lines** the dialog window **Templates for output lines** opens in which the client-specific bit-pattern for setting remote output signals can be defined; these can be selected with the command **CTRL** and in Manual Control.



Template table

The table with the defined templates cannot be edited, however, with a mouse click on the column title it can be sorted according to the selected column in either an increasing or decreasing sequence.

New

Generates a new template (see below).

Edit

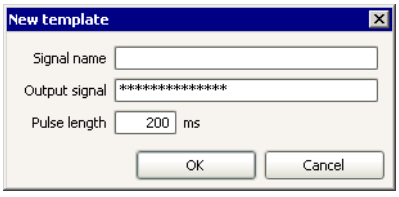
Edits the selected template (see below).

Delete

Deletes the selected template.

Generate new template or 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 respectively.



Signal name

25 characters

Name of template for the output signal.

Output signal

Bit-pattern with exactly 14 characters (0, 1, *, p), [********]**

Entry of the bit-pattern for the output signal with exactly 14 characters.

The following characters can be entered

0 = line inactive,

1 = line active,

***** = any line condition, and
p = set pulse

The output lines and 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 output line 1 to active (= set) which, e.g., would be a stop command for a connected Titrino. **************0*** sets the line to inactive.

> ***Note***
> *We recommend that all the non-relevant output lines are masked with an asterisk* *******so that the conditions of these lines are not altered.*

Pulse length

100 ... [200] ... 1000 ms
Duration of the transmitted pulse.

Examples for 765 Dosimat

Parameter	Bit-pattern	Function
Start Dos1	*********p********	Starts Dosimat 1 (Titrino via "activate")
Start Dos2	*******p**********	Starts Dosimat 2 (")
Start Dos*	*******p*p********	Starts Dosimats 1 and 2 (")

6.3.4 Options

Under **Tools, Options** general program properties can be set on the following 3 tabs:

- **General**
  Selection of the dialog language and switches the emergency stop button on/off.
- **Save**
  Saves settings on exiting *tiamo*.
- **PDF**
  Settings for pdf files

General

Dialog language

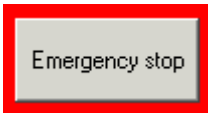
Dialog language

Deutsch, [English]
Selection of the dialog language.

> ***Note***
> *For the altered setting to become effective tiamo must be restarted.*

Emergency stop button

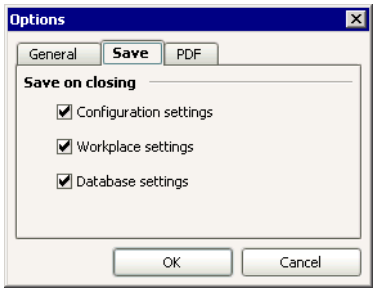
on, [off]
If this option is enabled then the emergency stop button will be shown in all program parts.



This button can be moved to any position with the left-hand mouse key pressed down and is shown right at the top on the screen both in the *tiamo* program window and outside it on the Windows desktop. A mouse click on this button immediately stops all running determinations on all active workplaces. The emergency stop is effective even if no user is logged in, e.g. when the user has been logged out automatically (see Login/Password protection).

> ***Note***
> *The emergency stop stops all commands and tracks on all workplaces but no device functions switched on by a command (e.g. pumps, valves, stirrers). To stop these devices a separate track containing the commands to stop the desired functions must be called in the Exit track with the condition* ***SV.STO = 1****. The emergency stop has no effect on actions still running in the manual control. These actions must be stopped there one by one with the* ***<Stop>*** *button.*

Save



Save on closing

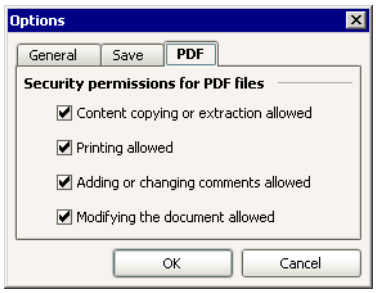
Here you can define the settings to be saved when *tiamo* is exited. If the option is **switched on** then when *tiamo* is exited the current view with its settings will be saved automatically. If the option is **switched off** then any alterations that may have been made to the view will not be saved and at the next program start the original, manually saved view will be loaded.

Configuration settings
on, [off]
Switches saving the configuration view on/off on exiting the program.

Workplace settings
on, [off]
Switches saving the workplace view on/off on exiting the program.

Database settings
on, [off]
witches saving the database view on/off on exiting the program.

PDF



Security permissions for PDF files

Content copying or extraction allowed
[on], off
If this option is **switched off** none of the PDF file contents can be copied or extracted.

Printing allowed
[on], off
If this option is **switched off** the PDF file cannot be printed out.

Adding or changing comments allowed
[on], of
If this option is **switched off** comments and form fields can neither be added nor altered.

Modifying the document allowed
[on], off
If this option is **switched off** no changes can be made to the PDF file.

6.4 Audit Trail

6.4.1 General

General

Definition

The term **Audit Trail** means the FDA-conform protocolling of all user actions with which *tiamo* generates, alters or deletes data. 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**. 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.

Desktop

Items

The desktop of the **Audit Trail** program window contains the following items:

- Menu bar
- Toolbar
- Filter selection
- Table of Audit Trail actions
- Navigation bar

Menu bar

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 *tiamo* help, shows information

Menu File

Print (PDF)
Print Audit Trail data records as PDF-file.

Export...
Export Audit Trail data records.

Archive...
Archive Audit Trail data records.

Delete
Delete archived Audit Trail data records.

Close
Close the Audit Trail window.

Menu View

Update
Updates Audit Trail table.

Column display
Defines the columns for the Audit Trail table.

Menu Filter

Last filter
Use last quick or special filter again.

Quick filter
Use quick filter.

Special filter...
Define and use special filter.

Remove filter
Remove current filter.

Menu Tools

Monitoring
Defines Audit Trail table monitoring.

Installation log
Opens log file for installation.

Menu Help

tiamo help
Open *tiamo* Help.

About
Shows information about the program and installation.

Toolbar

Print (PDF)
Print Audit Trail data records as PDF file.

Last filter
Use the last quick or special filter again.

Quick filter
Use the quick filter.

Special filter...
Define and use special filter.

Remove filter
Remove current filter.

Update
Update Audit Trail table.

tiamo Help
Open *tiamo* help.

Filter selection

Filter

Selection of the filter with which the Audit Trail table is to be filtered:

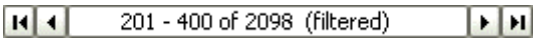
All entries
The table is shown unfiltered.

Quick filter
The table will be filtered according to the last Quick filter to have been defined.

Temporary filter
The table will be filtered according to the last Special filter to have been defined but not yet saved.

Filter name
The table will be filtered according to the selected and saved Special filter.

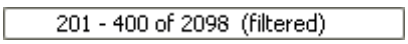
Audit Trail - navigation bar



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 items:

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.

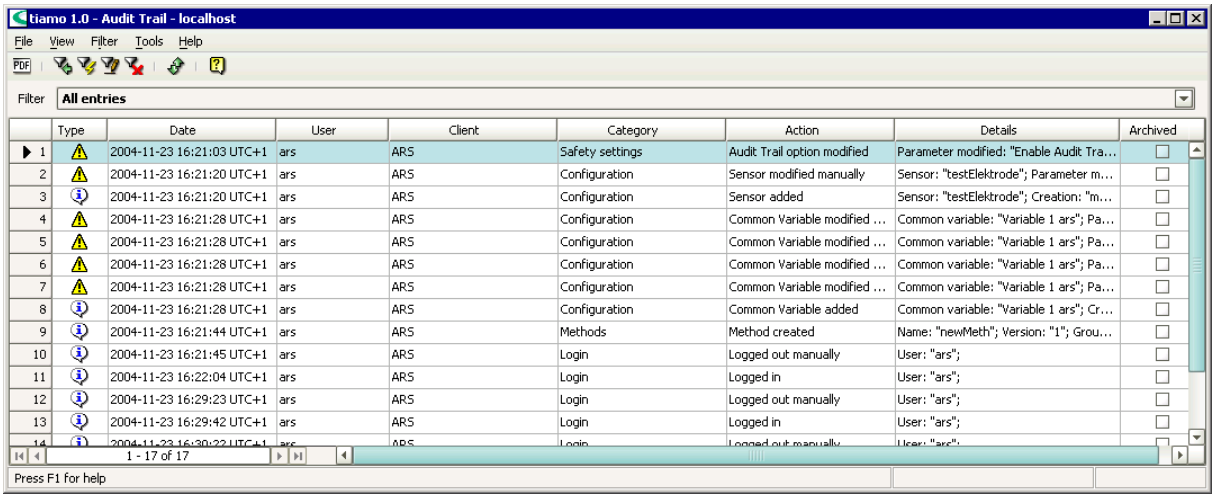
Jumps to last set of entries in the Audit Trail table.

Functions

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



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* ***Enable Audit Trail*** *is switched on in the Security settings.*

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 key as follows:

- **Drag the margin between the column titles**:
  sets the column width
- **Double-click on the margin between the 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.

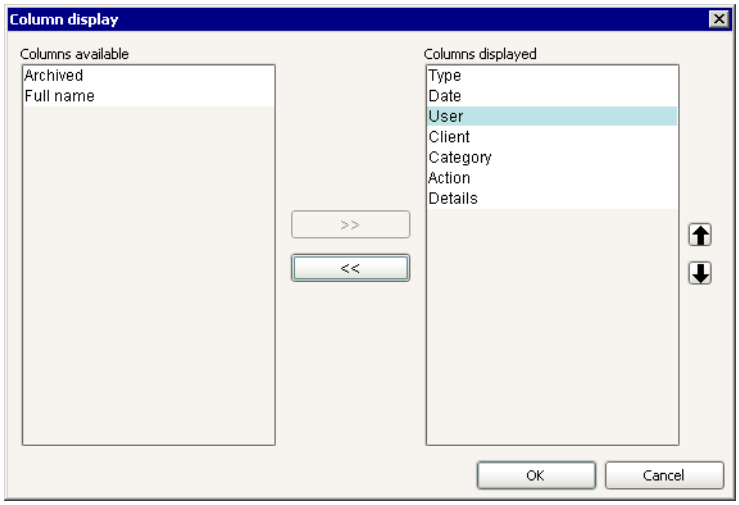
Functions

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
- How to proceed: Open Audit Trail

Column display

With **View, Column display** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the Audit Trail table.



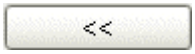
Columns available

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.

Changes the sequence of displayed columns by displacing the selected column upward or downward.

Filter Audit Trail

The following possibilities exist for filtering entries in the Audit Trail table:

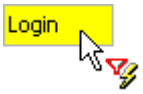
- Filter selection in the filter bar
- Quick filter
- Special filter
- Last filter
- Remove filter

Last filter

With the menu item **Filter, Last filter** or the symbol in the **Audit Trail** program window the last filter to have been used is reactivated again.

Quick filter

With the menu item **Filter, Quick filter** or the symbol in the **Audit Trail** program window a quick filter can be applied for the contents of the selected table field. After this function has been selected then, when navigating in the Audit Trail table, the field in which the cursor is located will have a colored background. At the same time the following special filter symbol appears:

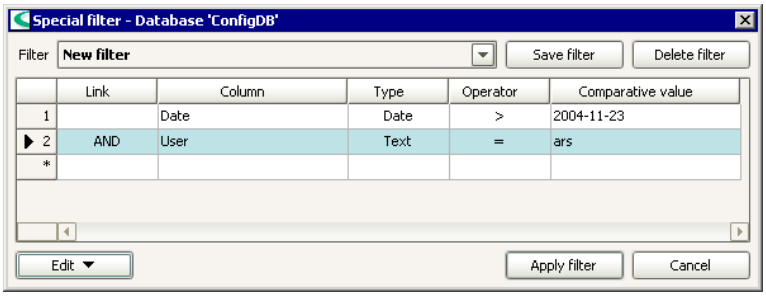


By double clicking on it with the left-hand mouse key the contents of the field selected in the table will be set as a filter condition and this filter will be used directly on the table.

> ***Note***
> *Within the filtered table the quick filter can be used again so that the number of entries can be reduced step by step.*

Special filter

With the menu item **Filter, Special filter** or the symbol in the **Audit trail** program window the dialog window **Special filter** opens for defining user-specific filters.



Filter

Filter name, [New filter]
Selection of the filter to be loaded for editing. As default an empty table with the name **New filter** is loaded.

Opens the dialog window **Save filter**, in which the filter conditions entered in the table can be saved under the required name as a special filter.

The currently loaded special filter will be deleted.

Table view

The overview table shows all the defined filter conditions and cannot be directly edited itself. The table view can be adapted with the left-hand mouse key 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 please see Edit filter condition.

Functions

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

Edit line
Open the dialog window **Edit filter condition** in which the filter condition of the line selected in the table can be edited.

Insert new line
Insert a new empty line above the line selected in the table. This automatically opens the dialog window **Edit filter condition**.

Cut lines
Transfer selected lines to clipboard.

Copy lines
Copy selected lines to clipboard.

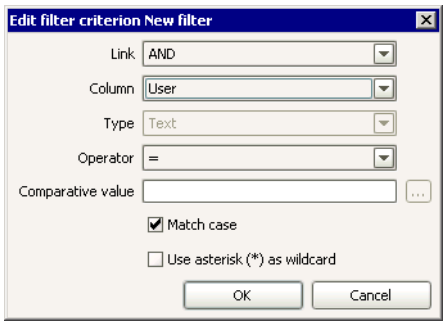
Paste lines
Paste lines from clipboard above selected line.

Delete lines
Delete selected lines.

Applies filter conditions to Audit Trail table.

Edit filter condition

With **Edit, Edit line** the dialog window **Edit filter condition #** opens in which the filter conditions selected in the filter table can be edited.



Link
[AND], OR
Selection of the type of logical operator with the previous filter conditions.

Column
[Type], Date, User, Full name, Client, Category, Action, Archived
Selection of a column for which a condition is to be defined. If a column **Type**, **Category**, **Action** and **Archived** is selected a **Comparative value** must then be selected which is automatically entered in the field with the same name.

Type
Shows the type of format for the column.

Operator
for **Type**, **Category**, **Action** and **Archived**: **=, <>**
for **Date**: **=, <>, <, <=, >, >=, Today**
for **User**, **Full name** and **Client**: **=, <>, empty, not empty**
Selection of the comparative operator for the filter condition.

> ***Note***
> *If for the column **Date** the **Operator Today** is selected then filtering will be carried out for the actual date. In the **Comparative value** field it is additionally possible to define a range in days (**-9999 ... 9999**) for which filtering is to be carried out based on the current date.*

Comparison value
for **Date**: **Date selection**
for **Date** with **Operator** = **Today**: **-9999 ... 9999**
for **User**, **Full name** and **Client**: **250 characters**
Selection or entry of the logical operator with the previous filter condition.

Match case
[on], off
If this option is enabled then upper and lower case letters will be taken into account when filtering the columns **User**, **Full name** and **Client**.

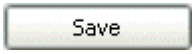
Use asterisk (*) as wildcard
on, [off]
If this option is enabled then an asterisk * can be used as a wildcard for any sequence of characters when filtering the columns **User**, **Full name** and **Client**.

Save filter

With the **[Save filter]** button the dialog window **Save filter** opens for saving a Special filter.

All the saved special filters are shown in the upper field.

Filter name
50 characters
Name under which the special filter is to be saved.



Saves filter under the entered name.

> ***Note***
> *Filters are stored globally in the configuration database and are therefore available for all clients.*

Remove filter

With the menu item **Filter, Remove filter** or the symbol in the **Audit Trail** program window the last filter to have been used is removed again and all the entries are shown.

Update Audit Trail

With the menu item **View, Update** or the symbol in the **Audit Trail** program window the Audit Trail table is updated.

> ***Note***
> *The audit Trail table is automatically updated when it is opened, but not afterwards.*

Export Audit Trail

With the menu item **File, Export** in the **Audit Trail** program window the dialog window **Export Audit Trail** opens.

Save file as
1000 characters
Entry or selection (with ...) of the complete path and file name for saving the export file.

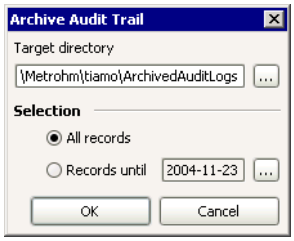
Selection
[All records]
All the entries from the filtered Audit Trail table are exported.

Selected records
Only the entries selected in the Audit Trail table will be exported.

> ***Note***
> *Audit Trail entries are exported in text-format. They can no longer be imported back into the Audit Trail table.*

Archive Audit Trail

With the menu item **File, Archive** in the **Audit Trail** program window the dialog window **Archive Audit Trail** opens.



Target directory
1000 characters
Entry or selection (with ...) of the directory in which the Audit Trail entries are to be archived.

Selection

[All records]
All entries from the filtered Audit Trail table will be archived.

Records until ...
Only data records from the Audit Trail table up to the selected date will be archived.

> ***Note***
> *Archiving Audit Trail entries is identical to Export, i.e. the Audit Trail entries are stored in text format. They can no longer be imported back into the Audit Trail table. The difference to exporting is that the archived entries can be marked in the column **Archived** 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.*

Delete Audit Trail

With the menu item **File, Delete** in the **Audit Trail** program window the dialog window **Delete Audit Trail** opens.

Selection

[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.

Password
Password of the first user to have the right to delete Audit Trail entries.

User 2

User
Short name of the second user to have the right to delete Audit Trail entries.

Password
Password of the second user to have the right to delete Audit Trail entries.

Print Audit Trail

With the menu item **File, Print (PDF)** or the symbol PDF in the **Audit Trail** program window the dialog window **Print Audit Trail (PDF)** opens.

Selection

All records
on, [off]
Print all the entries from the filtered Audit Trail table.

Selected records
[on], off
Only the entries selected in the Audit Trail table will be printed.

Orientation

Portrait
[on], off
Print the Audit Trail table in portrait format.

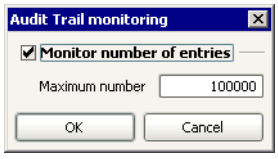
Landscape
on, [off]
Print the Audit Trail table in landscape format.

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 updated automatically when it is opened, but not afterwards.*

Audit Trail monitoring

With the menu item **Tools, Monitoring** in the **Audit Trail** program window the dialog window **Audit Trail monitoring** opens.



Monitor number of entries
[on], off
If this option is **switched on**, then the number of entries in the Audit Trail table will be monitored.

Maximum number
10 ... [100000] ... 500000
Maximum number of entries allowed in the Audit Trail table. If this number is exceeded an error message appears.

6.5 Subwindow Devices

6.5.1 General

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 diminished as required; it can also be maximized.

USB devices

Devices connected to the PC via USB (e.g. Titrando) are automatically recognized at the start of the program and entered in 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 by its serial number and again assigned to the existing device entries. The status will change to **ok**.

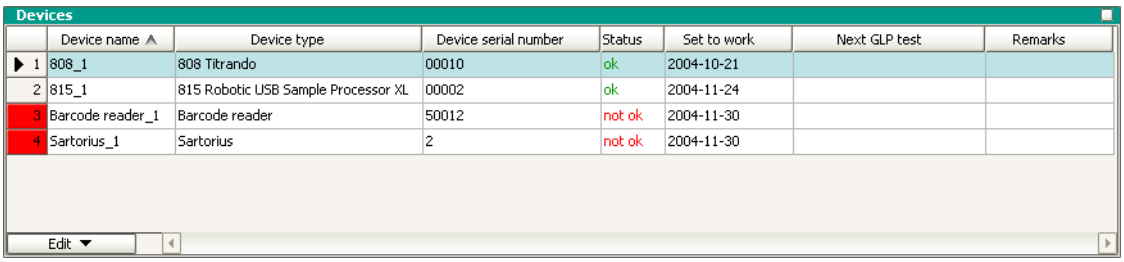
Peripheral devices of USB devices

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 USB connection must be interrupted and then re-established or *tiamo* must be restarted.

RS232 devices

Devices that are connected to the PC via an RS232 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



Contents

In the device table the following information about automatically recognized or manually added devices is shown as standard:

Device name
Name of the device.

Device type
Shows the type of device.

Device serial number
Shows the serial number of the device.

Status
Shows the 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 RS232 connection, the current status at the last access to the device is shown always. For balances, barcode readers and generic RS232 devices, the status cannot be monitorred. It will be set to* ***ok*** *after confirmation of the connection test.*

Set to work
Shows the date on which the device was added to the device table.

Next GLP test
Shows the 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
Shows comments about the device.

With the menu item **Edit, Column display...** the further columns **Program version** and **Date of GLP test** can be shown.

> ***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 component devices used in the method (dosing devices, measuring inputs) will be occupied, i.e. they can neither be controlled in parallel nor used nor configured in manual operation until the determination has been terminated. The line for an occupied instrument is shown in gray letters.*

Table view

The device table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse key as follows:

- **Drag the margin between the column titles**:
  Sets the column width
- **Double-click on the margin between the column title**:
  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 can be shown as a tooltip by keeping the mouse cursor 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 RS232 interface.

Delete
Deletes the selected device. Only devices that are not connected up can be deleted.

Properties...
Edits the selected device.

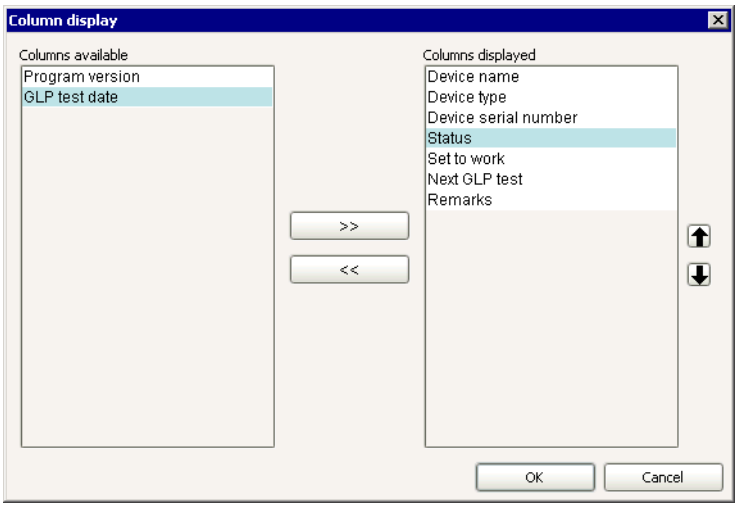
Column display...
Defines columns for the device table.

Print (PDF)...
Outputs the device table as a PDF file.

Initialize
Initialize selected device (only possible for USB devices).

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.

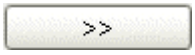


Columns available

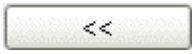
Shows all the fields that can be shown as columns in the device table.

Columns displayed

Shows all the fields that will be shown as columns in the device table. The default position is that the fields **Device name, Device type, Device serial number, Status, Set to work, Next GLP test, 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.

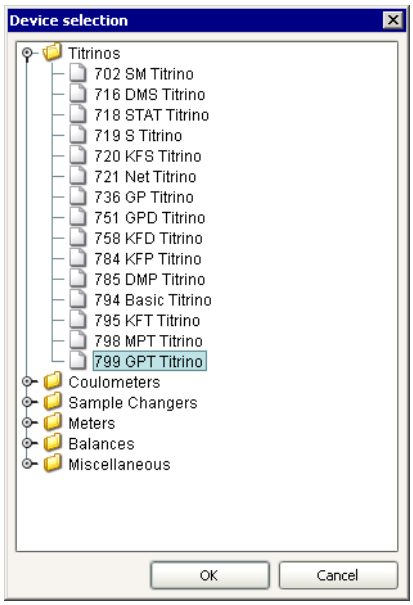


Removes the selected column from the table.

Alters the sequence of shown columns by moving the selected column upward or downward.

Add new device

Devices that are connected to the PC via an RS232 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 the 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.

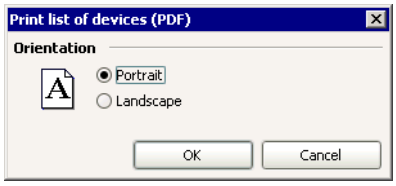
Delete device

With **Edit, Delete** the device selected in the device table is deleted.

> ***Note***
> *Only devices that are not connected up can be deleted.*

Print devices list

With **Edit, Print (PDF)...** the dialog window **Print list of devices (PDF)** opens.



Orientation

Portrait

[on], off

Print the device table in portrait format.

Landscape

on, [off]
Print the device table in landscape format.

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

Overview

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:

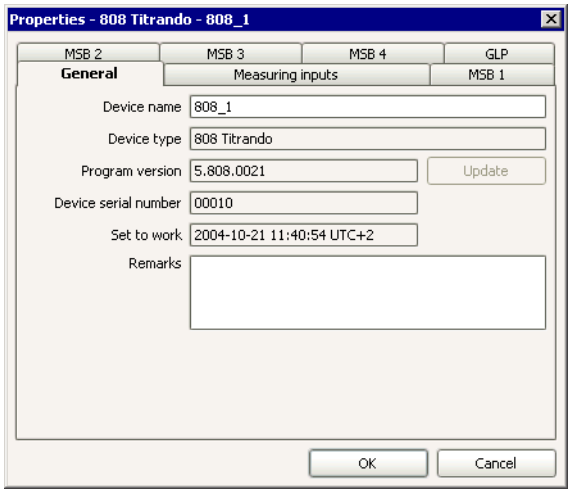
- 808, 809, 835, 836, 841, 842 Titrandos
- 846 Dosing Interface
- 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799 Titrinos
- 730 Sample Changer
- 774 Sample Changer
- 778, 789 Sample Processors
- 814, 815 USB Sample Processors
- 855 Robotic Titrosampler
- 756, 831 Coulometers
- 712 Conductometer
- Universal RS232 device
- Balances
- Barcode readers

Titrando

The parameters for the **808, 809, 835, 836, 841** and **842 Titrandos** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **Measuring inputs**
  Properties of the measuring inputs.
- **MSB #**
  Properties of the MSB connections 1...4 and the peripheral devices connected to them.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name
50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type
Shows the type of device.

Program version
Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

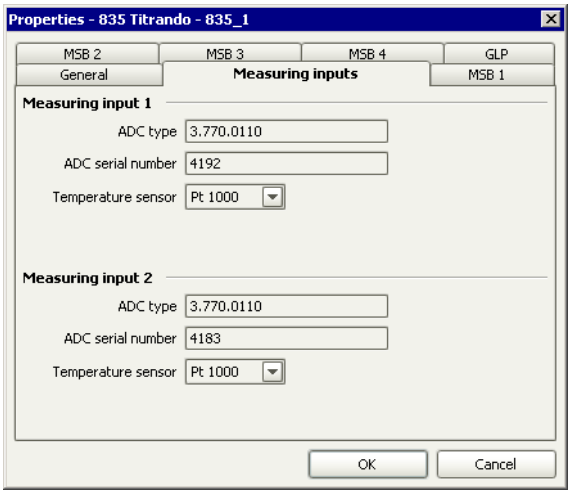
Shows the new device program version to be loaded.

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.*

Measuring inputs



Measuring input 1/2

ADC type

Shows the type of analog-digital converter.

ADC serial number

Shows the serial number of the measuring input.

Temperature sensor

[Pt 1000], NTC

Selects the type of temperature sensor connected to the measuring input. For an **NTC** type temperature sensor two further parameters are visible:

R (25 °C)

1000 ... [30000] ... 99999 Ohm

Nominal resistance of connected NTC sensor.

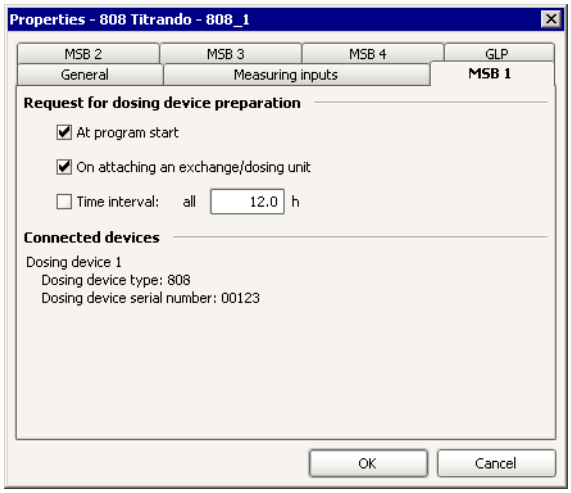
B value

1000 ... [4100] ... 9999

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

> ***Note***
> *Titrando models 2.8xx.0010 have only one measuring input.*

MSB



Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (prepare) is to be shown for the dosing device connected to the MSB.

At program start

[on], off

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

If this option is switched on then each time that an exchange unit is attached to the Dosimat or each time that a dosing unit is attached to the Dosino the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

0.1 ... [12.0] ... 999.9 h

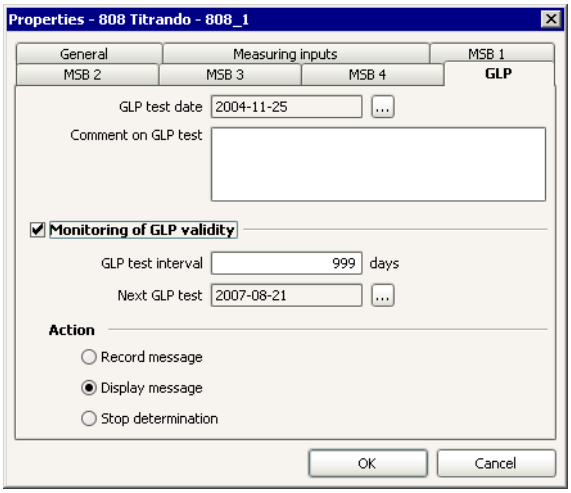
Time interval after which the request to prepare the dosing device will appear.

Connected devices

Information about the following peripheral devices connected to the MSB connection appears here:

- **Dosing device**
  The **Dosing device type** is shown here for the connected dosing devices; for type 8xx dosing devices the **Dosing device serial number** is also shown.
- **Stirrer**
  The **Stirrer type** and **Stirrer serial number** are shown here for the connected stirrers.
- **Remote box**
  No properties can be shown for a connected remote box.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Titrino

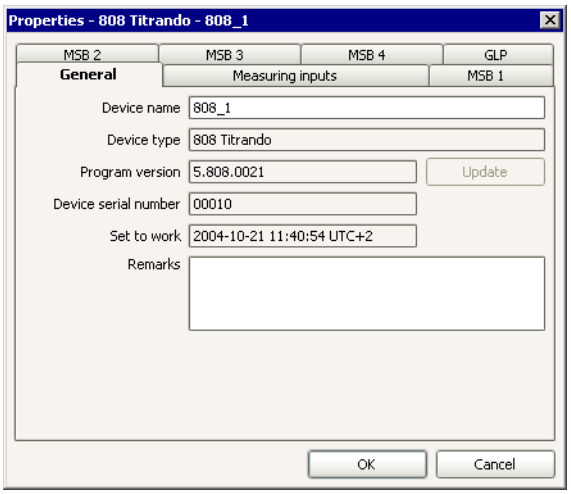
The parameters for the **702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798** and **799 Titrinos** are set on the following tabs:

- **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 device (685 Dosimat or 700 Dosino).

> ***Note***
> *These tabs for external dosing devices are only present for 736, 751, 758 and 799 Titrinos.*

- **RS232**
  Selection of the serial interface to which the Titrino is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Update

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Working hours

Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

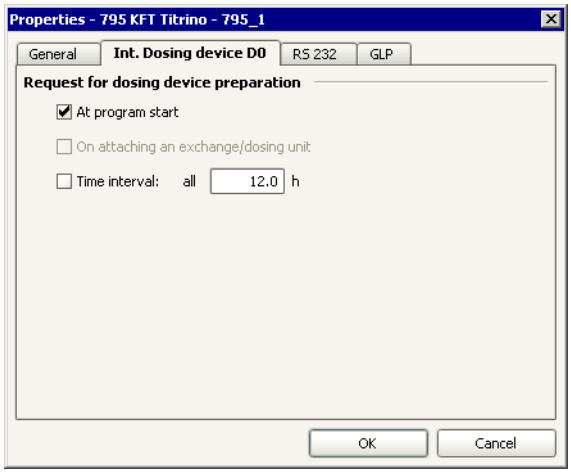
Shows the new device program version to be loaded.

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.*

Int. dosing device D0



Request for dosing device preparation

Selection when the request for carrying out a **PREP** (prepare) command is to be shown for the internal dosing device.

At program start

[on], off

If this option is switched on then the request to prepare the dosing device will appear at each program start.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

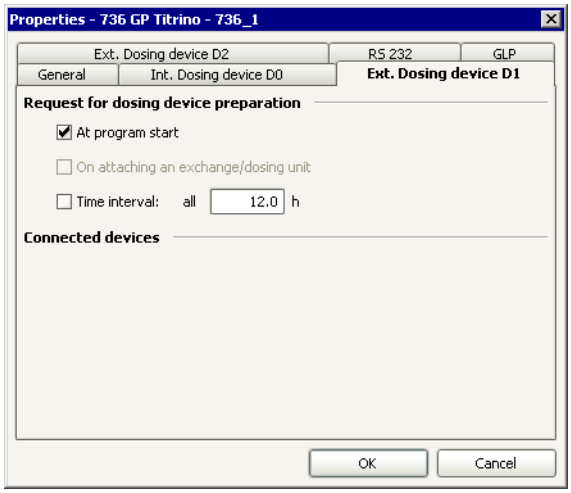
all

0.1 ... [12] ... 999.9 h

Time interval after which the request to prepare the dosing device will appear.

> ***Note***
> *The preparation of internal dosing devices on* ***Titrinos 702, 716, 718, 719, 720, 721, 784, 785, 794, 795, 798*** *can only be done on the device itself before starting tiamo.*

Ext. dosing device D#



Request for dosing device preparation

Selects when the request for carrying out a **PREP** (prepare) command is to be shown for the external dosing device **D1** or **D2**.

At program start

[on], off

If this option is switched on then at each program start the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

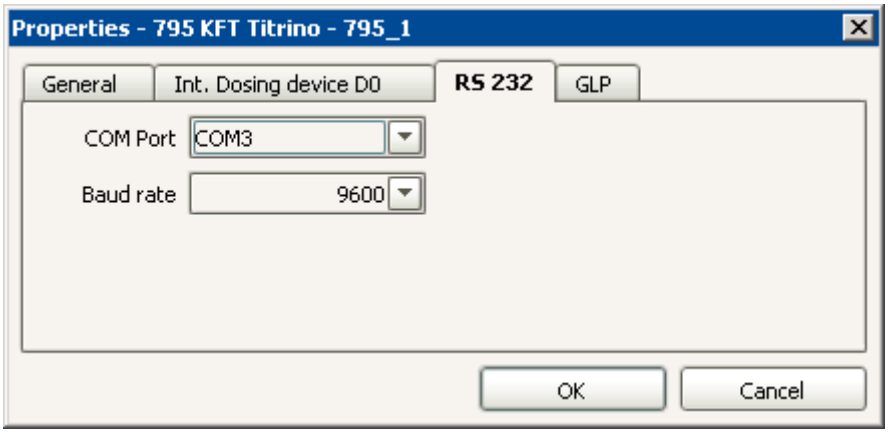
0.1 ... [12.0] ... 999.9 h

Time interval after which the request to prepare the dosing device will appear.

Connected devices

The **Dosing device type** (685 Dosimat or 700 Dosino) connected to the dosing device connection is shown here if it has been defined in the device itself.

RS 232



COM Port

COM1, COM2, ..., [first free COM port]

Selection of the serial interface on the PC to which the device is connected.

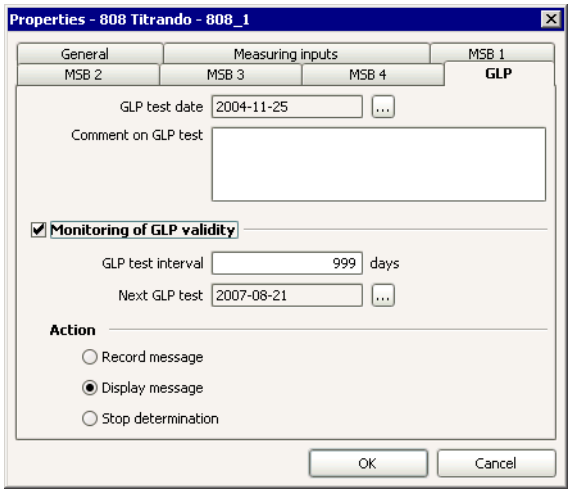
Baud rate

1200, 2400, 4800, [9600]

Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

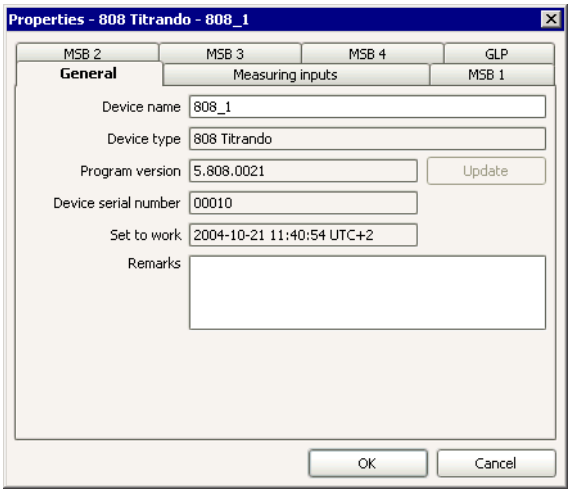
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Coulometer

The parameters for the **756 Coulometer** and **831 Coulometer** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **RS232**
  Selection of the serial interface to which the Coulometer is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Working hours

Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

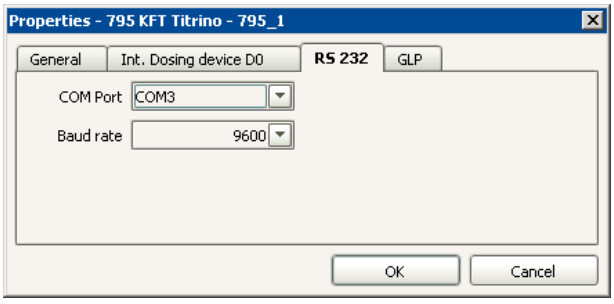
Shows the new device program version to be loaded.

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.*

RS 232



COM Port

COM1, COM2, ..., [first free COM port]

Selection of the serial interface on the PC to which the device is connected.

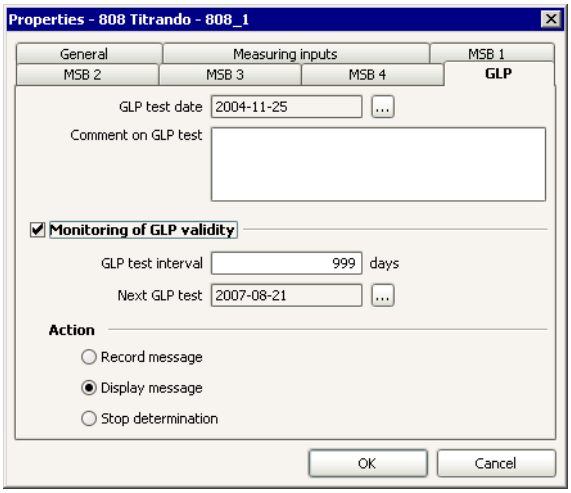
Baud rate

1200, 2400, 4800, [9600]

Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

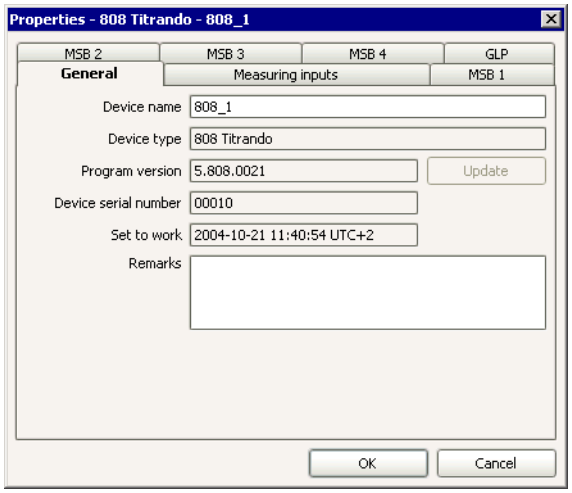
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Conductometer

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.
- **RS232**
  Selection of the serial interface to which the Coulometer is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Working hours

Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

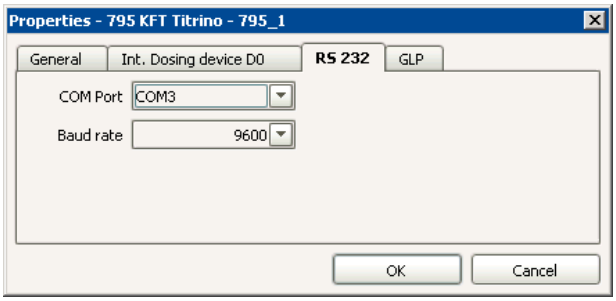
Shows the new device program version to be loaded.

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.*

RS 232



COM Port

COM1, COM2, ..., [first free COM port]

Selection of the serial interface on the PC to which the device is connected.

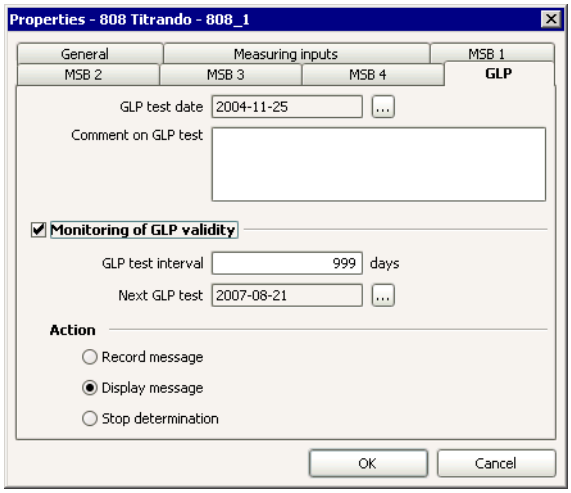
Baud rate

1200, 2400, 4800, [9600]

Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

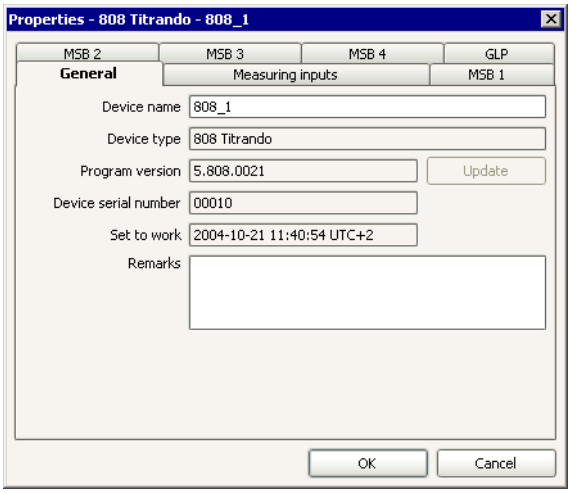
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Dosing Interface

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.
- **MSB #**
  Properties of the MSB connection and the peripheral devices connected to it.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Working hours

Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

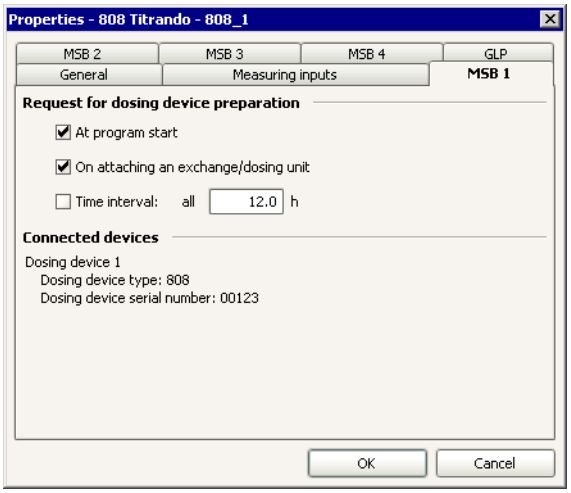
Shows the new device program version to be loaded.

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.*

MSB



Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (prepare) is to be shown for the dosing device connected to the MSB.

At program start

[on], off

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

If this option is switched on then each time that an exchange unit is attached to the Dosimat or each time that a dosing unit is attached to the Dosino the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

0.1 ... [12.0] ... 999.9 h

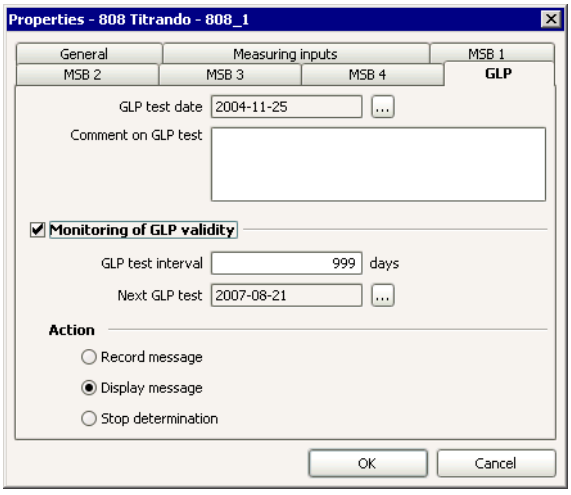
Time interval after which the request to prepare the dosing device will appear.

Connected devices

Information about the following peripheral devices connected to the MSB connection appears here:

- **Dosing device**
  The **Dosing device type** is shown here for the connected dosing devices; for type 8xx dosing devices the **Dosing device serial number** is also shown.
- **Stirrer**
  The **Stirrer type** and **Stirrer serial number** are shown here for the connected stirrers.
- **Remote box**
  No properties can be shown for a connected remote box.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]
If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval
0 ... [999] days
Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test
Date selection, [GLP test date + 999 days]
Date on which the next GLP test is to be carried out. This date can be selected after pressing [...] in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message
The message that the GLP test interval has expired will be saved automatically in the determination.

Display message
A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

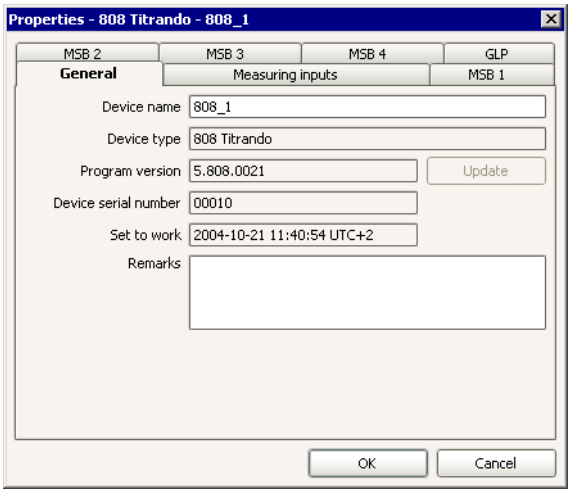
Stop determination
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

814/815 USB Sample Processor

The parameters for the **814 USB Sample Processor and 815 Robotic USB Sample Processor XL** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **Tower #**
  Properties of Tower 1 and Tower 2 (if present).
- **Rack**
  Information about the attached rack.
- **MSB #**
  Properties of MSB connections 1...3 and the peripheral devices connected to them.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name
50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type
Shows the type of device.

Program version
Shows the program version of the device.

Update

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

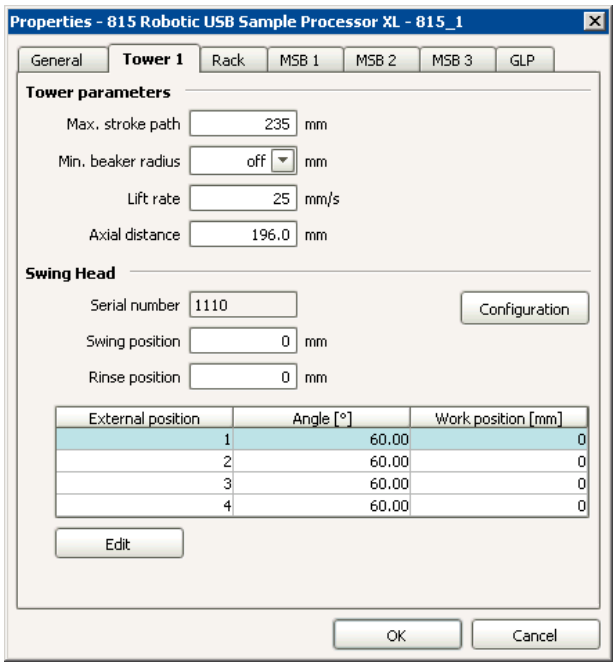
Shows the new device program version to be loaded.

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.*

Tower



Tower parameters

Max. stroke path

0 ... [235] mm

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Rest position", i.e. the lift is moved right to the top.

Min. beaker radius

1.0 ... 100.0 mm, [off]

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 for general Sample positions and Special beaker will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the sequence will be stopped and an error message will appear. With **off** no check will be made.

Lift rate

3 ... [25] mm/s

Lift speed for manual operation.

Axial distance

100.0 ... 300.0 mm

[166.0 mm] (778 Sample Processor, 814 USB Sample Processor XL)

[196.0 mm] (789 Robotic Sample Processor, 815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler)

Distance between the axis of rotation of the sample rack and turning axis of the robotic arm.

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

[0] ... 235 mm

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Rinse position

[0] ... 235 mm

Rinse position valid for all 4 external positions.

Configuration

Open the dialog window **Robotic arm configuration** (*see Robotic arm configuration*) in which the properties of the robotic arm of the swing head can be edited.

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 cannot be edited directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

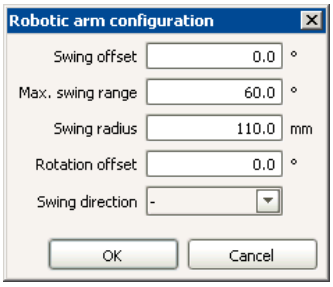
Work position for external position.

Edit

Open the dialog window **External position #** (*see External position*) in which the parameters for the external position selected in the table can be edited.

Robotic arm configuration

In the dialog window **Robotic arm configuration** specific settings can be made for each robotic arm mounted on a swing head.



Swing offset

-270.0 ... [0.0] ... 270.0 °

Turning angle offset for specific robotic arm model. This value must be set according to the leaflet supplied with the swing head.

Max. swing range

0.0 ... [60.0] ... 330.0 °

Maximum usable swing range for specific robotic arm model. Each robotic arm model has a different value because of its construction. This value must be set according to the leaflet supplied with the swing head and can also be reduced if necessary.

Swing radius

30.0 ... [110.0] ... 300.0 mm

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.

Rotation offset

-270.0 ... [0.0] ... 270.0 °

Offset from the center of the tower to the center of the robotic arm, which does not normally need to be altered. 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.

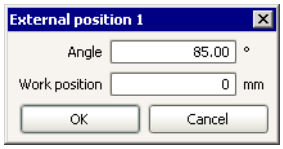
Swing direction

+ (clockwise rotation), – (counterclockwise rotation)

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.

External position

In the dialog window **External position #** a swing angle and a specific work position can be defined for each external position. Shift and rinse positions can only be defined for all 4 external positions together (see Tower # properties). No special position can be defined for external positions.



Angle

Offset...[60.00 °]...(Offset + max. swing range)

Definition of the turning angle for the selected external position. The offset is made up of a design-dependent angle (approx. 8-9°) together with the robotic arm offset from the Robotic arm properties *(see Robotic arm properties)*. The maximum swing range is also defined under Robotic arm properties.

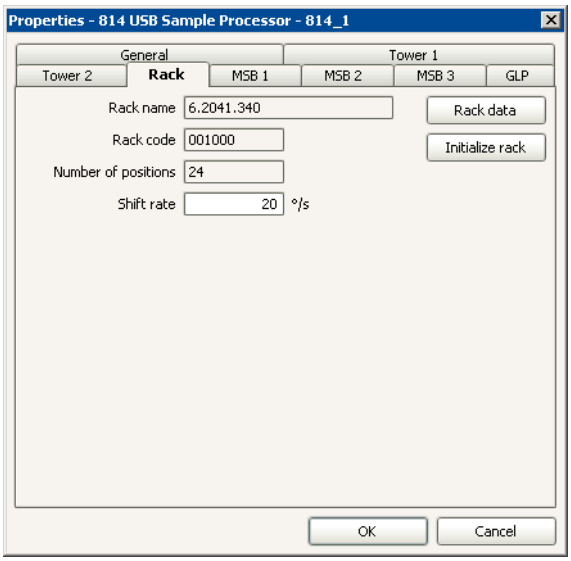
Work position

[0] ... 235 mm

Definition of the work position for the selected external position.

Rack

On the tab **Rack** the rack-specific data of the attached rack are shown.



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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

3 ... [20] °/s

Sample rack speed of rotation for manual operation.

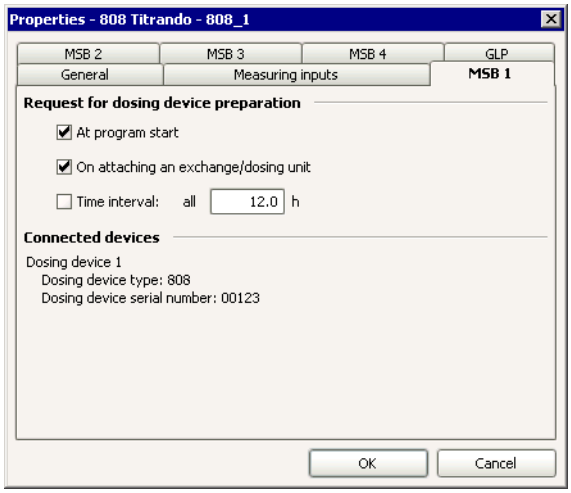
Rack data

Opens the dialog window **Rack data** (*see Configuration - Subwindow Rack data - Rack properties*) or **Rackdata (774)** in which the data of the attached rack is shown and can be edited.

Initialize rack

Initializes the attached rack. This resets the rack, lift and swing head, reads off the rack code and transfers the corresponding rack data to the Sample Processor.

MSB



Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (prepare) is to be shown for the dosing device connected to the MSB.

At program start

[on], off

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

If this option is switched on then each time that an exchange unit is attached to the Dosimat or each time that a dosing unit is attached to the Dosino the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

0.1 ... [12.0] ... 999.9 h

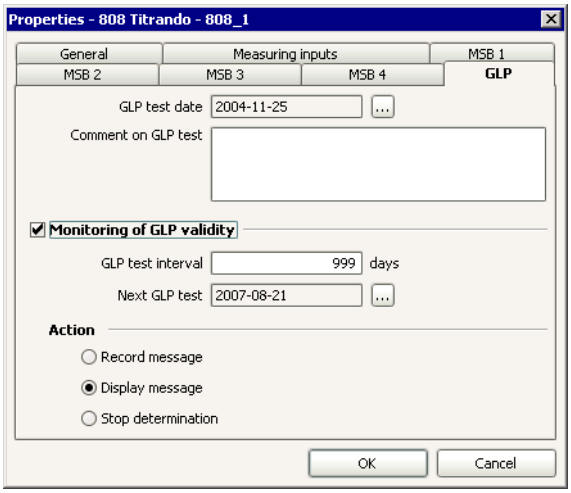
Time interval after which the request to prepare the dosing device will appear.

Connected devices

Information about the following peripheral devices connected to the MSB connection appears here:

- **Dosing device**
  The **Dosing device type** is shown here for the connected dosing devices; for type 8xx dosing devices the **Dosing device serial number** is also shown.
- **Stirrer**
  The **Stirrer type** and **Stirrer serial number** are shown here for the connected stirrers.
- **Remote box**
  No properties can be shown for a connected remote box.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

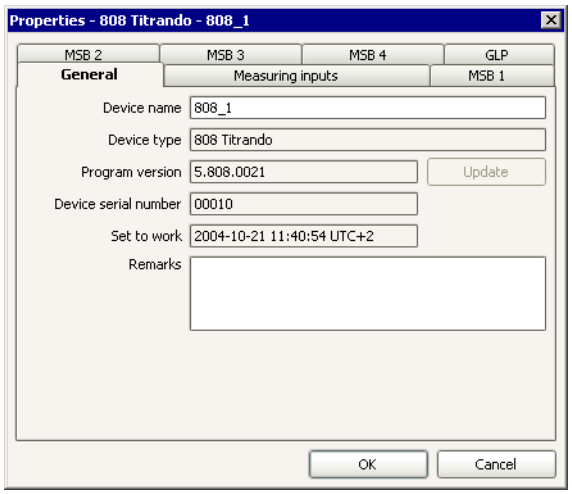
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

855 Robotic Titrosampler

The parameters for the **855 Robotic Titrosampler** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **Measuring inputs**
  Properties of the measuring inputs.
- **MSB #**
  Properties of the MSB connections 1...3 and the peripheral devices connected to them.
- **Tower 1**
  Properties of Tower 1.
- **Rack**
  Information about the attached rack.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version
Shows the old device program version.

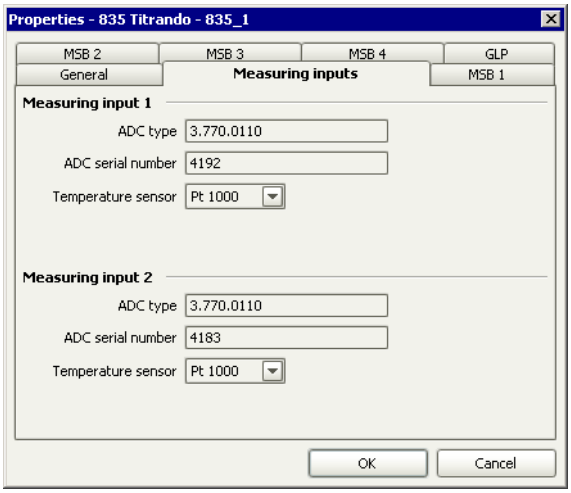
New version
Shows the new device program version to be loaded.

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.*

Measuring inputs



Measuring input 1/2

ADC type

Shows the type of analog-digital converter.

ADC serial number

Shows the serial number of the measuring input.

Temperature sensor

[Pt 1000], NTC

Selects the type of temperature sensor connected to the measuring input. For an **NTC** type temperature sensor two further parameters are visible:

R (25 °C)

1000 ... [30000] ... 99999 Ohm

Nominal resistance of connected NTC sensor.

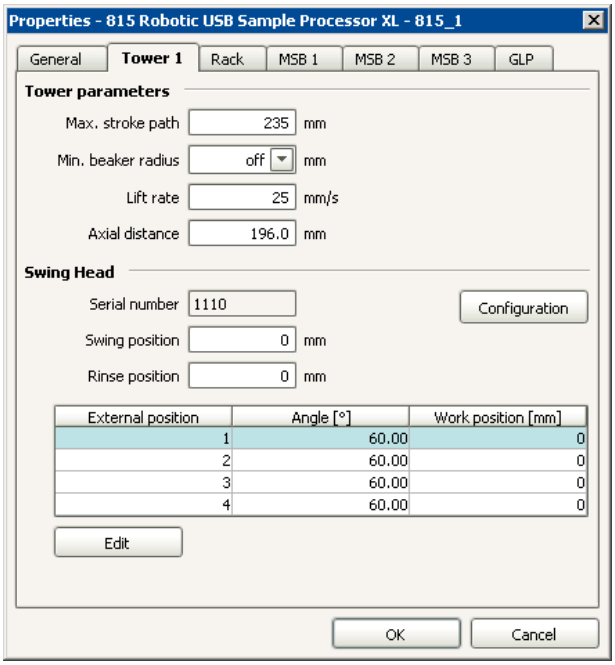
B value

1000 ... [4100] ... 9999

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

> ***Note***
> *Titrando models 2.8xx.0010 have only one measuring input.*

Tower



Tower parameters

Max. stroke path

0 ... [235] mm

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Rest position", i.e. the lift is moved right to the top.

Min. beaker radius

1.0 ... 100.0 mm, [off]

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 for general Sample positions and Special beaker will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the sequence will be stopped and an error message will appear. With **off** no check will be made.

Lift rate

3 ... [25] mm/s

Lift speed for manual operation.

Axial distance

100.0 ... 300.0 mm

[166.0 mm] (778 Sample Processor, 814 USB Sample Processor XL)

[196.0 mm] (789 Robotic Sample Processor, 815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler)

Distance between the axis of rotation of the sample rack and turning axis of the robotic arm.

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

[0] ... 235 mm

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Rinse position

[0] ... 235 mm

Rinse position valid for all 4 external positions.

Configuration

Open the dialog window **Robotic arm configuration** (*see Robotic arm configuration*) in which the properties of the robotic arm of the swing head can be edited.

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 cannot be edited directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

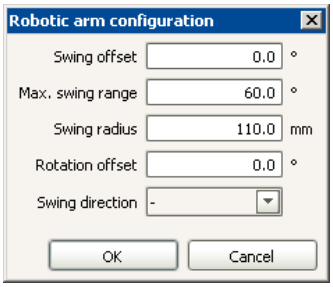
Work position for external position.

Edit

Open the dialog window **External position #** (*see External position*) in which the parameters for the external position selected in the table can be edited.

Robotic arm configuration

In the dialog window **Robotic arm configuration** specific settings can be made for each robotic arm mounted on a swing head.



Swing offset

-270.0 ... [0.0] ... 270.0 °

Turning angle offset for specific robotic arm model. This value must be set according to the leaflet supplied with the swing head.

Max. swing range

0.0 ... [60.0] ... 330.0 °

Maximum usable swing range for specific robotic arm model. Each robotic arm model has a different value because of its construction. This value must be set according to the leaflet supplied with the swing head and can also be reduced if necessary.

Swing radius

30.0 ... [110.0] ... 300.0 mm

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.

Rotation offset

-270.0 ... [0.0] ... 270.0 °

Offset from the center of the tower to the center of the robotic arm, which does not normally need to be altered. 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.

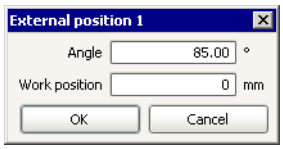
Swing direction

+ (clockwise rotation), – (counterclockwise rotation)

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.

External position

In the dialog window **External position #** a swing angle and a specific work position can be defined for each external position. Shift and rinse positions can only be defined for all 4 external positions together (see Tower # properties). No special position can be defined for external positions.



Angle

Offset...[60.00 °]...(Offset + max. swing range)

Definition of the turning angle for the selected external position. The offset is made up of a design-dependent angle (approx. 8-9°) together with the robotic arm offset from the Robotic arm properties *(see Robotic arm properties)*. The maximum swing range is also defined under Robotic arm properties.

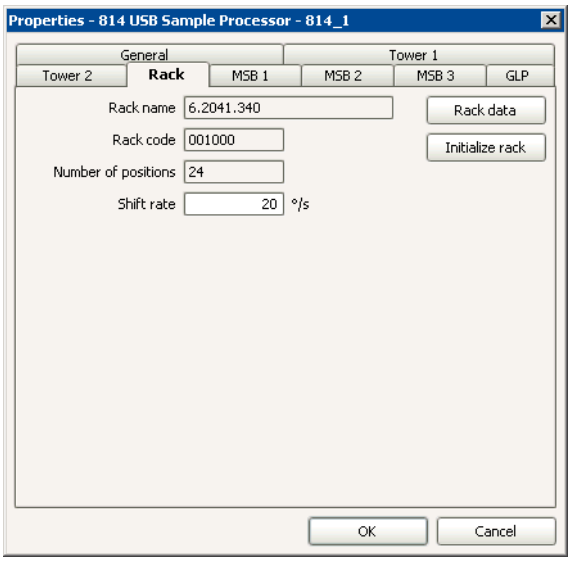
Work position

[0] ... 235 mm

Definition of the work position for the selected external position.

Rack

On the tab **Rack** the rack-specific data of the attached rack are shown.



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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

3 ... [20] °/s

Sample rack speed of rotation for manual operation.

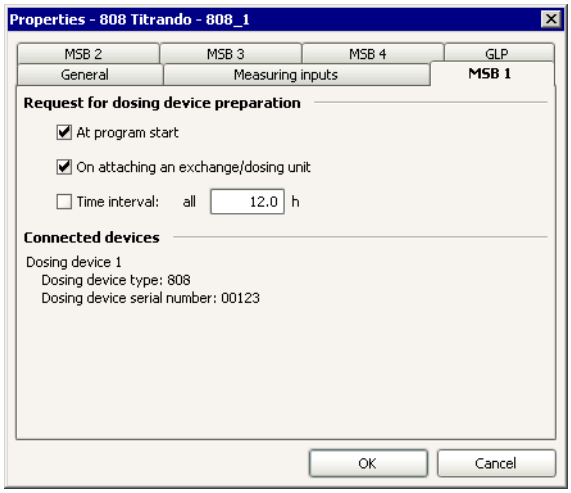
Rack data

Opens the dialog window **Rack data** (*see Configuration - Subwindow Rack data - Rack properties*) or **Rackdata (774)** in which the data of the attached rack is shown and can be edited.

Initialize rack

Initializes the attached rack. This resets the rack, lift and swing head, reads off the rack code and transfers the corresponding rack data to the Sample Processor.

MSB



Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (prepare) is to be shown for the dosing device connected to the MSB.

At program start

[on], off

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

If this option is switched on then each time that an exchange unit is attached to the Dosimat or each time that a dosing unit is attached to the Dosino the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

0.1 ... [12.0] ... 999.9 h

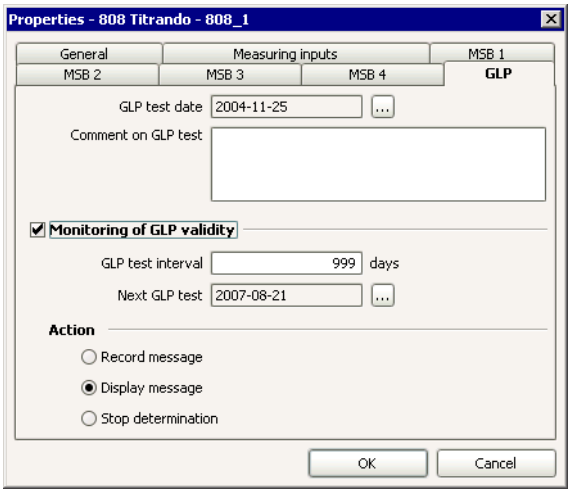
Time interval after which the request to prepare the dosing device will appear.

Connected devices

Information about the following peripheral devices connected to the MSB connection appears here:

- **Dosing device**
  The **Dosing device type** is shown here for the connected dosing devices; for type 8xx dosing devices the **Dosing device serial number** is also shown.
- **Stirrer**
  The **Stirrer type** and **Stirrer serial number** are shown here for the connected stirrers.
- **Remote box**
  No properties can be shown for a connected remote box.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

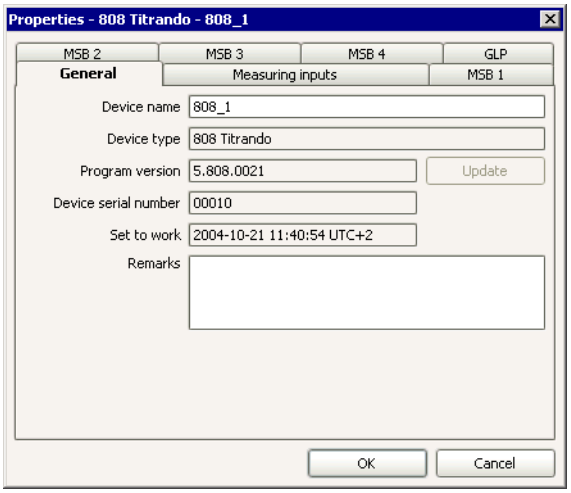
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

778/789 Sample Processor

The parameters for the **778 Sample Processor** and **789 Robotic Sample Processor XL** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **Tower #**
  Properties of Tower 1 and Tower 2 (if present).
- **Rack**
  Information about the attached rack.
- **MSB #**
  Properties of MSB connections 1...3 and the peripheral devices connected to them.
- **RS232**
  Selection of the serial interface to which the device is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

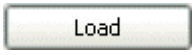
Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Opens the dialog window **Load new program version**.

Old version
Shows the old device program version.

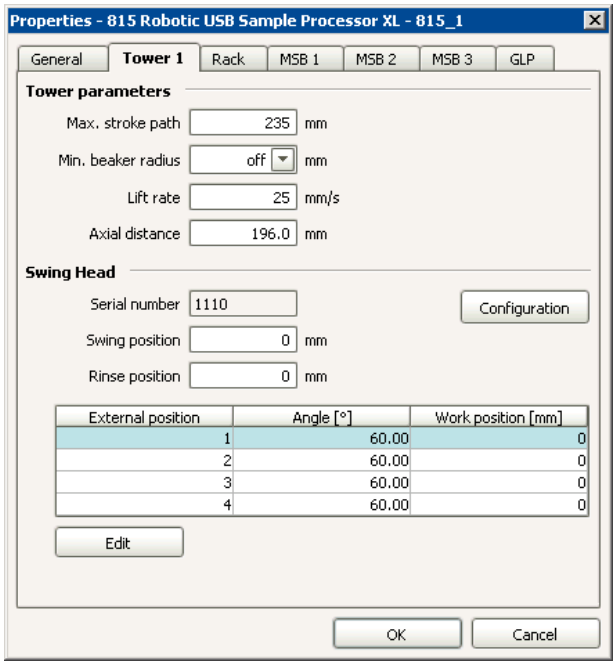
New version
Shows the new device program version to be loaded.



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.*

Tower



Tower parameters

Max. stroke path

0 ... [235] mm

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Rest position", i.e. the lift is moved right to the top.

Min. beaker radius

1.0 ... 100.0 mm, [off]

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 for general Sample positions and Special beaker will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the sequence will be stopped and an error message will appear. With **off** no check will be made.

Lift rate

3 ... [25] mm/s

Lift speed for manual operation.

Axial distance

100.0 ... 300.0 mm

[166.0 mm] (778 Sample Processor, 814 USB Sample Processor XL)

[196.0 mm] (789 Robotic Sample Processor, 815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler)

Distance between the axis of rotation of the sample rack and turning axis of the robotic arm.

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

[0] ... 235 mm

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Rinse position

[0] ... 235 mm

Rinse position valid for all 4 external positions.

Configuration

Open the dialog window **Robotic arm configuration** (*see Robotic arm configuration*) in which the properties of the robotic arm of the swing head can be edited.

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 cannot be edited directly.

External position
Number of the external position.

Angle [°]
Swing angle for external position.

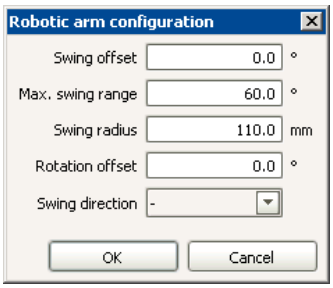
Work position [mm]
Work position for external position.

Edit

Open the dialog window **External position #** (*see External position*) in which the parameters for the external position selected in the table can be edited.

Robotic arm configuration

In the dialog window **Robotic arm configuration** specific settings can be made for each robotic arm mounted on a swing head.



Swing offset
-270.0 ... [0.0] ... 270.0 °
Turning angle offset for specific robotic arm model. This value must be set according to the leaflet supplied with the swing head.

Max. swing range
0.0 ... [60.0] ... 330.0 °
Maximum usable swing range for specific robotic arm model. Each robotic arm model has a different value because of its construction. This value must be set according to the leaflet supplied with the swing head and can also be reduced if necessary.

Swing radius
30.0 ... [110.0] ... 300.0 mm
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.

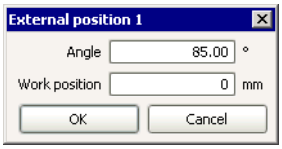
Rotation offset
-270.0 ... [0.0] ... 270.0 °
Offset from the center of the tower to the center of the robotic arm, which does not normally need to be altered. If a robotic arm must be mounted on the tower so that it is offset to one side then this value can be determined by the service technician during rack adjustment.

Swing direction

+ (clockwise rotation), – (counterclockwise rotation)
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.

External position

In the dialog window **External position #** a swing angle and a specific work position can be defined for each external position. Shift and rinse positions can only be defined for all 4 external positions together (see Tower # properties). No special position can be defined for external positions.



Angle

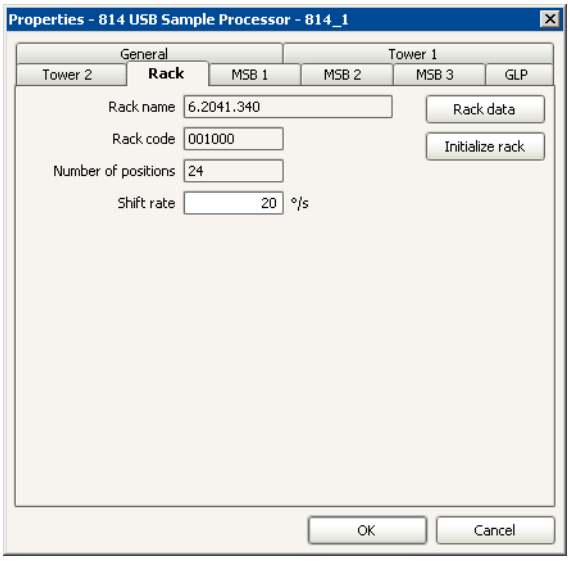
Offset...[60.00 °]...(Offset + max. swing range)
Definition of the turning angle for the selected external position. The offset is made up of a design-dependent angle (approx. 8-9°) together with the robotic arm offset from the Robotic arm properties *(see Robotic arm properties)*. The maximum swing range is also defined under Robotic arm properties.

Work position

[0] ... 235 mm
Definition of the work position for the selected external position.

Rack

On the tab **Rack** the rack-specific data of the attached rack are shown.



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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

3 ... [20] °/s

Sample rack speed of rotation for manual operation.

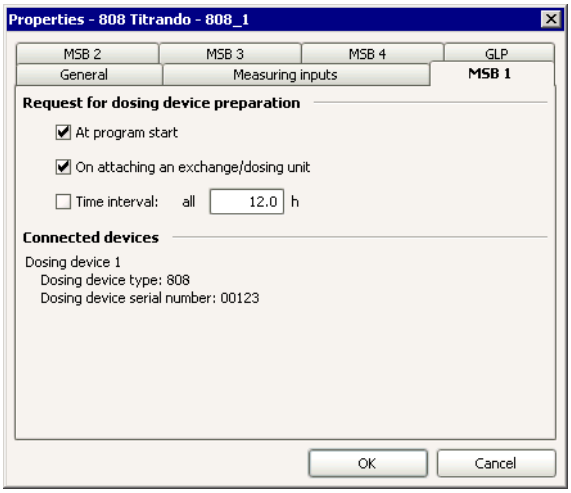
Rack data

Opens the dialog window **Rack data** (*see Configuration - Subwindow Rack data - Rack properties*) or **Rackdata (774)** in which the data of the attached rack is shown and can be edited.

Initialize rack

Initializes the attached rack. This resets the rack, lift and swing head, reads off the rack code and transfers the corresponding rack data to the Sample Processor.

MSB



Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (prepare) is to be shown for the dosing device connected to the MSB.

At program start

[on], off

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

If this option is switched on then each time that an exchange unit is attached to the Dosimat or each time that a dosing unit is attached to the Dosino the request to prepare the dosing device will appear.

Time interval

on, [off]

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

0.1 ... [12.0] ... 999.9 h

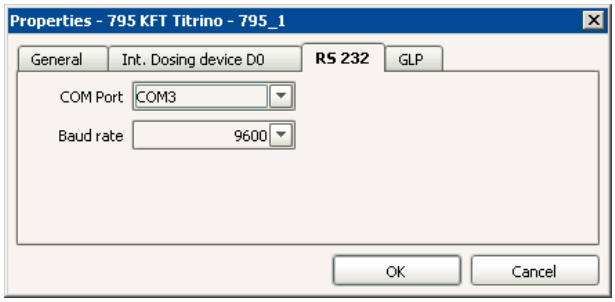
Time interval after which the request to prepare the dosing device will appear.

Connected devices

Information about the following peripheral devices connected to the MSB connection appears here:

- **Dosing device**
  The **Dosing device type** is shown here for the connected dosing devices; for type 8xx dosing devices the **Dosing device serial number** is also shown.
- **Stirrer**
  The **Stirrer type** and **Stirrer serial number** are shown here for the connected stirrers.
- **Remote box**
  No properties can be shown for a connected remote box.

RS 232



COM Port

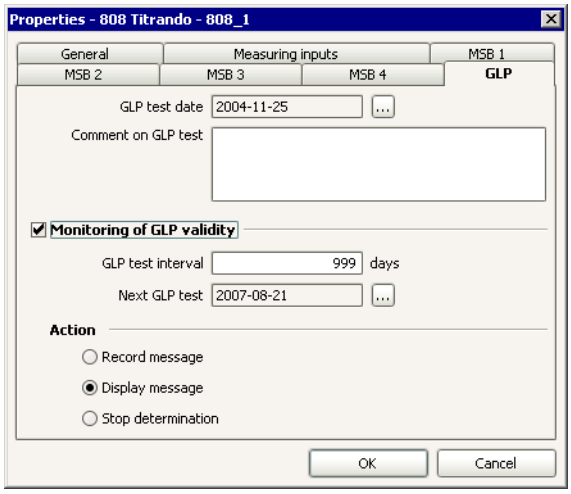
COM1, COM2, ..., [first free COM port]
Selection of the serial interface on the PC to which the device is connected.

Baud rate

1200, 2400, 4800, [9600]
Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under* ***GLP test date****.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

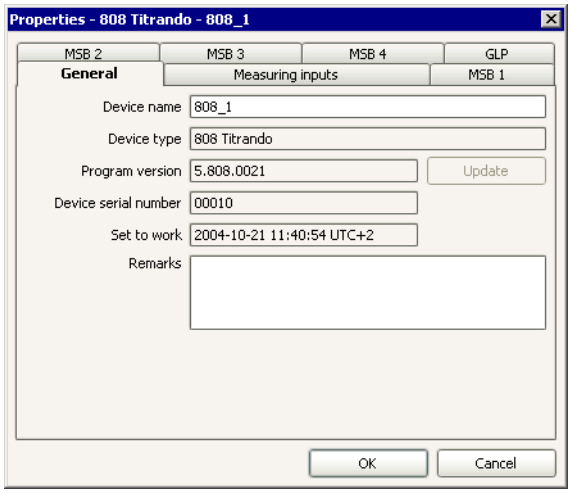
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

730 Sample Changer

The parameters for the **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).
- **Rack**
  Information about the attached rack.
- **Dosing devices**
  Properties of the connection and the dosing devices connected to it.
- **RS232**
  Selection of the serial interface to which the device is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name
50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type
Shows the type of device.

Program version
Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version

Shows the old device program version.

New version

Shows the new device program version to be loaded.

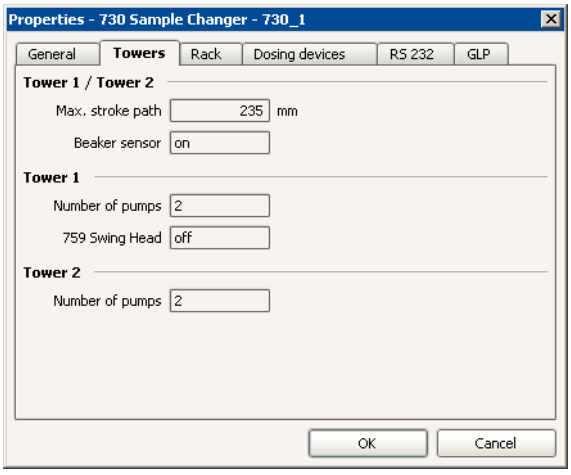
Load

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.*

Towers

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 "Rest 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 that 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

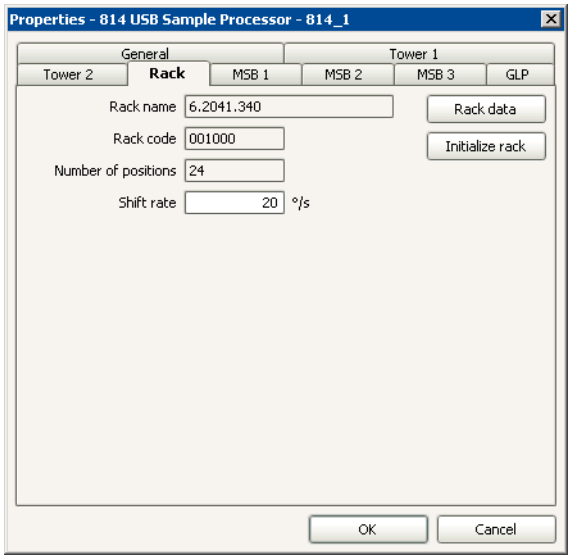
Number of pumps

Shows how many pumps are connected to Tower 1.

> ***Note***
> *A swing head can only be mounted on Tower 1.*

Rack

On the tab **Rack** the rack-specific data of the attached rack are shown.



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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

3 ... [20] °/s

Sample rack speed of rotation for manual operation.

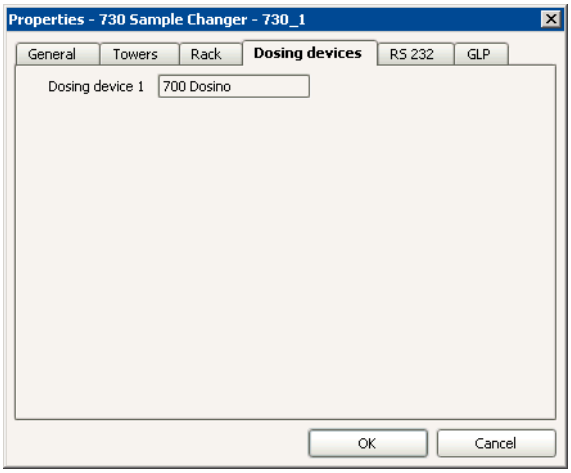
Rack data

Opens the dialog window **Rack data** (*see Configuration - Subwindow Rack data - Rack properties*) or **Rackdata (774)** in which the data of the attached rack is shown and can be edited.

Initialize rack

Initializes the attached rack. This resets the rack, lift and swing head, reads off the rack code and transfers the corresponding rack data to the Sample Processor.

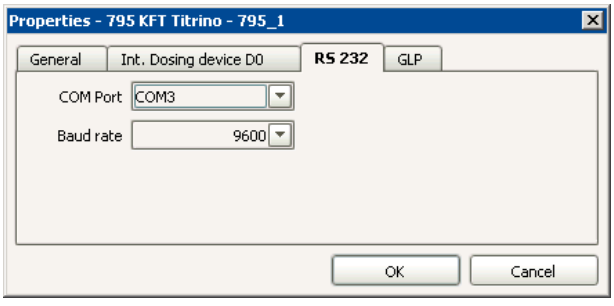
Dosing device



Shows the number and type of dosing devices connected to the **730 Sample Changer** or **774 Oven Sample Processor**. A maximum of 12 type **685 Dosimat** or **700 Dosino** dosing devices can be connected.

> ***Note***
> *Connecting up the dosing devices is described in the Instructions for Use for the 730 Sample Changer and 774 Oven Sample Processor. If no dosing device is connected then the card will remain empty.*

RS 232



COM Port

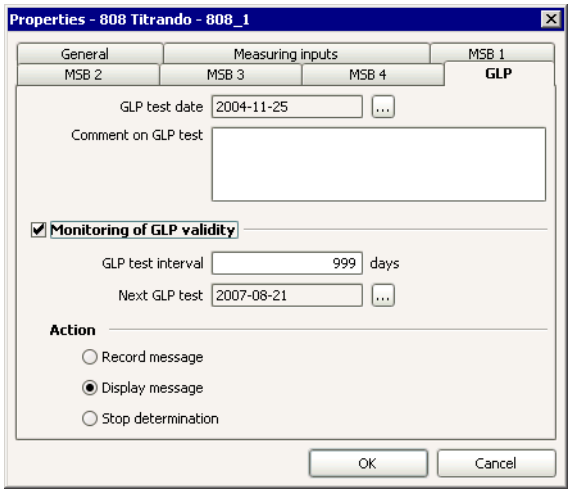
COM1, COM2, ..., [first free COM port]
Selection of the serial interface on the PC to which the device is connected.

Baud rate

1200, 2400, 4800, [9600]
Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

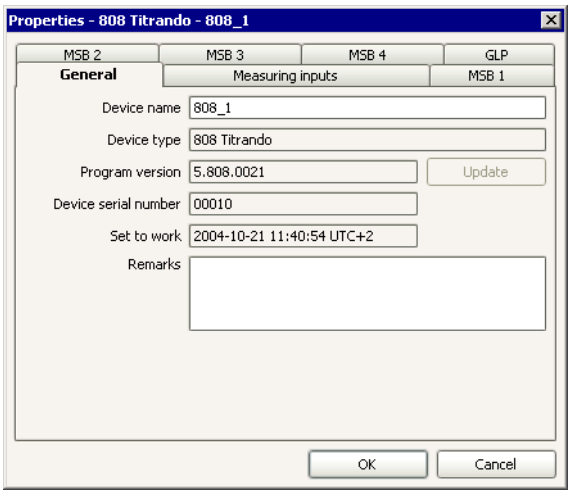
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

774 Oven Sample Processor

The parameters for the **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
- **Rack**
  Information about the attached rack.
- **Dosing devices**
  Properties of the connection and the dosing devices connected to it.
- **Gas**
  Shows the parameters for the gas flow.
- **Oven**
  Shows the oven parameters.
- **RS232**
  Selection of the serial interface to which the device is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type
Shows the type of device.

Program version
Shows the program version of the device.

Update

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Load new program version

If when a device is connected up it is discovered that this has an old program version that is not supported by *tiamo* then it must be updated. This is done by selecting the device in the Device table and using **Edit, Properties** to open the Properties window for the device. On the tab **General** the button **[Update]** is then active.

Update

Opens the dialog window **Load new program version**.

Old version
Shows the old device program version.

New version
Shows the new device program version to be loaded.

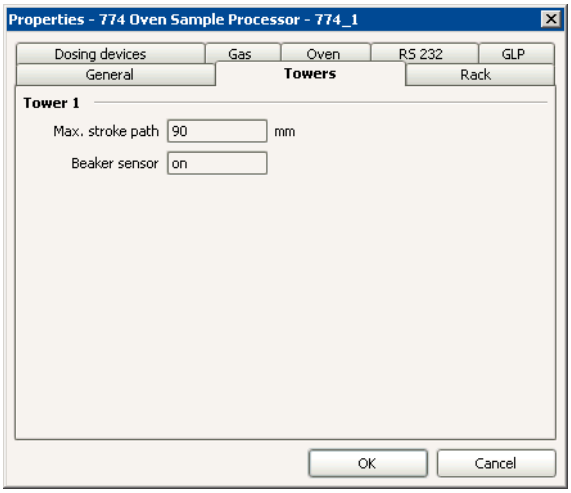
Load

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.*

Towers

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

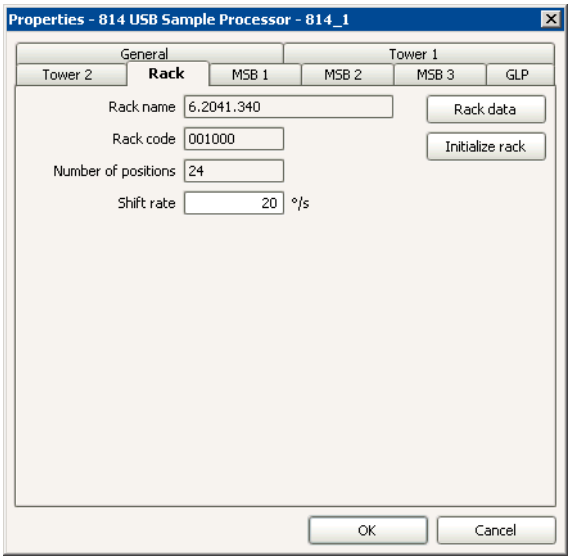
Shows the lowest permitted lift position for the tower. A lift height of **0 mm** corresponds to the "Rest position", i.e. the lift is moved right to the top.

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.

Rack

On the tab **Rack** the rack-specific data of the attached rack are shown.



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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

3 ... [20] °/s

Sample rack speed of rotation for manual operation.

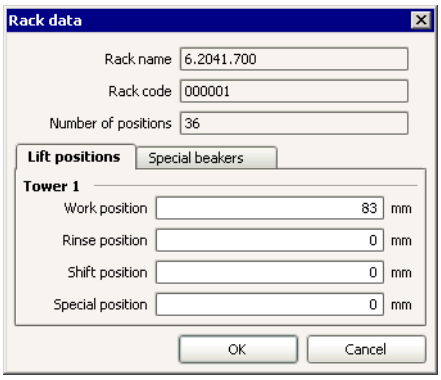
Rack data

Opens the dialog window **Rack data** (*see Configuration - Subwindow Rack data - Rack properties*) or **Rackdata (774)** in which the data of the attached rack is shown and can be edited.

Initialize rack

Initializes the attached rack. This resets the rack, lift and swing head, reads off the rack code and transfers the corresponding rack data to the Sample Processor.

Edit rack properties (774)



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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.

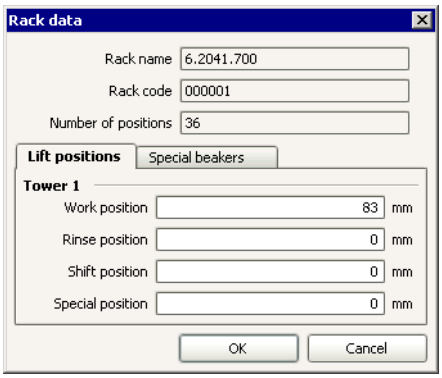
Number of positions

Shows the number of positions on the attached 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 positions for Tower 1.
- **Special beaker**
  Settings for the special beaker on the rack in position.

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

0 ... [83] ... 100 mm

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Rinse position

[0] ... 100 mm

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Shift position

[0] ... 100 mm

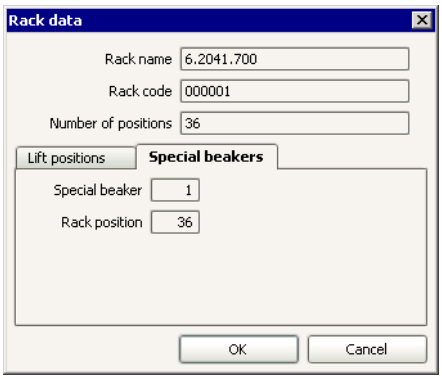
Shift position for Lift 1. Each time that the rack rotates the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here then the rotation will take place at the current lift position. This means that the shift position must be selected so that a safe rotation over the whole rack is possible at any time.

Special position

[0] ... 100 mm

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.

Special beakers



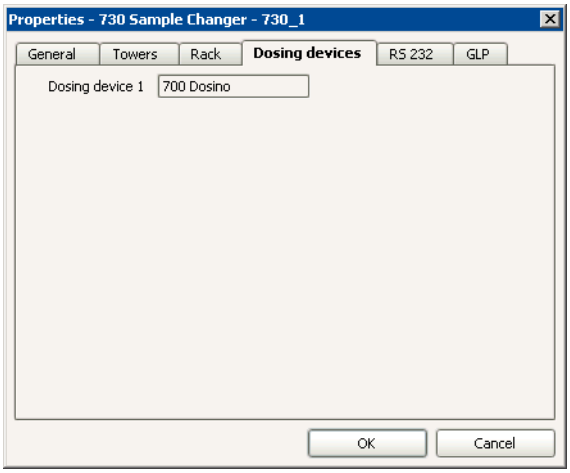
Special beaker

Shows the number of the special beaker for the selected rack.

Rack position

Shows the number of the rack position for the special beaker.

Dosing device

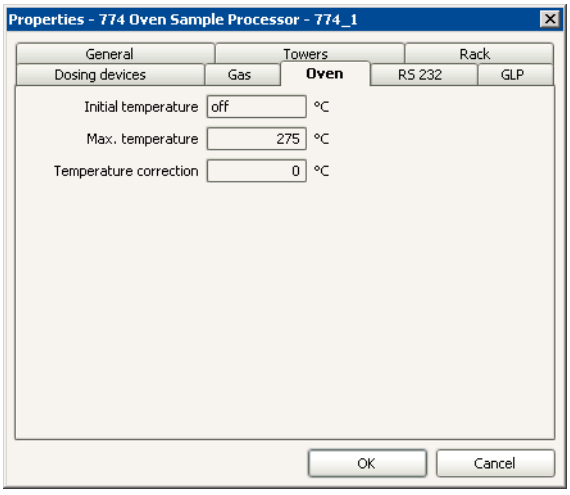


Shows the number and type of dosing devices connected to the **730 Sample Changer** or **774 Oven Sample Processor**. A maximum of 12 type **685 Dosimat** or **700 Dosino** dosing devices can be connected.

> ***Note***
> *Connecting up the dosing devices is described in the Instructions for Use for the 730 Sample Changer and 774 Oven Sample Processor. If no dosing device is connected then the card will remain empty.*

Oven

On the tab **Oven** the oven parameters for the **774 Oven Sample Processor** are shown. The parameters cannot be edited, they are only read off by the device.



Initial temperature

Shows the initial temperature set on the device. 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.

Max. temperature

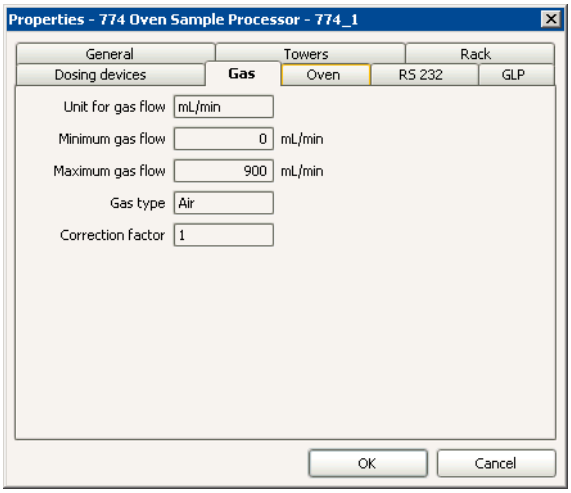
Shows the maximum temperature set on the device. This parameter is a safety setting and is intended to prevent a sample from being overheated. If the oven reaches this temperature on heating up then the oven heating will be switched off.

Temperature correction

Shows the temperature correction set on the device. 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 can be compensated. The displayed temperature is the oven temperature corrected by this value.

Gas

On the tab **Gas** the parameters for the gas flow to the **774 Oven Sample Processor** are shown. These 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.

Gas type

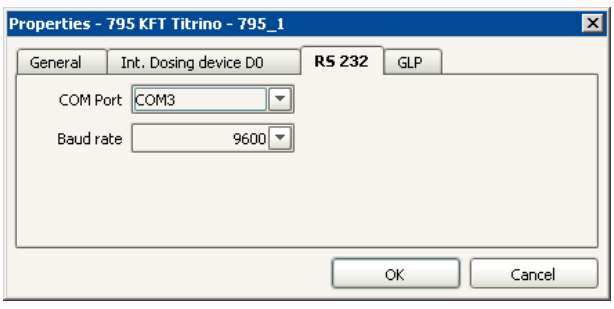
Shows the carrier gas.

Correction factor

Shows the correction for the gas flow measurement with "other" gases.

> ***Note***
> *If the minimum gas flow is undercut or the maximum gas flow is exceeded then an error message will appear.*

RS 232



COM Port

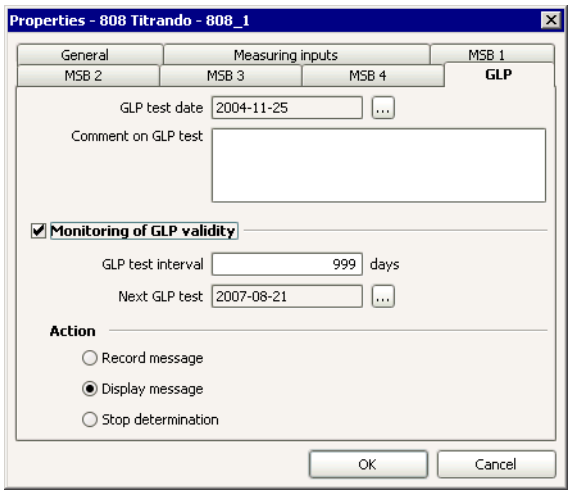
COM1, COM2, ..., [first free COM port]
Selection of the serial interface on the PC to which the device is connected.

Baud rate

1200, 2400, 4800, [9600]
Transmission speed. Additionally, this baud rate must be set on the device itself.

> ***Note***
> *Thes parameters are only editable for devices with status **not ok** (power and/or RS connection interrupted).*

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]
Comments about GLP test.

Monitoring of GLP validity

on, [off]
If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days
Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]
Date on which the next GLP test is to be carried out. This date can be selected after pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

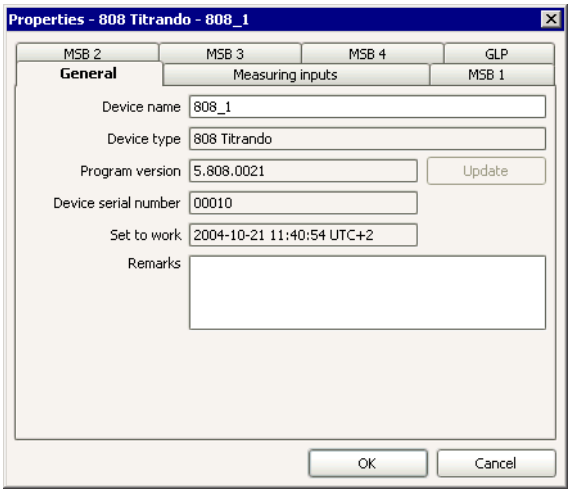
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Balance

The parameters for a **Balance** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **RS232**
  Selects the serial interface to which the balance is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

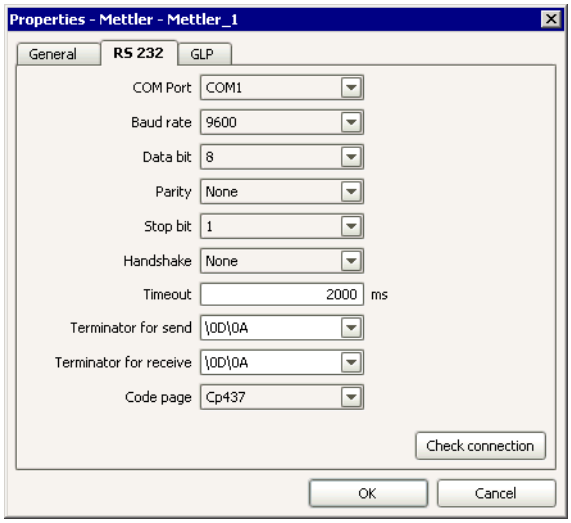
Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

RS 232



COM Port
COM1, COM2, ..., [first free COM port]
Selects the serial interface on the PC to which the balance is connected.

Baud rate
300, 600, 1200, 2400, 4800, [9600], 19200
Transmission speed.

Data bit
7, [8]
Number of data bits.

Parity
[none], odd, even
Type of parity check.

Stop bit
[1], 2
Number of stop bits.

Handshake
[None], HW, SW
Type of data transmission protocol.

Timeout

1000 ... [2000] ... 9000 ms

Maximum waiting time for receiving characters. If this time is exceeded the reception will be stopped.

Terminator for send

\0D, \0D\0A, \0D\0A\0A, \0D\0D\0A, ['empty']

Final character for transmission in hexadecimal code.

Terminator for receive

\0D, \0D\0A, \0D\0A\0A, \0D\0D\0A, ['leer']

Final character for reception in hexadecimal code.

Code page

[Cp437], Cp850, Cp851

Code page used for the data transmission.

Check connection

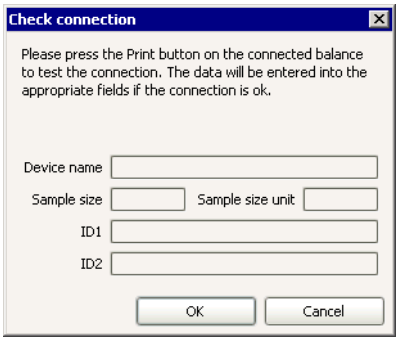
Tests the connection to the balance. The dialog window **Check connection** appears.

Test connection

In order to test the connection to a balance the balance must be selected in the Device table and then under **Edit, Properties** the Properties window for this device opened. On the tab **RS 232** the button **[Check connection]** must be pressed.

Check connection

Opens the dialog window **Check connection**.



If the print key on the connected balance is pressed then the data provided by the balance will be inserted in the following fields:

Device name

Name of balance.

Sample size

Sample weight.

Sample size unit

Sample weight unit.

ID1

Sample identification ID1.

ID2

Sample identification ID2.

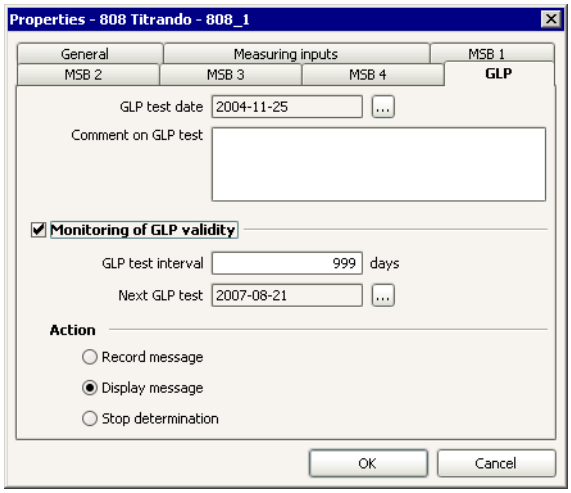
Entry date

Date and time of data entry by balance (only displayed for Sartorius balances with **Data memory** switched on).

Speichernummer

Internal memory number of the balance (only displayed for Sartorius balances with **Data memory** switched on).

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Barcode reader

Note
A barcode reader has to be configured as a device in tiamo only then when its functions for automatic data import into sample tables should be used. If a USB barcode reader not configured as a device is connected to the PC it will be recognized in a similar way to a keyboard as being an HID (Human Interface Device) and can be used for data entry in all fields.

The parameters for a **Barcode reader** are set on the following tabs:

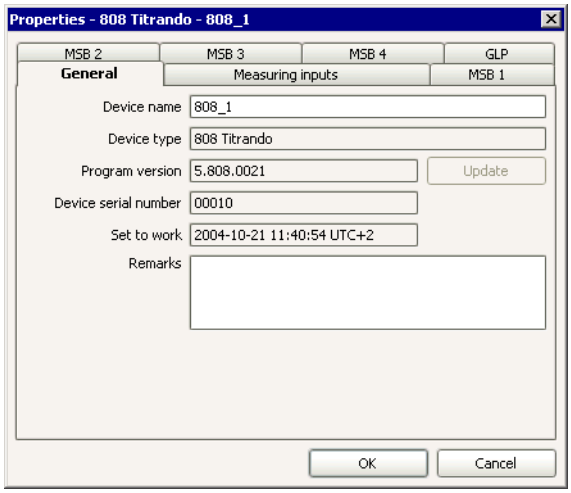
- **General**
  General device information such as device name, device type, serial number, etc.
- **Settings**
  Settings for the barcode reader.
- **GLP**
  Information about GLP test and GLP monitoring.

Note
If the functions of a barcode reader for automatic data import into sample tables should be used it must be added in tiamo as a device and cofigured so that during each data transmission 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 connected barcode reader)*
Postamble #1: ***04hex*** *(^D, EOT)*
End: ***<CR><LF>***

Refer to the user manual of the barcode reader for its configuration.

General



Device name
50 characters, [device type number_#]
Name of device (can be freely defined by user).

Device type
Shows the type of device.

Program version
Shows the program version of the device.

Update

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number
Shows the serial number of the device.

Set to work
Shows the date on which the device was automatically added to the device table.

Working hours
Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

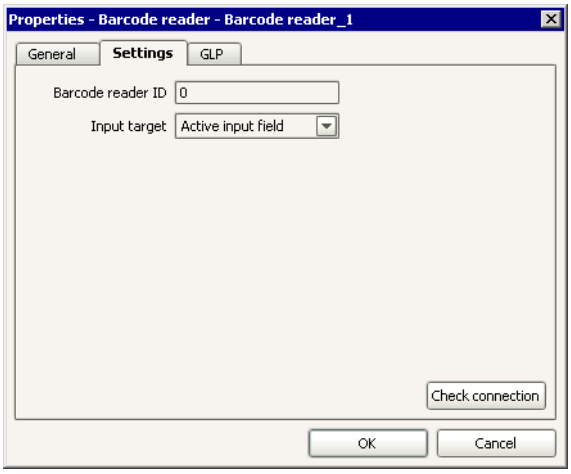
Data storage under legal control
on, [off]
This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks
1000 characters, [empty]
Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

Settings



Barcode reader ID

Shows the identification of the barcode reader.

Input target

[Active input field], Method, ID1...8, Sample size, Sample size unit, Sample position

Selection of the field into which the output from the barcode reader is to be entered.

Check connection

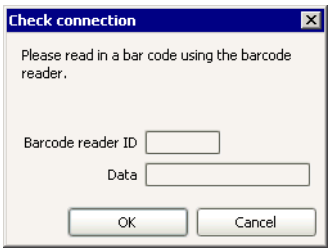
Tests the barcode reader connection. The dialog window **Check connection** appears.

Check connection

In order to test the connection to a barcode reader, the device must be selected in the device table and then under **Edit, Properties** the properties window is opened for this device. On the tab **Settings** the button **[Check connection]** must then be pressed.

Check connection

Opens the dialog window **Check connection**.



If a barcode is read in with the barcode reader then the received data will be inserted in the following fields:

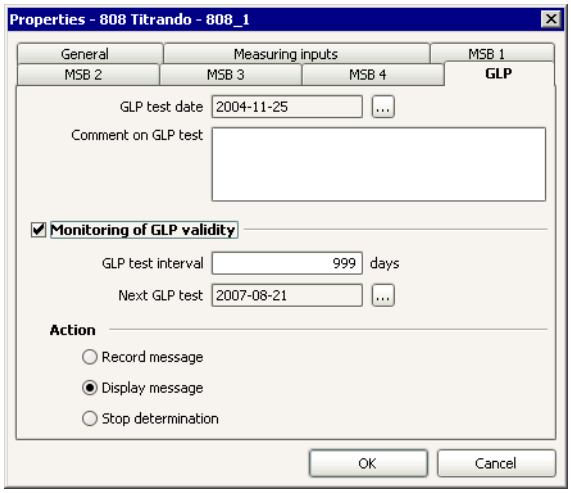
Barcode reader ID

Identifier of the barcode reader.

Data

Read-in data.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

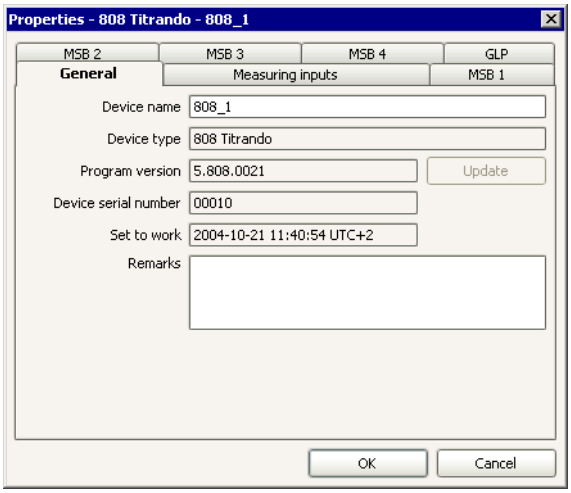
The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

RS232 device

The parameters for a generic **RS232 device** are set on the following tabs:

- **General**
  General device information such as device name, device type, serial number, etc.
- **RS232**
  Selects and configures the serial interface to which the device is connected.
- **GLP**
  Information about GLP test and GLP monitoring.

General



Device name

50 characters, [device type number_#]

Name of device (can be freely defined by user).

Device type

Shows the type of device.

Program version

Shows the program version of the device.

Opens the dialog window **Load new program version**. This button is only active when the device has an old program version that is not supported by *tiamo* which can be updated by *tiamo* itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Working hours

Shows the number of operating hours (only for 778, 789, 814, 815, and 855 devices).

Data storage under legal control

on, [off]

This option must be enabled if the balance has its own data memory (only for Sartorius balances).

Remarks

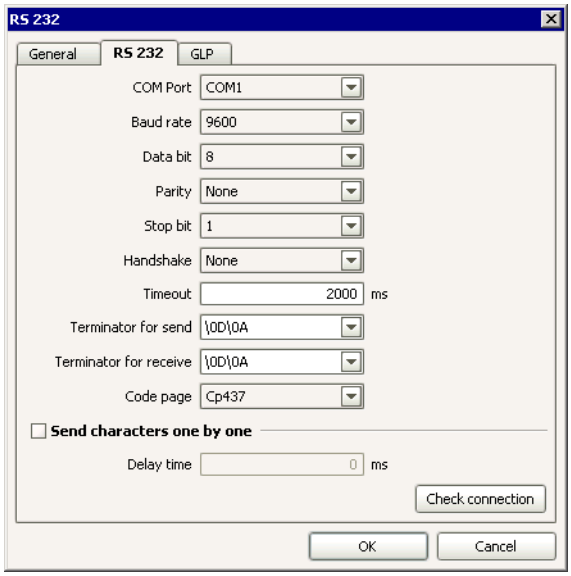
1000 characters, [empty]

Remarks about the device.

Disconnect

This button is only shown with a balance or barcode reader. In order to delete the device from the device list the device must be disconnected.

RS 232



COM Port

COM1, COM2, ..., [first free COM port]

Selection of the serial interface on the PC to which the device is connected.

Baud rate

300, 600, 1200, 2400, 4800, [9600], 19200

Transmission speed.

Data bit

7, [8]

Number of data bits.

Parity

[None], Odd, Even

Type of parity check.

Stop bit

[1], 2

Number of stop bits.

Handshake

[None], HW, SW

Type of data transmission protocol.

Timeout

1000 ... [2000] ... 9000 ms

Maximum waiting time for receiving characters. If this time is exceeded the reception will be stopped.

Terminator for send

20 characters, \0D, \0D\0A, \0D\0A\0A, \0D\0D\0A (**\0D** = CR, **\0A** = LF)

Final character for transmission in hexadecimal code.

Terminator for receive

20 characters, \0D, \0D\0A, \0D\0A\0A, \0D\0D\0A (**\0D** = CR, **\0A** = LF)
Final character for reception in hexadecimal code.

Code page

[Cp437], Cp850, Cp851
Code page used for the data transmission.

Send characters one by one

on, [off]
If this option is enabled every character is sent separately. Before sending the next character, the **Delay time** is waited for.

Delay time

[0] ... 9000 ms
Waiting time before sending the next character.

Check connection

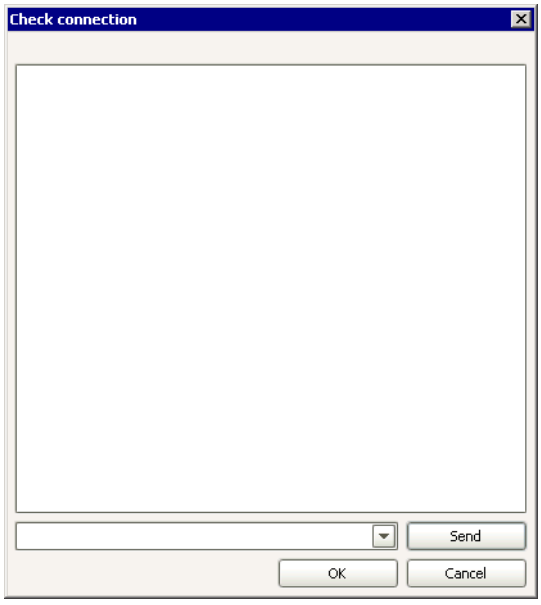
Tests the connection to the device. The dialog window **Check connection** appears.

Test connection

In order to test the connection to a generic RS232 device the device must be selected in the Device table and then under **Edit, Properties** the Properties window for this device is opened. On the tab **RS 232** the button **[Check connection]** must then be pressed.

Check connection

Opens the dialog window **Check connection**.

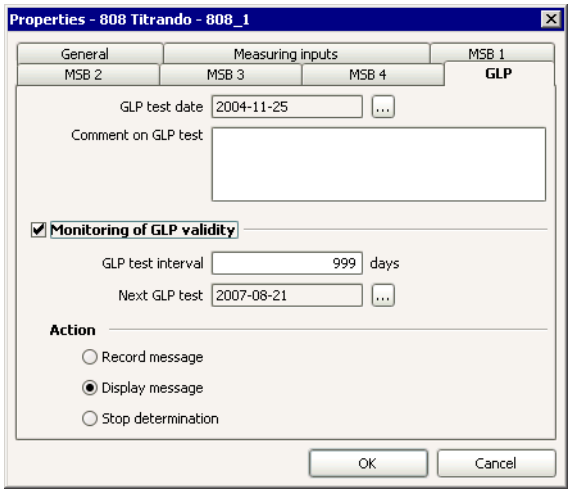


The messages sent to and received by the device are shown in the large text field.

Send

Sends the message entered in the field to the left of the button to the device.

GLP



GLP test date

Date selection

Date of the last GLP test. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Comment on GLP test

1000 characters, [empty]

Comments about GLP test.

Monitoring of GLP validity

on, [off]

If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has been entered under **GLP test date**.*

GLP test interval

0 ... [999] days

Time interval to next GLP test. If an interval is entered here then the date for the **Next GLP test** will be adapted automatically.

Next GLP test

Date selection, [GLP test date + 999 days]

Date on which the next GLP test is to be carried out. This date can be selected after pressing … in the dialog window **Select date** (*see General program functions - Edit - Select date*). After the date has been entered the value for the **GLP test interval** will be adapted automatically.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered at both the Start test and the command sequence:

Record message

The message that the GLP test interval has expired will be saved automatically in the determination.

Display message

A message appears and you can then choose whether to continue with the run or to terminate it. If the run is continued then the message that the GLP test interval has expired will be saved automatically in the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

6.6 Subwindow Titrants/Solutions

6.6.1 General

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 diminished as required; it can also be maximized.

Titrants

Titrants are used as solutions for the titration commands **DET**, **MET**, **SET**, **KFT** and **STAT**. They can be used in exchange units or dosing units.

Auxiliary solutions

Auxiliary solutions are used as solutions for the dosing commands **ADD**, **DOS** and **LQH**. They can be used in exchange units or dosing units.

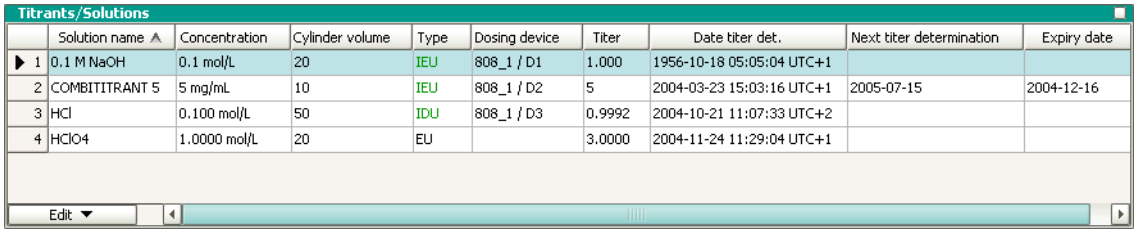
Intelligent exchange units (IEU) and dosing units (IDU)

Intelligent exchange and dosing units have a datachip with stored solution data. When placed 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



	Solution name	Concentration	Cylinder volume	Type	Dosing device	Titer	Date titer det.	Next titer determination	Expiry date
1	0.1 M NaOH	0.1 mol/L	20	IEU	808_1 / D1	1.000	1956-10-18 05:05:04 UTC+1		
2	COMBITITRANT 5	5 mg/mL	10	IEU	808_1 / D2	5	2004-03-23 15:03:16 UTC+1	2005-07-15	2004-12-16
3	HCl	0.100 mol/L	50	IDU	808_1 / D3	0.9992	2004-10-21 11:07:33 UTC+2		
4	HClO4	1.0000 mol/L	20	EU		3.0000	2004-11-24 11:29:04 UTC+1		

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 attached (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 the menu item **Edit, Column display...** further columns of the Solution properties can be shown.

> ***Note***
> *Lines that contain red entries 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 increasing or decreasing sequence. The table view can be adapted with the left-hand mouse key in the following ways:

- **Drag the margin between the column titles**:
  Sets the column width
- **Double-click on the margin between the column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required position

If the contents of a field is larger than the column width then the whole contents can be shown as a tooltip by keeping the mouse cursor on the field.

Functions

The menu **Edit** below the solution table contains the following menu items:

New...
Manually add a new exchange or dosing unit.

Delete
Delete the selected solution.

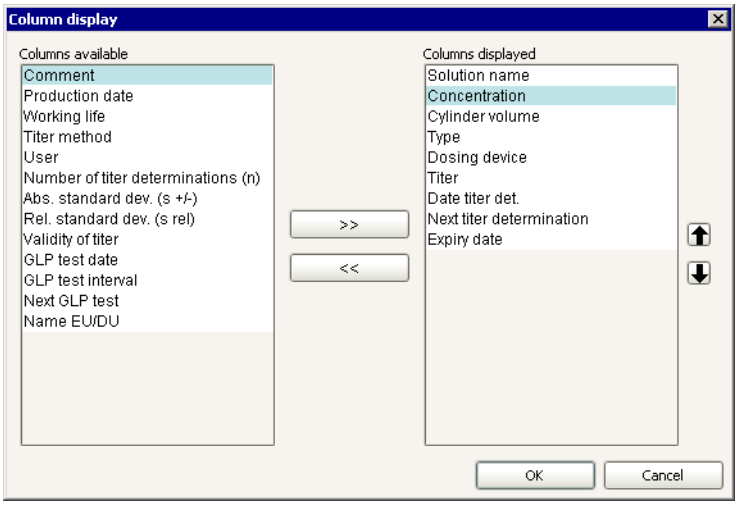
Properties...
Edit the selected solution.

Column display...
Define the columns for the solution table.

Print (PDF)...
Show the solution table as a PDF file.

Column display

With **Edit, Column display...** the dialog window **Column display** opens. Here you can define the columns to be shown in the Solution table.

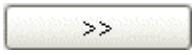


Columns available

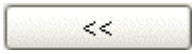
Shows all the fields that can be shown as columns in the solution table.

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.

Alters the sequence of the shown columns by moving the selected column upward or downward.

Add new solution

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**. This automatically opens the Properties window for configuring the solution. After the Properties window has been closed the solution with its set parameters will be entered in the solution table. The parameters can be altered at any time with **Edit, Properties**.

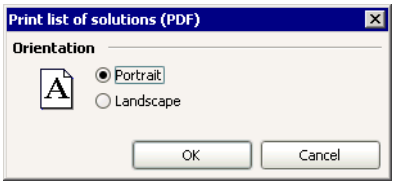
> ***Note***
> *Solutions in intelligent 806 Exchange Units (IEU) or 807 Dosing Units (IDU) with data chip must only be manually added and configured when they are attached to devices that cannot read in the data automatically (e.g. Titrino, 700 Dosino).*

Delete solution

With **Edit, Delete** the solution selected in the solution table is deleted.

Print solution list

With **Edit, Print (PDF)** the dialog window **Print list of solutions (PDF)...** opens.



Orientation

Portrait

[on], off
Print the solution table in portrait format.

Landscape

on, [off]
Print the solution table in landscape format.

OK

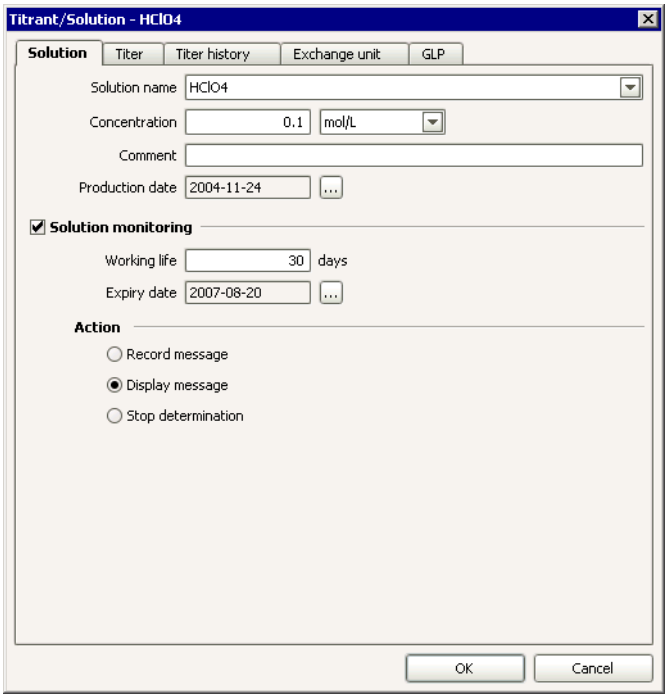
The solution table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.6.3 Solution properties

With the menu item **Edit, Properties...** in the subwindow **Titrant/Solution** the properties window for the solution selected in the solution table opens, in which the parameters for the solution can be edited. It consists of the following tabs:

- **Solution**
  General information about the solution such as solution name, concentration, preparation date, etc.
- **Titer**
  Information about the titer value and titer determination.
- **Titer history**
  Shows 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**
  Information about GLP test and GLP monitoring.

Solution



Solution name

24 characters, selection from predefined names

Name of the solution (can be entered or selected).

Concentration

Value: **1E-12 ... [1.000] ... 1E+12, max. 10 characters**

Unit: **10 characters, [mol/L], mmol/L, µmol/mL, g/L, mg/L, µg/mL, mg/mL, ppm, %, mEq/L**

Concentration 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.

Comment

24 characters

Comment about the solution (e.g. batch number.)

Production date

Select date

For an added new manually entered solution the current date will automatically be entered here. When editing an existing solution the date can be selected by pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Solution monitoring

on, [off]

If this option is switched on then the working life of the solution will be monitored.

Working life

0 ... [999] days

Working life of the solution in days. If a value is entered here then the **Expiry date** will be automatically adapted.

Expiry date

Select date, [Production date + 999 days]

Expiry date of the solution. This date can be selected by pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*). When a date has been entered the **Working life** will be automatically adapted.

Action

If during solution monitoring it is found that the working life has expired then one of the following actions will be triggered automatically at Start test:

Record message

The message that the working life of the solution has expired will be automatically saved with the determination.

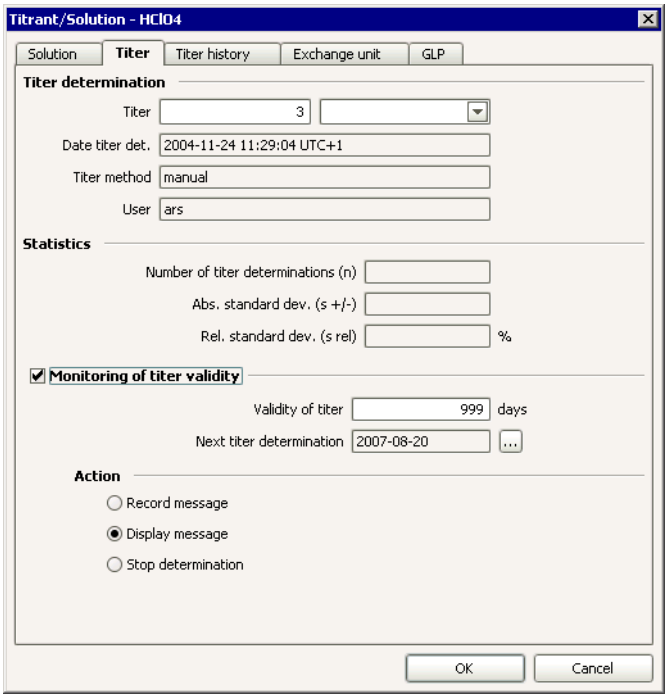
Display message

A message will appear and you can choose whether to continue the run or terminate it. If the run is continued then the message that the working life of the solution 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]**.

Titer



Titer determination

Titer

Value: **1E-12 ... [1.000] ... 1E+12, max. 10 characters**

Unit: **10 characters, ['empty'], mol/L, mmol/L, µmol/mL, g/L, mg/L, µg/mL, mg/mL, ppm, %, mEq/L**

Titer of the solution. The value for the titer of a solution used by the titration commands **DET**, **MET**, **SET** and **KFT** is available as a variable **'Command name.TITER'** for calculations.

Date titer det.

Date and time of last titer determination, which is automatically entered after 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 +/-)
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 of titer validity

on, [off]
If this option is switched on then the validity of the titer will be monitored.

Validity of titer
0 ... [999] days
Validity of the titer in days. If a value is entered here then the date for the **Next titer determination** will be automatically adapted.

Next titer determination
Select date, [Date of titer determination + 999 days]
Date on which the next titer determination is to be carried out. This date can also be selected by pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*). After a date has been entered the value for the **Validity of titer** will be automatically adapted.

Action

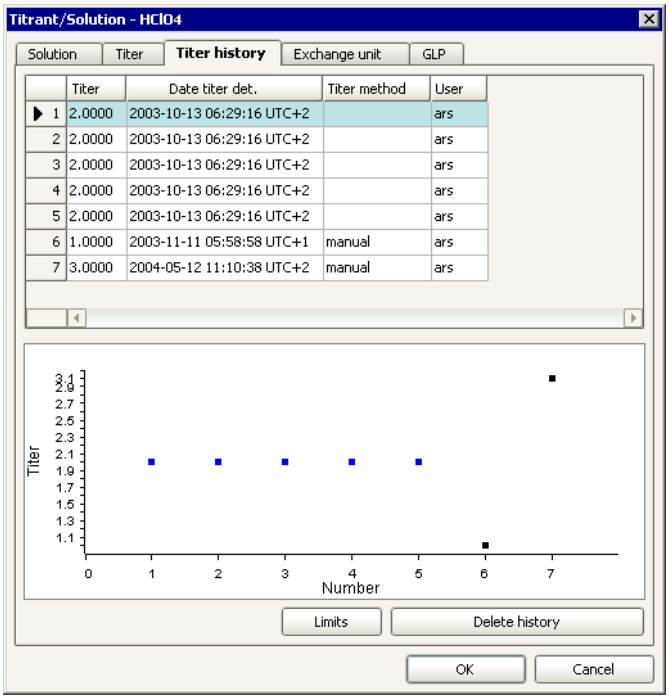
If during titer monitoring it is found that the validity of the titer has expired then one of the following actions will be triggered automatically at Start test.

Record message
The message that the validity of the titer has expired will be automatically saved with the determination.

Display message
A message will appear and you can choose whether to continue the run or terminate it. If the run is continued then the message that the validity period of the titer 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]**.

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 infringed then the line number will also be shown with an orange and red background respectively.

Date titer det.

Date and time of titer determination.

Titer method

Name of the method with which the titer determination was carried out. If the titer was 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 login then the user logged in under Windows will be entered automatically.

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

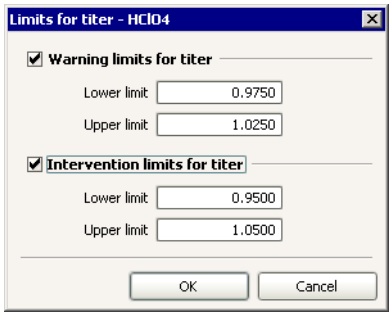
Opens the dialog window **Limits for titer**, in which the warning and intervention limits can be defined for the titer. These limits apply only to the graph, no monitoring is carried out during the titer determination.

Delete history

Deletes titer history.

Titer history - Limits

In the dialog window **Limits for titer** warning and intervention limits can be defined for the 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 infringed no action will be taken.



Warning limits for titer

on, [off]
If this option is **switched on** then the titer value will be shown in **orange** if this limit is infringed.

Lower limit
10 numbers, [0.9750]
Lower warning limit.

Upper limit
10 numbers, [1.0250]
Upper warning limit.

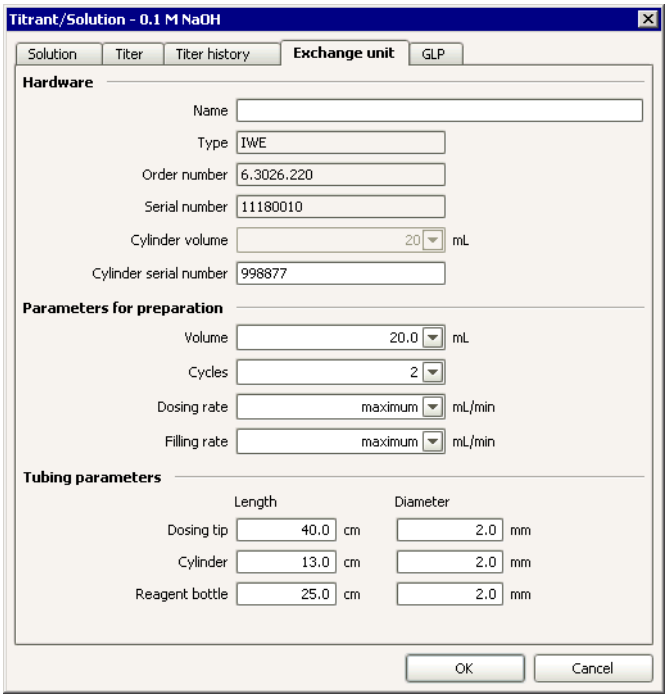
Intervention limits for titer

on, [off]
If this option is **switched on** then the titer value will be shown in **red** if this limit is infringed.

Lower limit
10 numbers, [0.9500]
Lower intervention limit.

Upper limit
10 numbers, [1.0500]
Upper intervention limit.

Exchange unit



Hardware

Name

24 characters, ['empty']
Freely definable name for exchange unit.

Type

Shows the type of exchange unit:

EU
Non-intelligent exchange unit without data chip.

IEU
Intelligent 806 Exchange Unit with data chip.

Order number

24 characters, ['empty']
Order number of exchange unit. With intelligent exchange units the order number is read off automatically and cannot be edited.

Serial number

24 characters, ['empty']
Serial number of exchange unit. With intelligent exchange units the serial number is read off automatically and cannot be edited.

Cylinder volume

1, 5, 10, [20], 50 mL
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 sequence.

Cylinder serial number

8 characters, ['empty']
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.

Parameters for preparation

Configures the parameters to be used in the command **PREP**.

Volume

0.00000 ... 99999.99999 mL, [cylinder volume]

Volume to be dosed in during preparation. With **Cylinder volume** the whole contents of the cylinder will be dosed in.

Cycles

1 ... [2] ... 9

Number of rinsing cycles during preparation.

Dosing rate

0.01 ... 150.00 mL/min, [maximum]

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.

Filling rate

0.01 ... 150.00 mL/min, [maximum]

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.

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 alter the tubing parameters.

Dosing tip

Length

0.0 ... [40.0] ... 999.9 cm

Length of the tubing connecting the cock to the dosing tip.

Diameter

0.0 ... [2.0] ... 9.9 mm

Diameter of the tubing connecting the cock to the dosing tip.

Cylinder

Length

0.0 ... [13.0] ... 999.9 cm

Length of the tubing connecting the cock to the cylinder.

Diameter

0.0 ... [2.0] ... 9.9 mm
Diameter of the tubing connecting the cock to the cylinder.

Reagent bottle

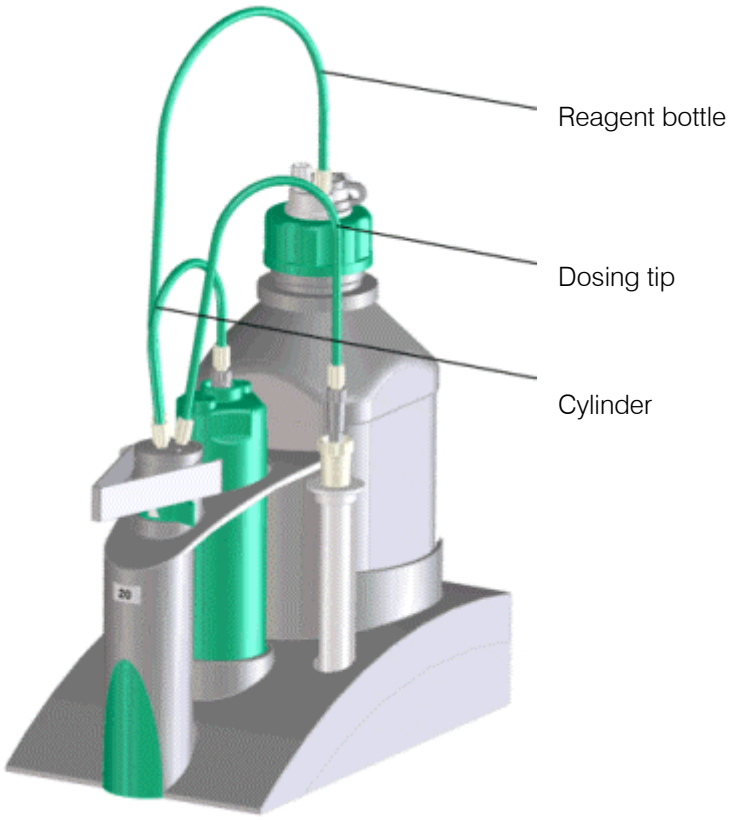
Length

0.0 ... [25.0] ... 999.9 cm
Length of the tubing connecting the cock to the reagent bottle.

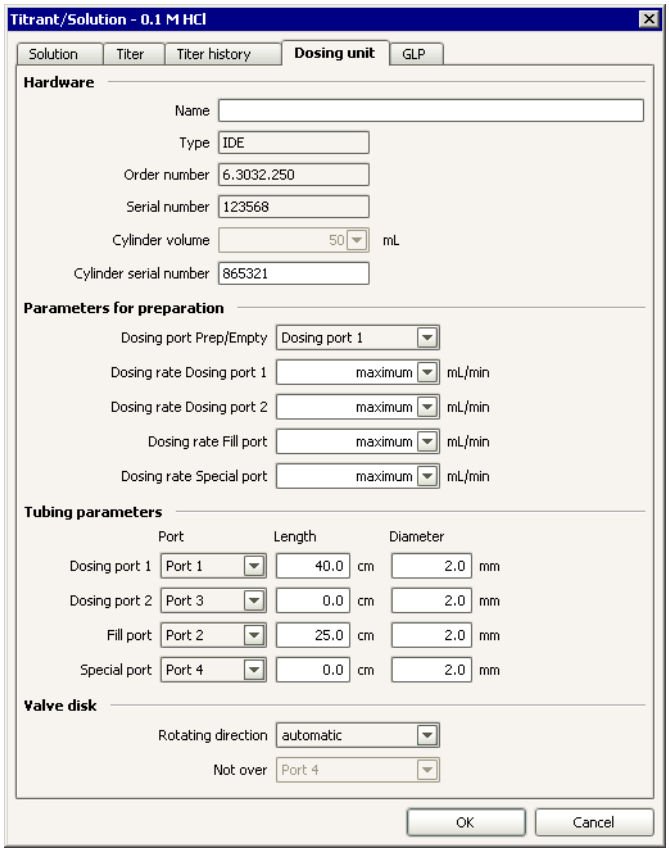
Diameter

0.0 ... [2.0] ... 9.9 mm
Diameter of the tubing connecting the cock to the reagent bottle.

Exchange unit tubing connections



Dosing unit



Hardware

Name

24 characters, ['empty']
Freely definable name for the dosing unit.

Type

Shows the type of dosing unit:

DU
Non-intelligent dosing unit without data chip.

IDU
Intelligent 807 Dosing Unit with data chip.

Order number

24 characters, ['empty']
Order number of dosing unit. With intelligent dosing units the order number is read off automatically and cannot be edited.

Serial number

24 characters, ['empty']
Serial number of dosing unit. With intelligent dosing units the serial number is read off automatically and cannot be edited.

Cylinder volume

2, 5, 10, [20], 50 mL
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 sequence.

Cylinder serial number

8 characters, ['empty']
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.

Parameters for preparation

Configures the parameters to be used in the commands **PREP** and **EMPTY**.

Dosing port Prep/Empty
[Dosing port 1], Dosing port 2, Fill port, Special port
Dosing port via which the cylinder contents are to be ejected during preparation and emptying.

Dosing rate Dosing port 1
0.01...166.00 mL/min, [maximum]
Speed at which dosing is to be carried out at **Dosing port 1**. The maximum dosing rate depends on the cylinder volume of the dosing unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Dosing rate Dosing port 2
0.01...166.00 mL/min, [maximum]
Speed at which dosing is to be carried out at **Dosing port 2**. The maximum dosing rate depends on the cylinder volume of the dosing unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Dosing rate Fill port
0.01...166.00 mL/min, [maximum]
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 dosing unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Dosing rate Special port
0.01...166.00 mL/min, [maximum]
Speed at which dosing is to be carried out at the **Special port**. The maximum dosing rate depends on the cylinder volume of the dosing unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Maximum Dosing rate for dosing unit as a function of the cylinder volume:

Cylinder volume	Maximum rate
2 mL	6.6 mL/min
5 mL	16.6 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 occupancy 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 alter the tubing parameters.*

Dosing port 1
Port
[Port 1], Port 2, Port 3, Port 4
Port to be used as Dosing port 1.

Length
0.0 ... [40.0] ... 999.9 cm
Length of tubing attached to Dosing port 1.

Diameter
0.0 ... [2.0] ... 9.9 mm
Diameter of tubing attached to Dosing port 1.

Dosing port 2
Port
Port 1, Port 2, [Port 3], Port 4
Port to be used as Dosing port 2.

Length
[0.0] ... 999.9 cm
Length of tubing attached to Dosing port 2.

Diameter
0.0...[2.0]...9.9 mm
Diameter of tubing attached to Dosing port 2.

Fill port
Port
Port 1, [Port 2], Port 3, Port 4
Port to be used as Fill port for aspirating the solution.

Length
0.0...[25.0]...999.9
Length of tubing attached to Fill port.

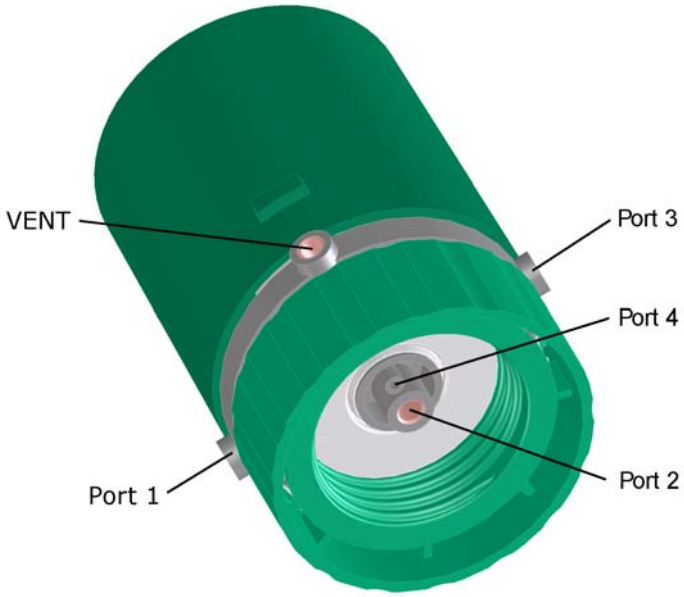
Diameter
0.0...[2.0]...9.9 mm
Diameter of tubing attached to Fill port.

Special port
Port
Port 1, Port 2, Port 3, [Port 4]
Port to be used as Special port.

Length
[0.0] ... 999.9 cm
Length of tubing attached to Special port.

Diameter
0.0...[2.0]...9.9 mm
Diameter of tubing attached to Special port.

Port occupancy of dosing unit:



Valve disc

Rotating direction

descending, ascending, [automatic], not over

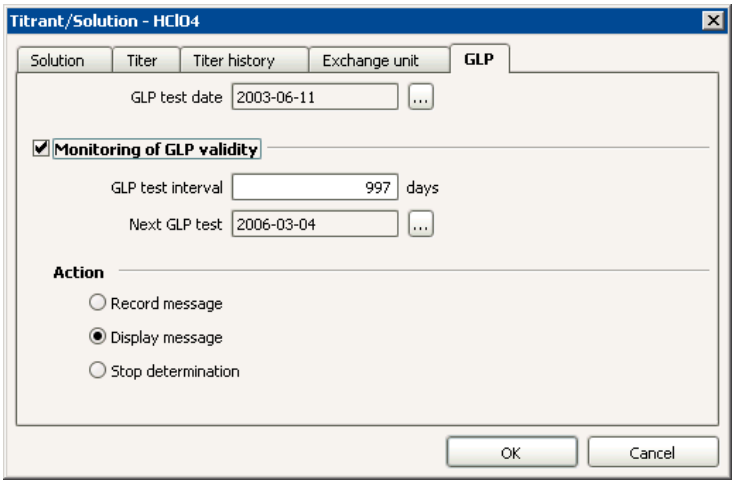
Specification of the rotating direction of the valve disk. **automatic** is the rotating direction with the shortest way.

Not over

1, 2, 3, [4]

Here you can choose the protected port. The protected port is the one which is not driven at during rotation.

GLP



GLP test date

Select date

Date of last GLP test for exchange or dosing unit. This date can be selected by pressing ... in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Monitoring of GLP validity

on, [off]
If this option is switched on then the time interval for the GLP test will be monitored.

> ***Note***
> *This option can only be switched on when a date has already been entered under* ***GLP test date****.*

GLP test interval
0 ... [999] days
Time interval up to next GLP test. If an interval is entered then the date for the **Next GLP test** will be automatically adapted.

Next GLP test
Select date, [GLP test date + 999 days]
Date on which the next GLP test is to be carried out. This date can be selected by pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*). When a date has been entered the value for **GLP test interval** will be automatically adapted.

Action

If the time interval for the GLP test has expired then one of the following actions will be triggered automatically both at Start test (see Single determinations or Determination series) and during the command sequence:

Record message
The message that the GLP test interval has expired will be automatically saved with the determination.

Display message
A message will appear and you can choose whether to continue the run or terminate it. If the run is continued then the message that the GLP test interval 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 General

Subwindow sensors

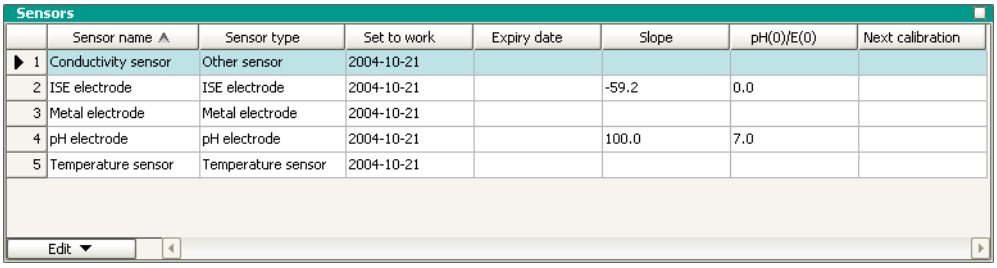
The subwindow **Sensors** contains the Sensor table with all the configured sensors. It can be shown in a separate window on the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View, Quick access**. The subwindow can be enlarged and diminished as required; it can also be maximized.

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



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.

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**.

With the menu item **Edit, Column display...** further columns from the Sensor properties can be shown.

> ***Note***
> *Lines containing entries in red 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 increasing or decreasing sequence. The table view can be adapted as follows with the left-hand mouse key:

- **Drag the margin between the column titles**:
  Sets the column width
- **Double-click on the margin between the column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required position

If the contents of a field is larger than the column width then the whole contents can be shown as a tooltip by keeping the mouse cursor on the field.

Functions

The menu **Edit** beneath the sensor table contains the following menu items:

New...
Adds a new sensor manually.

Delete
Deletes the selected sensor.

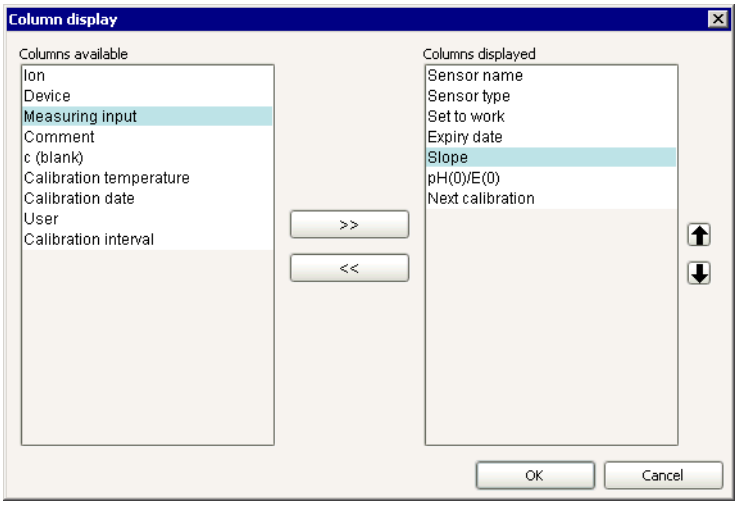
Properties...
Edits the selected sensor.

Column display...
Defines columns for the sensor table.

Print (PDF)...
Outputs the sensor table as a PDF file.

Column display

With **Edit, Column display...** the dialog window **Column display** opens. Here you can define the columns to be shown in the Sensor table.

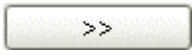


Columns available

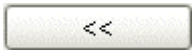
Shows all the fields that can be shown as columns in the Sensor table.

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, Start up, 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.

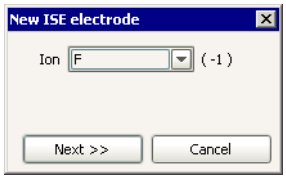
Alters the sequence of shown columns by moving the selected column upward or downward.

Add new sensor

In order to add a new 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**
- **Other sensor**

The Properties window then opens automatically for the configuration of the sensor. 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

Ag, BF4, Br, Ca, Cd, Cl, CN, Cu, [F], I, K, Na, NH4, NO2, NO3, Pb, S, SCN, SO4, Surfactant, Custom

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

Name: **[empty], max. 6 characters**

Valency: **-4, -3, -2, -1, +1, [+2], +3, +4**

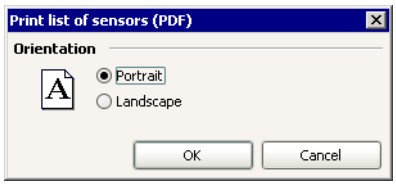
Name for the self-selected ion and also selects the valency. This parameter is only visible when in the field **Ion Custom** has been selected.

Delete sensor

With **Edit, Delete** the sensor selected in the sensor table is deleted.

Print sensor list

With **Edit, Print (PDF)...** the dialog window **Print list of sensors (PDF)** opens.



Orientation

Portrait

[on], off

Print the sensor table in portrait format.

Landscape

on, [off]

Print the sensor table in landscape format.

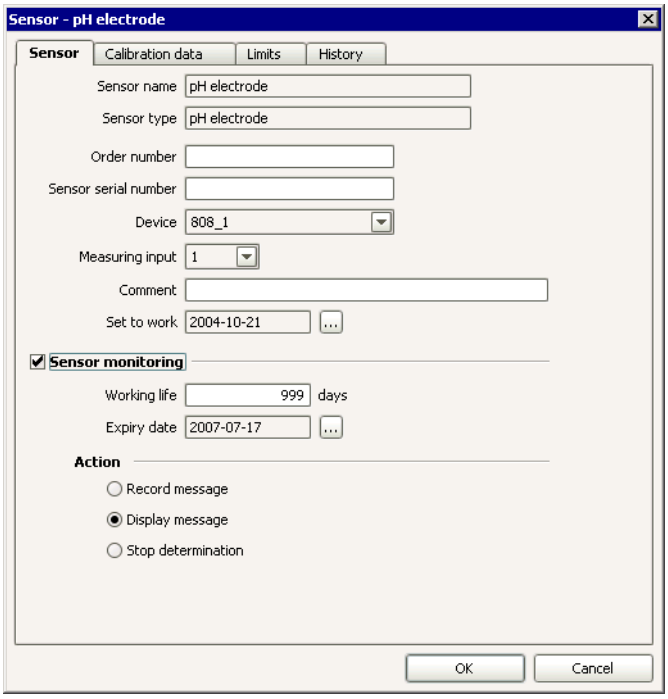
The sensor table is produced in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.7.3 Sensor properties

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, start up, 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.

Sensor



Sensor name
24 characters
Name of the sensor.

Sensor type
Shows the type of sensor.

Ion
Shows the ion to be measured and its valency. This parameter only appears for **ISE electrodes**.

Order number
24 characters, ['empty']
It is possible to enter the order number of the sensor.

Sensor serial number
10 characters, ['empty']
It is possible to enter the serial number of the sensor.

Device

Select device, ['empty']

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.

Measuring input

[1], 2

It is possible to select the measuring input to which the sensor is connected. The connection of a sensor to a particular measuring input is not checked during the run. This parameter only appears if a **Device** has been chosen.

Comment

24 characters

It is possible to enter remarks about the sensor.

Set to work

Select date

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 General program functions - Edit - Select date*).

Sensor monitoring

on, [off]

If this option is switched on then the working life of the sensor will be monitored.

Working life

0 ... [999] days

Working life of the sensor in days. If a value is entered here then the **Expiry date** will be adapted automatically.

Expiry date

Select date, [Set to work + 999 days]

Expiry date of the sensor. This date can be selected by pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*). If a date is entered here then the value for the **Working life** will be adapted automatically.

Action

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:

Record message

The message that the working life of the sensor has expired will be automatically saved with the determination.

Display message

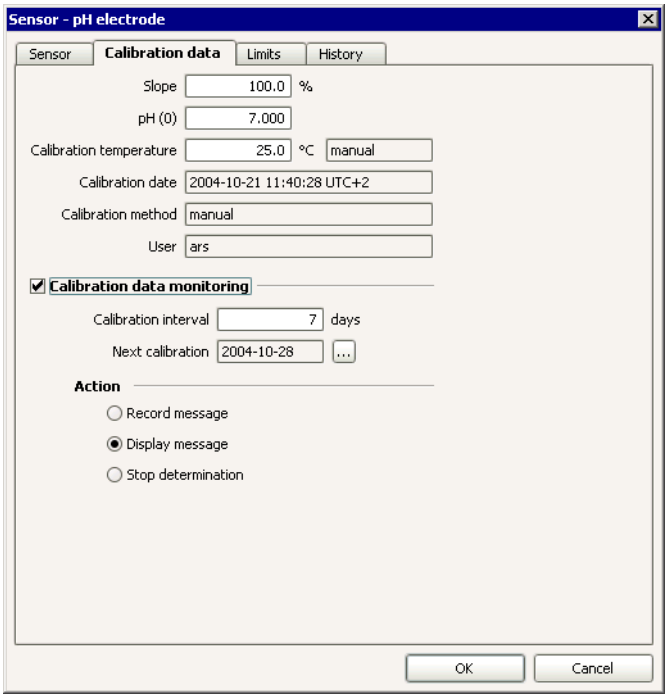
A message will appear and you can choose whether to continue with the run or cancel it. If the run is continued then the message that the working life of the sensor has expired will be saved automatically with the determination.

Stop determination

The running determination will be terminated automatically. The following message must be confirmed with **[OK]**.

Calibration data

> ***Note***
> *This tab only appears for pH and ISE electrodes.*



Slope

pH electrode: **-999.9 ... 999.9 %, [100.0]**
ISE electrode: **-999.9 ... 999.9 mV, [59.2/valency]**
Slope of the pH or ISE electrode. This value can be determined automatically with a calibration from the linearized calibration curve or entered manually. The slope of a sensor that is used by the commands **DET**, **MET**, **SET**, **KFT**, **MEAS** and **CAL LOOP** is available as a variable **'Command name.SLO'** for calculations.

pH(0)

-20.000 ... [7.000] ... 20.000
The electrode zero point **pH(0)** is only shown for pH electrodes. After the slope the **pH(0)** is the second characteristic quantity 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 that is used by the commands **DET**, **MET**, **SET**, **KFT**, **MEAS** and **CAL LOOP** is available as a variable **'Command name.ENP'** for calculations.

E(0)

-2000.0 ... [0.0] ... 2000.0 mV
The electrode zero point **E(0)** is only shown for ISE electrodes. **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 that is used by the commands **DET**, **MET**, **SET**, **KFT**, **MEAS** and **CAL LOOP** is available as a variable **'Command name.ENP'** for calculations.

c (blank)

[0.00] ... 999999999
This parameter is only shown for ISE electrodes. **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 low 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 to zero. The parameter **c (blank)** of an ISE electrode that is used by the commands **MEAS Conc** and **CAL MEAS Conc** is available as a variable **'Command name.BLV'** for calculations.

Calibration temperature
-20.0 ... [25.0] ... 150.0 °C
Temperature during the calibration. Whether the temperature was measured with a Pt1000 or an NTC temperature sensor, or entered manually, is also shown.

Calibration date
Date and time of last calibration that is entered automatically after each automatic calibration or manual entry.

Calibration method
Name of the method with which the last calibration was carried out. 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. If work is not carried out using log in then the user logged in under Windows will be entered automatically.

Calibration data monitoring

on, [off]
If this option is switched on then the validity of the calibration will be monitored.

Calibration interval
0 ... [999] days
Validity of the calibration in days. If a value is entered here then the date for the **Next calibration** will be adapted automatically.

Next calibration
Select date, [Calibration date + 999 days]
Date on which the next calibration is to be carried out. This date can be selected by pressing in the dialog window **Select date** (*see General program functions - Edit - Select date*). When a date has been entered the value for the **Calibration interval** will be adapted automatically.

Action

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:

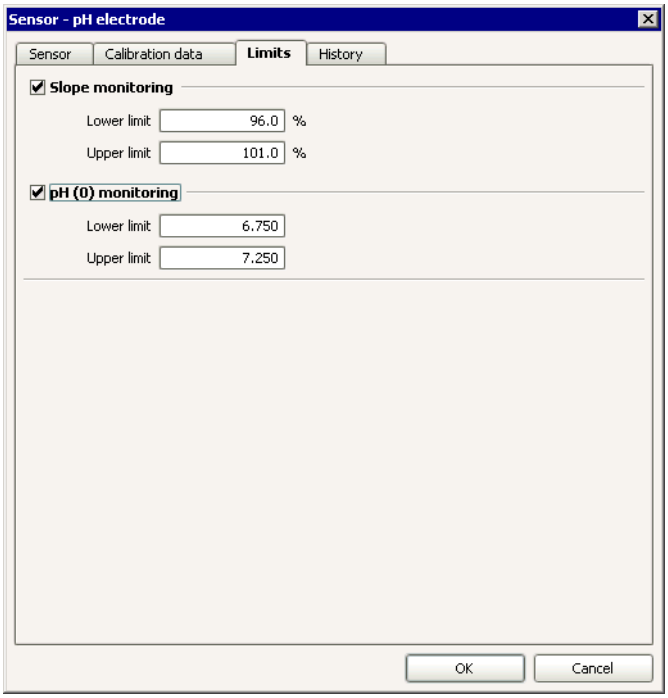
Record message
The message that the validity of the calibration has expired will be automatically saved with the determination.

Display message
A message will appear and you can choose whether to continue with 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.

Stop determination
The running determination will be terminated automatically. The following message must be confirmed with **[OK]**.

Limits

> ***Note***
> *This tab is only shown for pH and ISE electrodes.*



Slope monitoring

on, [off]
If this option is switched on then a check will be made whether the **Slope** determined during calibration is within the defined limits. If it is outside them a corresponding message appears and you can choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit
-2.147E+9 ... 2.147E+9
pH: **96.0 %**
ISE (+1): **55.0 mV** ISE (-1): **-61.0 mV**
ISE (+2): **25.0 mV** ISE (-2): **-31.0 mV**
ISE (+3): **16.0 mV** ISE (-3): **-23.0 mV**
ISE (+4): **12.0 mV** ISE (-4): **-17.0 mV**
Lower limits for the slope.

Upper limit
-2.147E+9 ... 2.147E+9
pH: **101.0 %**
ISE (+1): **61.0 mV** ISE (-1): **-55.0 mV**
ISE (+2): **31.0 mV** ISE (-2): **-25.0 mV**
ISE (+3): **23.0 mV** ISE (-3): **-16.0 mV**
ISE (+4): **17.0 mV** ISE (-4): **-12.0 mV**
Upper limits for the slope.

pH(0) monitoring

on, [off]
If this option is switched on then a check will be made 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 choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

-2.147E+9 ... [6.750] ... 2.147E+9

Lower limit for pH(0).

Upper limit

-2.147E+9 ... [7.250] ... 2.147E+9

Upper limit for pH(0).

E(0) monitoring

on, [off]

If this option is **switched on** then a check will be made 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 choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

-2.147E+9 ... [-2000.0] ... 2.147E+9 mV

Lower limit for E(0).

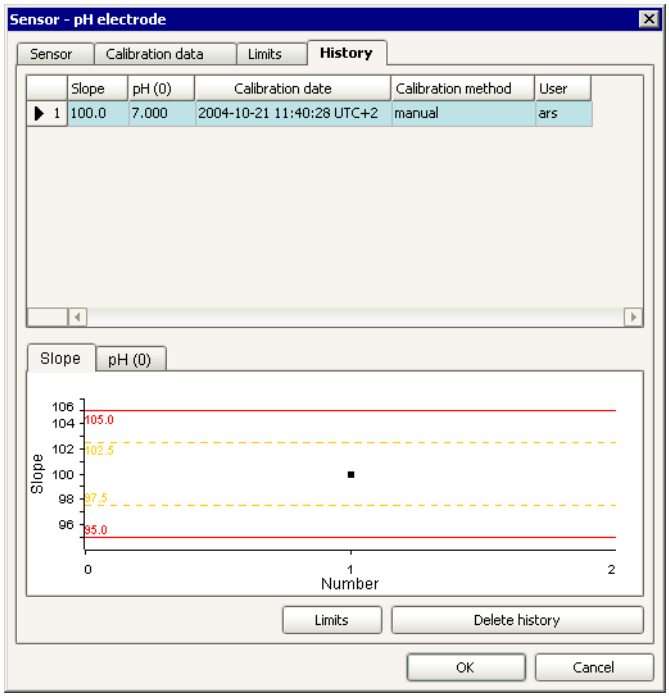
Upper limit

-2.147E+9 ... [2000.0] ... 2.147E+9 mV

Upper limit for E(0).

History

> ***Note***
> *This tab is only shown 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 **pH(0)** are shown, for ISE electrodes the **Slope**, **E(0)** and **c (blank)**.

Slope, pH(0), E(0) and c (blank)

The values are shown in the following colors:

- **Blue**, when the values have been 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 infringed then the line number will also be shown with an orange or red background respectively.

Calibration date

Date and time of the calibration.

Calibration method

Name of the method with which the calibration was carried out. If the calibration data has been entered manually then **manual** will be shown here.

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 name of the user logged in under Windows will be entered automatically.

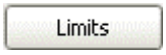
History graph

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:

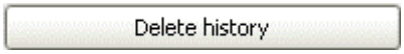
- **Blue**, when the values have been determined automatically by a method.
- **Black**, when the values have been entered manually.

If limits have been defined then the warning limits are shown in **orange** and the intervention **limits** in red.

> ***Note***
> *The history graph can be copied into the clipboard with the context-sensitive menu item* ***Copy****.*



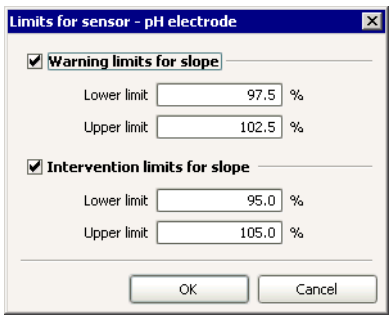
Opens the dialog window **Sensor limits** in which the warning and intervention limits for the calibration data can be defined. These limits only apply to the graph, no monitoring will take place during calibration. For monitoring during calibration the limits set under Limits (*see Sensor properties - Limits*) apply.



Deletes the sensor history.

Sensor history - Limits

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 define limits then these will be shown on the graph in **orange** for warning limits and **red** for intervention limits. However, whether these limits are observed is not monitored, i.e. infringing these limits does not trigger any action. For monitoring during calibration the limits set under Limits (*see Sensors - Properties - Limits*) apply.



Warning limits for slope

on, [off]
If this option is **switched on** then the values for the slope will be shown in **orange** if the limits are infringed.

Lower limits
-2.147E+9 ... 2.147E+9
pH electrode: **97.5 %**
ISE (+1): **57.2 mV** ISE (-1): **-61.2 mV**
ISE (+2): **27.7 mV** ISE (-2): **-31.7 mV**
ISE (+3): **17.7 mV** ISE (-3): **-21.7 mV**
ISE (+4): **12.8 mV** ISE (-4): **-16.8 mV**
Lower warning limits for the slope.

Upper limits
-2.147E+9 ... 2.147E+9
pH electrode: **102.5 %**
ISE (+1): **61.2 mV** ISE (-1): **-57.2 mV**
ISE (+2): **31.7 mV** ISE (-2): **-27.7 mV**
ISE (+3): **21.7 mV** ISE (-3): **-17.7 mV**
ISE (+4): **16.8 mV** ISE (-4): **-12.8 mV**
Upper warning limits for the slope.

Intervention limits for the slope

on, [off]
If this option is **switched on** then the values for the slope will be shown in **red** if the limits are infringed.

Lower limits
-2.147E+9 ... 2.147E+9
pH: **95.0 %**
ISE (+1): **55.0 mV** ISE (-1): **-62.4 mV**
ISE (+2): **26.7 mV** ISE (-2): **-32.7 mV**
ISE (+3): **16.7 mV** ISE (-3): **-22.7 mV**
ISE (+4): **11.8 mV** ISE (-4): **-17.8 mV**
Lower intervention limits for the slope.

Upper limits
-2.147E+9 ... 2.147E+9
pH: **105.0 %**
ISE (+1): **62.4 mV** ISE (-1): **-55.0 mV**
ISE (+2): **32.7 mV** ISE (-2): **-26.7 mV**
ISE (+3): **22.7 mV** ISE (-3): **-16.7 mV**
ISE (+4): **17.8 mV** ISE (-4): **-11.8 mV**
Upper intervention limits for the slope.

Warning limits for pH(0) and E(0)

on, [off]
If this option is **switched on** then the values for pH(0) or E(0) will be shown in **orange** if the limits are infringed.

Lower limits

-2.147E+9 ... 2.147E+9

pH electrode: **6.500**

ISE: **-15 mV**

Lower warning limits for pH(0) and E(0).

Upper limits

-2.147E+9 ... 2.147E+9

pH electrode: **7.500**

ISE: **15 mV**

Upper warning limits for pH(0) and E(0).

Intervention limits for pH(0) and E(0)

on, [off]

If this option is **switched on** then the values for pH(0) or E(0) will be shown in **red** if the limits are infringed.

Lower limits

-2.147E+9 ... 2.147E+9

pH: **6.000**

ISE: **-30 mV**

Lower intervention limits for pH(0) and E(0).

Upper limits

-2.147E+9 ... 2.147E+9

pH: **8.000**

ISE: **30 mV**

Upper intervention limits for pH(0) and E(0).

6.8 Subwindow Common Variables

6.8.1 General

Subwindow common variables

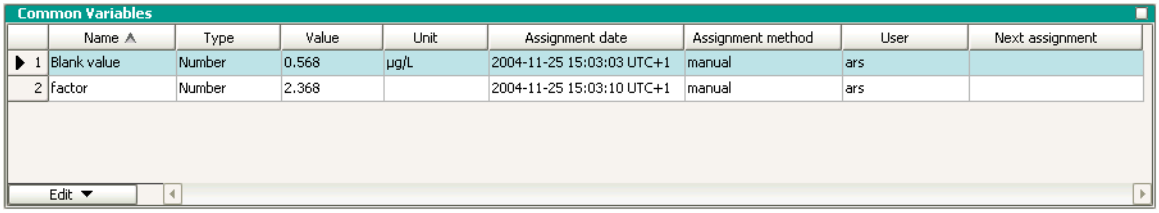
The subwindow **Common Variables** contains the table with the configured common variables. It can be shown in a separate window in the program part **Configuration** as a part of the configuration view or (if not present on the desktop) with **View, Quick access**. The subwindow can be enlarged and diminished as required; it can also be maximized.

Use of common variables

Common variables are method-embracing variables that are stored per client and can be used in formulas under the name **'CV.Name'**. They are either entered manually in the configuration or assigned in the method sequence by a **CALC** command.

> ***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 altered value in a different formula. For this you should use Method variables.*

6.8.2 Table of common variables



Contents

In the table of common variables the following information about the common variables is shown as standard:

Name
Name of common variable.

Type
Type of common variable (**Number**, **Text** or **Date/Time**).

Value
Value of common variable.

Unit
Unit of common variable.

Assignment date
Date of the last value assignment to 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.

With the menu item **Edit, Column display...** further columns can be shown from the Properties of the common variable.

> ***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 key as follows:

- **Drag the margin between the column titles**:
  Sets the column width
- **Double-click on the margin between the column title**:
  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 can be shown as a tooltip by keeping the mouse cursor on the field.

Functions

The menu **Edit** beneath the table of common variables contains the following menu items:

New...
Adds a new common variable manually.

Delete
Deletes the selected common variable.

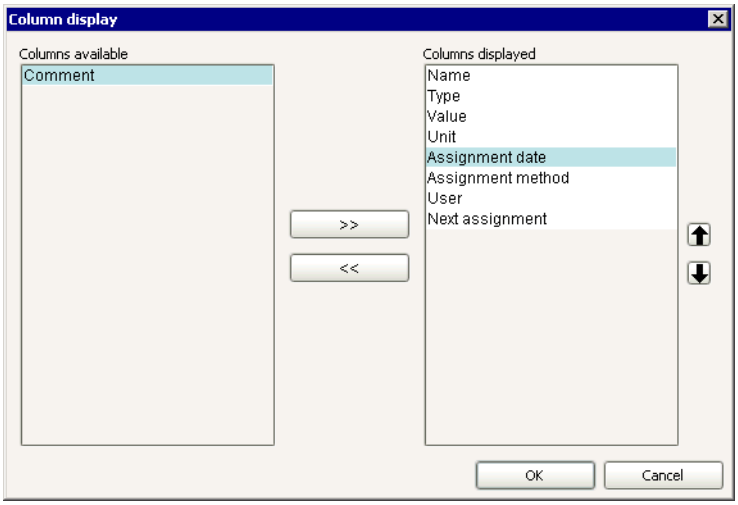
Properties...
Edits the selected common variable.

Column display...
Defines the columns for the table of common variables.

Print (PDF)...
Outputs the table of common variables as a PDF file.

Column display

With **Edit, Column display...** the window **Column display** opens, in which the columns that are to be shown in the Table of common variables can be defined.

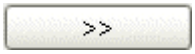


Columns available

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 **Sensor type** are always present and cannot be removed.



Adds the selected column to the table.

Removes the selected column from the table.

Alters the sequence of displayed columns by moving the selected column upward or downward.

Add new common variable

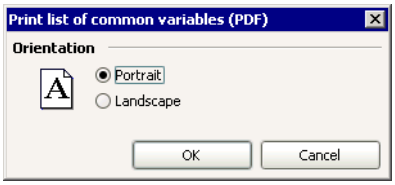
With **Edit, New...** a new common variable is added manually to the Table of common variables. The Properties window then opens automatically for editing the common variable. After the Properties window has been closed the common variable will be entered in the table of common variables. The parameters can be altered at any time with **Edit, Properties**.

Delete common variable

With **Edit, Delete** the common variable selected in the table is deleted.

Print list of common variables

With **Edit, Print (PDF)...** the dialog window **Print list of common variables (PDF)** opens.



Orientation

Portrait
[on], off
Print table of common variables in portrait format.

Landscape
on, [off]
Print table of common variables in landscape format.

OK

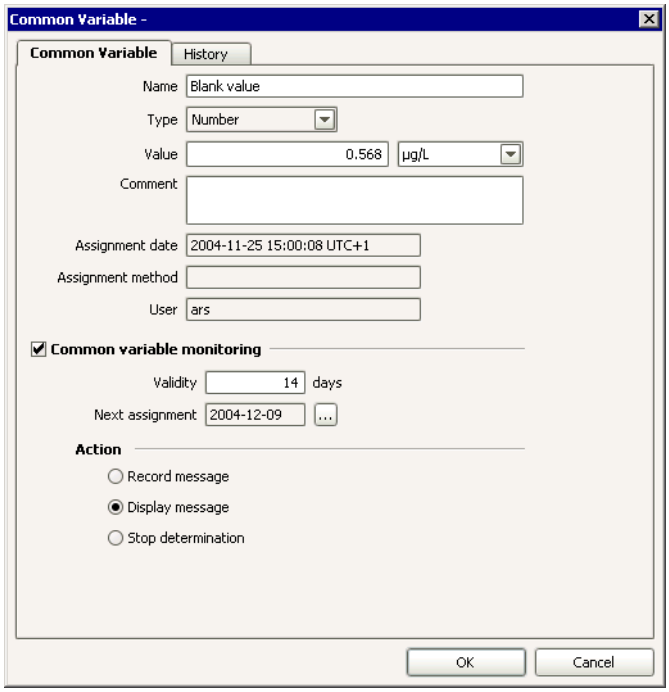
The table of common variables is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed out and/or saved.

6.8.3 Common variables properties

With the 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**
  Shows the last 10 values.

Common variable



Name

50 characters

Name of common variable.

Type

[Number], Text, Date/Time

Selection of the type for a new common variable. For existing common variables the type will only be shown; it cannot be edited.

Value

Number: **-1E+99 ... 1E+99**

Text: **256 characters**

Date: **date selection**

Value of the common variable. 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.

With variables of the type **Date/Time** the date can be selected by pressing on in the dialog window **Select date** (*see General program functions - Edit - Select date*).

Value (unit)

20 characters, 'empty', [mol/L], mmol/L, µmol/mL, g/L, mg/L, µg/mL, mg/mL, ppm, %, mEq/L

Name of the unit. If a value is assigned automatically by a **CALC** command 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.

Comment

256 characters

It is possible to enter remarks about the common variable.

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***
> *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 under login then the name of the user logged in under Windows will automatically be entered here.

Common variable monitoring

on, [off]

If this option is switched on then the validity of the common variables will be monitored.

Validity

0 ... [999] days

Period that the common variable is valid in days. If a value is entered here then the field **Next assignment** will be adapted automatically.

Next assignment

Date selection, [assignment date + 999 days]

Date on which the next value assignment must take place. This date can be selected by pressing on in the dialog window **Select date** (*see General program functions - Edit - Select date*). When the date has been entered the value for the **validity** period will be adapted automatically.

Action

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:

Record message

The message that the validity period of the common variable has expired will be automatically saved with the determination.

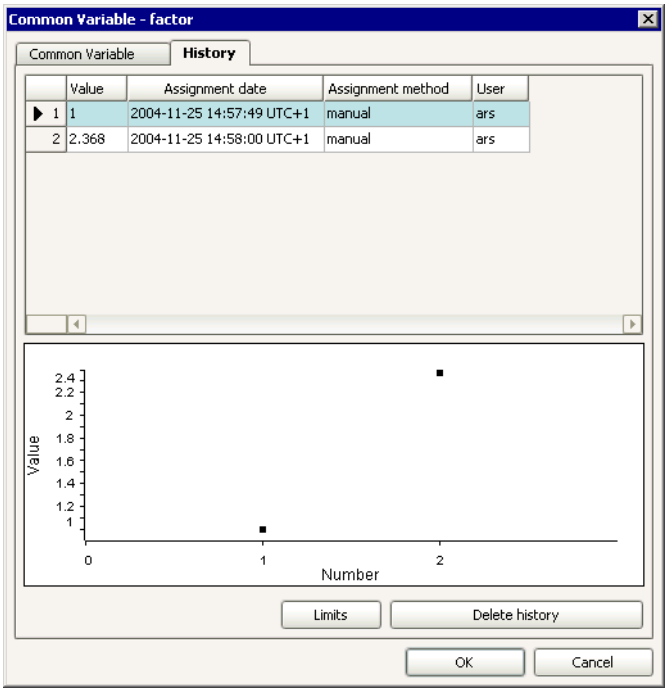
Display message

A message will be shown and you can then choose if you wish to continue with the run or terminate 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 terminated. The following message must be confirmed with **[OK]**.

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 entered in the following colors:

- **Blue**, if the value has been assigned automatically by a method.
- **Black**, if the value has been entered manually.
- **Orange**, if the value is outside the warning limits.
- **Red**, if the value is outside the action limits

If the warning or action limits are infringed then the line number will also be shown with an orange or 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 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 under login then the name of the user logged in under Windows will automatically be entered here.

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 assigned automatically by a method.
- **Black**, if the value has been entered manually.

If limits have been defined then the warning limits are shown in **orange** and the action limits in **red**.

> ***Note***
> *The history graph can also be copied into the clipboard using the context-sensitive menu item* ***Copy****.*

Limits

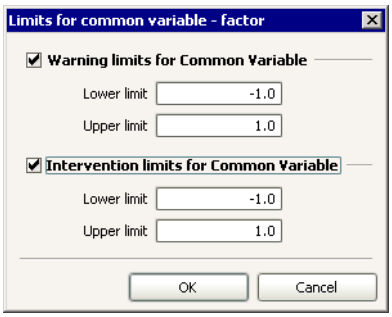
Opens the dialog window **Limits for common variable** in which the warning and action limits can be defined for the common variables. These limits apply only to the graph; no monitoring takes place during value assignment.

Delete history

Deletes the history.

History - limits

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 on the graph in **orange** for warning limits and in **red** for intervention limits. However, no monitoring is carried out as to whether the limits have been observed, i.e. no actions take place if these limits are exceeded.



Warning limits for common variable

on, [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
-2.147E+9 ... 2.147E+9, ['empty']
Lower warning limit for common variable.

Upper limit
-2.147E+9 ... 2.147E+9, ['empty']
Upper warning limit for common variable.

Intervention limits for common variable

on, [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
-2.147E+9 ... 2.147E+9, ['empty']
Lower intervention limit for common variable.

Upper limit
-2.147E+9 ... 2.147E+9, ['leer']
Upper intervention limit for common variable.

6.9 Subwindow Rack data

6.9.1 General

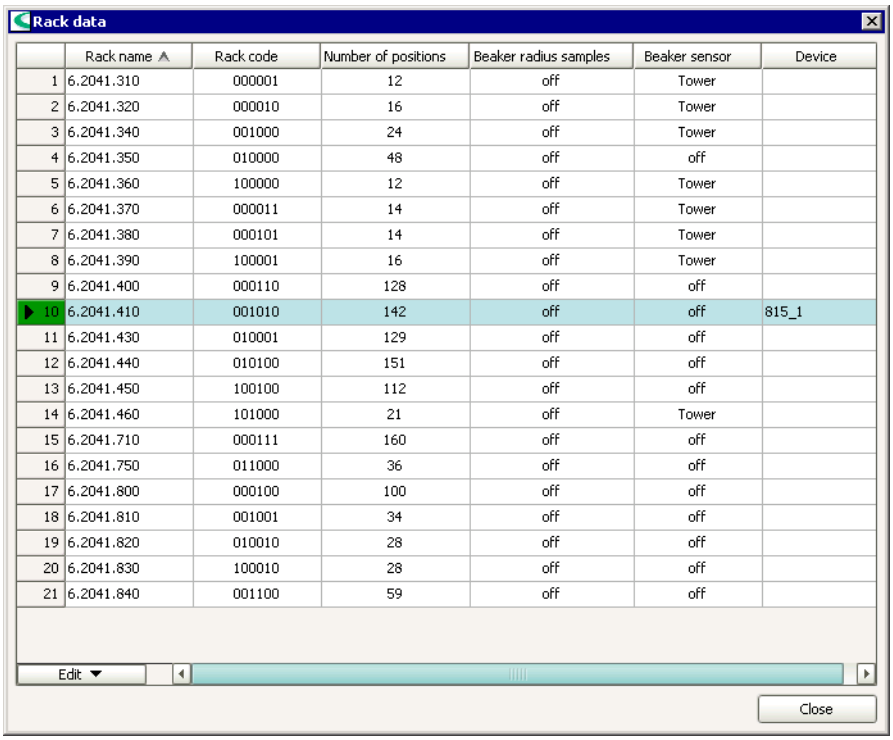
Subwindow Rack data

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 diminished as required; it can also be maximized.

Standard racks

The rack table contains all the sample racks that are supplied for sample changers by Metrohm as standard.

6.9.2 Rack table



	Rack name	Rack code	Number of positions	Beaker radius samples	Beaker sensor	Device
1	6.2041.310	000001	12	off	Tower	
2	6.2041.320	000010	16	off	Tower	
3	6.2041.340	001000	24	off	Tower	
4	6.2041.350	010000	48	off	off	
5	6.2041.360	100000	12	off	Tower	
6	6.2041.370	000011	14	off	Tower	
7	6.2041.380	000101	14	off	Tower	
8	6.2041.390	100001	16	off	Tower	
9	6.2041.400	000110	128	off	off	
10	6.2041.410	001010	142	off	off	815_1
11	6.2041.430	010001	129	off	off	
12	6.2041.440	010100	151	off	off	
13	6.2041.450	100100	112	off	off	
14	6.2041.460	101000	21	off	Tower	
15	6.2041.710	000111	160	off	off	
16	6.2041.750	011000	36	off	off	
17	6.2041.800	000100	100	off	off	
18	6.2041.810	001001	34	off	off	
19	6.2041.820	010010	28	off	off	
20	6.2041.830	100010	28	off	off	
21	6.2041.840	001100	59	off	off	

Contents

The following information about the racks configured in the rack table is shown 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 increasing or decreasing sequence. The table view can be adapted with the left-hand mouse key as follows:

- **Drag the margin between the column titles**:
  Sets the column width
- **Double-click on the margin between the column titles**:
  Sets the optimal column width
- **Drag the column title**:
  Moves the column to the required place

If the contents of a field is larger than the column width then the whole contents can be shown as a tooltip by keeping the mouse cursor 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 Device 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 operation then the line will be shown in gray and the rack cannot be edited until the determination has been concluded.

Functions

The menu **Edit** beneath the rack table contains the following menu items:

New...

Adds a new rack manually.

Delete

Deletes the selected rack.

Properties...

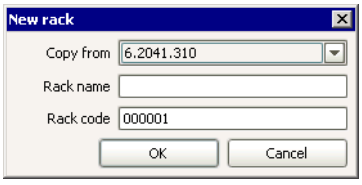
Edits the selected rack.

Print (PDF)...

Outputs the rack table as a PDF file.

Add 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. With **Edit, New...** the dialog window **New rack** opens.



Copy from

All existing racks, [Rack selected in the table]

Selection of the rack to be used as a template for the new rack.

Rack name

25 characters

Name for the new rack. The selected name must not already exist.

Rack code

6-place binary pattern with 0 and 1, [Code of selected rack]

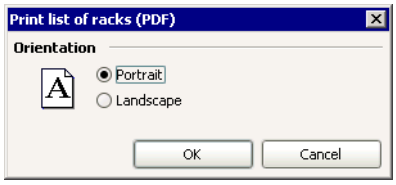
Code of the new rack. The selected rack code must not already exist.

Delete rack

With **Edit, Delete** the rack selected in the rack list will be deleted.

Print rack list

With **Edit, Print (PDF)** or the corresponding symbol the dialog window **Print list of racks (PDF)** opens.



Orientation

Portrait

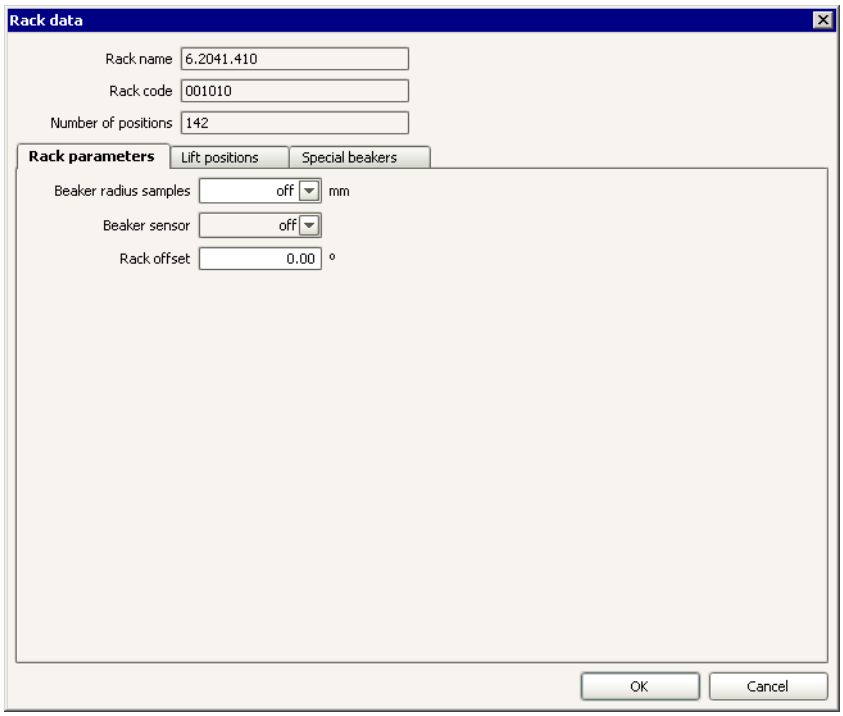
[on], off
Print rack table in portrait format.

Landscape

on, [off]
Print rack table in landscape format.

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.

6.9.3 Rack properties



Rack name

Shows the name of the attached rack. If no rack is in position then "**-----**" will be shown.

Rack code

Shows the rack code of the attached rack. 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.

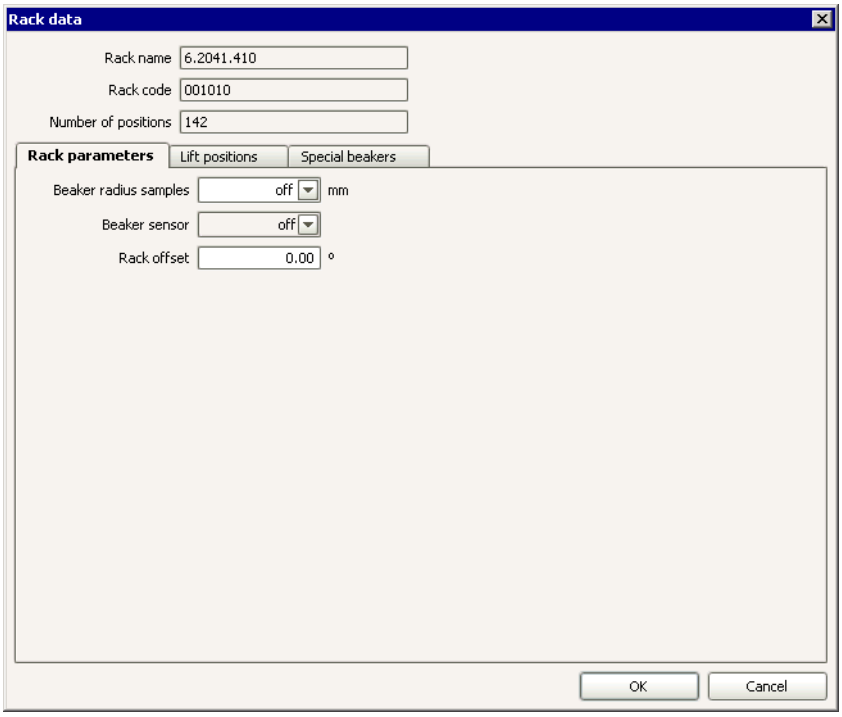
Number of positions

Shows the number of positions on the attached rack. If no rack is in position then the display will be empty.

The parameters for the attached rack are defined on the following 3 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 beaker**
  Settings for all special beakers on the rack in position.

Rack parameters



Beaker radius samples

1.0 ... 100.0 mm, [off]

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 Properties Tower #) 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.

Beaker sensor

[Tower], Robotic arm, off

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.

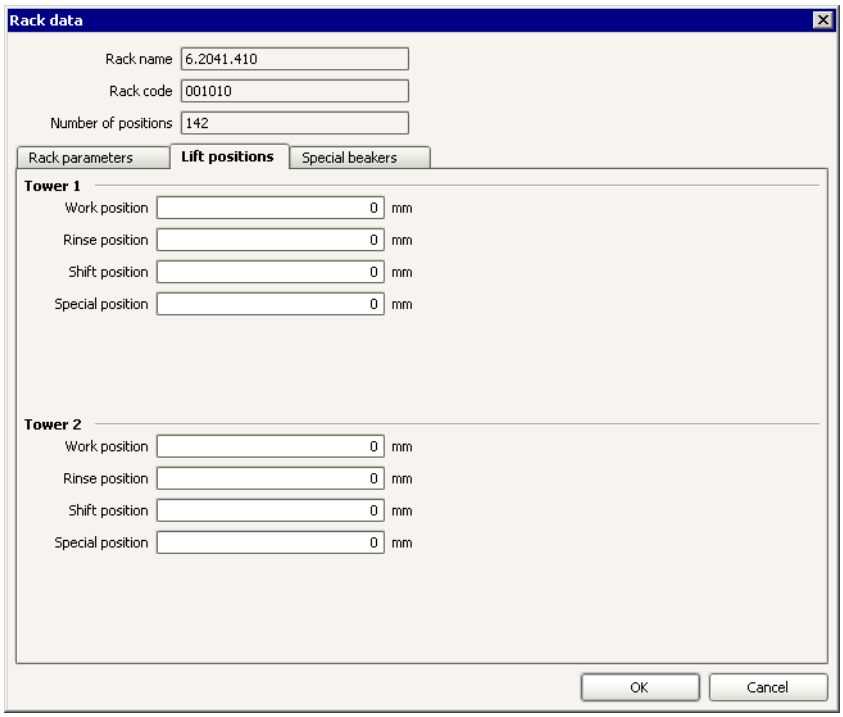
With the parameter **Beaker test** in the command **MOVE** you can determine whether the determination is to be terminated if a beaker is missing with or without the display of a corresponding message and whether the series is to be continued or also terminated.

Rack offset

-5.00 ... [0.00] ... 5.00 °

The rack offset is a production-dependent tolerance value between the upper part of the rack and the lower part. The rack offset value is determined during rack adjustment and shown here. It can be edited if necessary.

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

[0] ... 235 mm

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Rinse position

[0] ... 235 mm

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Shift position

[0] ... 235 mm

Shift position for Lift 1. Each time that the rack rotates 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 rotation will take place at the current lift position. This means that the shift position must be selected so that a safe rotation over the whole rack is possible at any time.

Special position

[0] ... 235 mm

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.

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

[0] ... 235 mm

Work position for Lift 2. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Rinse position

[0] ... 235 mm

Rinse position for Lift 2. This lift position is used for rinsing the electrodes.

Shift position

[0] ... 235 mm

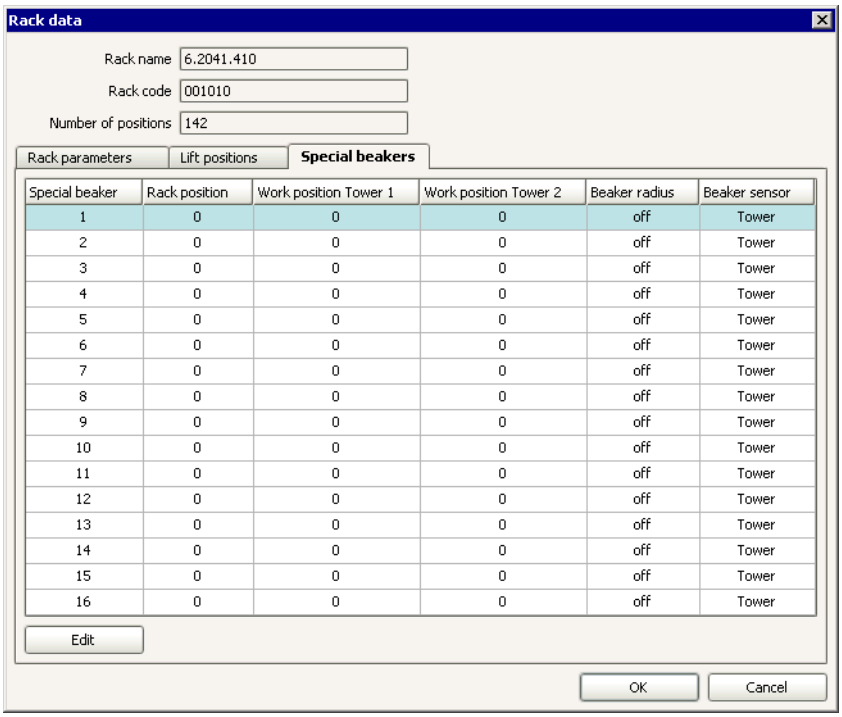
Shift position for Lift 2. Each time that the rack rotates the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here then the rotation will take place at the current lift position. This means that the shift position must be selected so that a safe rotation over the whole rack is possible at any time.

Special position

[0] ... 235 mm

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.

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 a sample series can start at rack position 1. Rack positions that 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 for the particular tower are taken over 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.

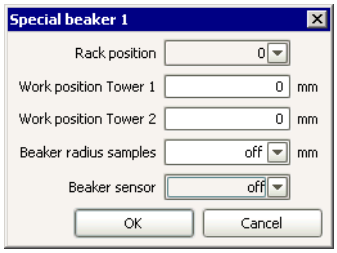
Beaker radius
Radius of the special beaker.

Beaker sensor
Shows whether and which beaker sensor is to be used for the special beaker.

Opens the dialog window **Special beaker #** for editing the data of the selected special beaker.

Special beaker

In the dialog window **Special beaker #** the parameters for the special beaker selected in the Table of special beakers can be defined.



Rack position
[0] ... n (n is rack-dependent)
Number of rack position for selected special beaker.

> ***Note***
> *Special beakers should preferably be set at high rack positions, so that a sample series can start at rack position 1. Rack positions that are defined as special beakers are no longer available as sample positions. They will be jumped over during an automatic movement to a sample position.*

Work position Tower 1
[0] ... 235 mm
Work position of the selected special beaker at Tower 1.

Work position Tower 2
[0] ... 235 mm
Work position of the selected special beaker at Tower 2.

Beaker radius

1.0 ... 100.0 mm, [off]

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 Properties Tower #*) 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.

Beaker sensor

[Tower], Robotic arm, off

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.

Chapter 7 How to proceed

7.1 Audit Trail

7.1.1 Open Audit Trail

> ***Note***
> *The table can only be opened if the option **Enable Audit Trail** is switched on in the Security settings.*

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.
3. If desired, click on menu item **View, Column** display and define the desired columns and their sequence in the dialog window **Column display**.

7.1.2 Filter Audit Trail

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.

Quick filter

3. Click on symbol or menu item **Filter, Quick filter**.
   After this function has been selected then, when navigating in the Audit Trail table, the field in which the cursor is located will have a yellow background.
4. 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 used directly on the table.

> ***Note***
> *Within the filtered table the quick filter can be used again so that the number of entries can be reduced step by step.*

Define and apply special filter

3. Click on symbol or menu item **Filter, Special filter**.
   The dialog window **Special filter** opens for defining user-specific filters.
4. Define and save filter.
5. Click on **[Apply filter]**.
   The table will be filtered.

Apply special filter

3. Select desired filter in the field **Filter**.
   The table will be filtered.

7.1.3 Export Audit Trail

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.
3. If desired, filter Audit Trail table.
4. If desired, select Audit Trail entries to be exported.
5. Click on menu item **File, Export**.
   The window **Export Audit Trail** opens.
6. Enter or select directory and file name of the export file in the field **Save file as**.
7. Select the desired option (**All records** or **Selected records**) in the field **Selection**.
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 can no longer be imported back into the Audit Trail table.*

7.1.4 Archive Audit Trail

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.
3. Click on menu item **File, Archive**.
   The window **Archive Audit Trail** opens.
4. Enter or select directory and file name of the archive file in the field **Save file as**.
5. Select the desired option (**All records** or **Records until** including date selection) in the field **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 with Exporting, i.e. the Audit Trail entries are saved in text format. They can no longer be imported into the Audit Trail table. The difference to exporting is that the archived entries can be marked in the column **Archived** and then deleted.*
>
> *The text files generated during archiving are no longer protected and can be manipulated. If you want to make sure that these files are archived in an unaltered condition then you must use suitable external backup or archiving programs.*

7.1.5 Delete Audit Trail

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.
3. Archive desired Audit Trail entries (see *How to proceed: Archive Audit Trail*).
4. Click on menu item **File, Delete**.
   The window **Delete Audit Trail** opens.
5. Select the desired option (**All archived records** or **Archived records until** including date selection) in the field **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.

7.2 Backup

7.2.1 Backup database

General

In *tiamo* the **determination databases** are also called databases; in contrast to the configuration database they can be generated by the user and contain the determination data. 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 the Local server systems (*tiamo light*, *tiamo full)* the databases are stored on the disk drives managed by the computer and are only available for the users logged in to this computer who have the appropriate rights of access. In the Client-server system (*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 rights of access can use these databases.

Backup database manually

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Click on **[Backup]** in the dialog window **Database manager**.
   The window **Backup database** opens.
4. Select **Backup directory.**
5. Select or enter **Backup name**. 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 on restoring.*

6. Start manual backup of the database with **[Start]**.

Backup database automatically

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Select desired database and click on **[Properties]**.
   The window **Properties - database** opens.
4. On tab **General**, enter **Comment** on database.
5. On tab **Backup**, enable the option **Backup monitoring**.
6. Enter **Interval** for backup monitoring or date for **Next backup**.
7. Enable option **Start backup automatically**.
8. Select **Backup directory**.
9. Close window **Properties - database** with **[OK]**.

7.2.2 Restore database

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Click on **[Restore]** in the dialog window **Database manager**.
   The window **Restore databases** opens.
4. Select the **Backup directory** that contains the desired backed up database.
5. Select or enter the **Backup name** for the desired database.
6. For **Save as**, enter name under which the database is to be restored.
7. Start database revovery with **[Start]**.

> ***Note***
> *Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.*

7.2.3 Backup configuration data

General

The configuration data in *tiamo* is saved in the **configuration database**. Under configuration data is to be understood all *tiamo* method-embracing settings for devices, titrants/solutions, sensors, common variables and rack data. Configuration data also includes methods, security settings, user administration, program administration, templates, and Audit Trail.

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.

Backup configuration data manually

1. Select program part Configuration.
2. Click on symbol or menu item **File, Backup, Manually**.
   The window **Backup configuration data manually** opens.
3. Select **Backup directory.**
4. Select or enter **Backup name**. 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 on restoring.*

5. Start manual backup of the configuration database with **[Start]**.

Backup database automatically

1. Select program part Configuration.
2. Click on menu item **File, Backup, Automatically**.
   The window **Backup configuration data automatically** opens.
3. Enable the option **Automatic backup**.
4. Enter **Interval** for backup monitoring or date for **Next backup**.
5. Select **Backup directory**.
6. Close window **Backup configuration data automatically** with **[OK]**.

7.2.4 Restore configuration data

tiamo light, tiamo full

1. Close *tiamo*.
2. Start **ConfigRestore.exe** in the program directory **...\tiamo\bin**.
   The dialog window **Restore configuration data** opens.
3. Select the **Backup directory** that contains the desired backed up configuration database.
4. Select or enter the **Backup name** for the desired database.
5. Start configuration database revovery with **[Start]**.

tiamo multi

1. Make sure that tiamo is closed on all clients connected to the server and on the server itself.
2. Start **ConfigRestore.exe** in the program directory **...\tiamo\bin** on the server.
   The dialog window **Restore configuration data** opens.
3. Select the **Backup directory** that contains the desired backed up configuration database.
4. Select or enter the **Backup name** for the desired database.
5. Start configuration database revovery with **[Start]**.

7.2.5 Backup methods

General

Methods are stored in the configuration database and are 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*.

Backup configuration data manually

1. Select program part Configuration.
2. Click on menu item **File, Backup, Manually**.
   The window **Backup configuration data manually** opens.
3. Select **Backup directory**.

4. Select or enter **Backup name**. 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 on restoring.*

5. Start manual backup of the configuration database with **[Start]**.

Backup database automatically

1. Select program part Configuration.
2. Click on menu item **File, Backup, Automatically**.
   The window **Backup configuration data automatically** opens.
3. Enable the option **Automatic backup**.
4. Enter **Interval** for backup monitoring or date for **Next backup**.
5. Select **Backup directory**.
6. Close window **Backup configuration data automatically** with **[OK]**.

Export methods

1. Select program part Method.
2. Click on symbol or menu item **File, Method manager...**.
3. The window **Method manager** opens.
4. Select desired **Method group**.
5. Select desired methods.
6. Click on menu item **Edit, Export..**..
7. The window **Select directory for export** opens.
8. Select the directory where the method should be exported and click on **[OK]**.
9. The selected methods are each exported as files named as **'Method name'.mmet**.

> ***Note***
> *The exported methods are stored uncoded but with a checksum. In case a file stored in this manner is being manipulated, it cannot be imported again.*

7.2.6 Archive Audit Trail

1. Select program part Configuration.
2. Click on symbol or menu item **Tools, Audit Trail**.
   The window **Audit Trail** opens.
3. Click on menu item **File, Archive**.
   The window **Archive Audit Trail** opens.
4. Enter or select directory and file name of the archive file in the field **Save file as**.
5. Select the desired option (**All records** or **Records until** including date selection) in the field **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 can no longer be imported back into the Audit Trail table. The difference to exporting is that the archived entries can be marked in the column **Archived** and then deleted.*
>
> *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.*

7.3 Determinations

7.3.1 Start single determination

Single determination without statistics

1. Select program part Workplace.
2. In subwindow **Run**, click on tab **Single determination**.
3. If desired, enter Determination parameters.
4. Select **Method** from the desired method group that is to be used for carrying out the determination.
   The subwindow **Method** shows the method loaded.
5. If a method was loaded in which the option **Statistics** in the **START** command is enabled, disable the checkbox **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 subwindow **Run**, click on tab **Single determination**.
3. If desired, enter Determination parameters.
4. Select **Method** from the desired method group that is 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 option **Statistics** must be enabled in the **START** command of the method and, additionally, the option **Statistics** must be enabled in the **CALC** command of each desired result.*

5. Enable the checkbox **Statistics** on the tab **Single determination** and modify the number of single determinations if desired.
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.

> ***Note***
> *If the method contains a **DATABASE** command, this command must be executed in all statistically linked determinations. Otherwise the statistical results will be displayed faulty and the determinations cannot be reprocessed.*

7.3.2 Start determination series

Determination series without statistics

1. Select program part Workplace.
2. In subwindow **Run**, click on tab **Determination series**.
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 checkbox **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. In subwindow **Run**, click on tab **Determination series**.
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 calculate statistical calculations for results, the option **Statistics** must be enabled in the **START** command of the method and, additionally, the option **Statistics** must be enabled in the **CALC** command of each desired result.*

5. Enable the checkbox **Statistics** on the tab **Determination series** and modify the number of single determinations if desired.
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.

> ***Note***
> *If the method contains a **DATABASE** command, this command must be executed in all statistically linked determinations. Otherwise the statistical results will be displayed faulty and the determinations cannot be reprocessed.*

7.3.3 Search determinations

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Click on symbol or menu item **Determinations, Search**.
   The dialog window **Search - Database** opens.
4. Enter or select desired Search terms and Search options.
5. Click on **[Search next]**.
   The next determination containing the search term is marked in the Determination overview.

7.3.4 Filter determinations

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.

Quick filter

3. Click on symbol or menu item **Filter, Quick filter**.
   After this function has been selected then, when navigating in the determination table, the field in which the cursor is located will have a yellow background.
4. 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 used directly on the table.

> ***Note***
> *Within the filtered table the quick filter can be used again so that the number of entries can be reduced step by step.*

Define and apply special filter

3. Click on symbol or menu item **Filter, Special filter**.
   The dialog window **Special filter** opens for defining user-specific filters.
4. Define and save filter.
5. Click on **[Apply filter]**.
   The table will be filtered.

Apply special filter

3. Select desired filter in the field **Filter**.
   The table will be filtered.

7.3.5 Sign determination

Select determination

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. 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.*

4. Click on 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**.
5. Enter or select **User**, **Password**, **Reason**, and **Comment** and click on **[Sign]**.
   The selected determination will be signed on level 1.

> ***Note***
> *Methods can be signed several times at level 1. They can 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***
> *Determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization.*

4. Click on symbol menu item **Sign, Signature 2...**.
   The window **Signature Level 2** opens. If the selected determination can be signed, **Signature possible** is displayed in the field **Info**.
5. Enter or select **User**, **Password**, **Reason**, and **Comment** and click on **[Sign]**.
   The selected determination will be signed on level 2.

> ***Note***
> *Determinations that have been 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 (see Delete signature 2).*

7.3.6 Export determinations

Define 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 template 'New file'** opens.
4. Define properties of the new export template and close window with **[OK]**.
5. Close window **Export templates** with **[Close]**.

Select determinations

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.

Export determinations

1. Click on menu item **Determinations, Export...**.
   The window **Export determinations** opens.
2. Choose **Selection** for export, select **Export template** and click on **[OK]**.
   The selected determinations are exported into the directory defined in the export template.

7.3.7 Import determinations

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Click on menu item **Determinations, Import...**.
   The window **Import determinations** opens.
4. Select desired determinations and click on **[Open]**.
   The selected determinations are imported into the open database.

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

7.3.8 Delete determinations

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.
4. Click on symbol or menu item **Determinations, Delete** and confirm deletion.
   The selected determinations with all determination versions are deleted.

> ***Note***
> *If the option **Comment on modification of determintions** is switched on in the Security settings then the window **Modification comment determination** will appear before the modification is saved.*

7.3.9 Make current previous determination version

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Select desired determination.
4. Click on 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.
5. Select desired determination that should be made current.
6. Click onsymbol or menu item **Determinations, Make current**.
   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.

7.3.10 Reprocess determinations

> ***Note***
> *Determinations that have a Signature at Level 2 cannot be reprocessed.*

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.
4. Click on symbol or menu item **Determinations, Reprocess**.
   The dialog window **Reprocessing** opens and the first of the selected determinations is displayed.

Modify variables

5. Open tab **Variables**.
6. Select desired variable.
7. Click on **[Modify]**.
   The dialog window **Modify variable** opens.
8. Enter new **Value** for the variable and click on **[OK]**.
9. Click on **[Recalculate]**.
   The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result view**.

> ***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).*

10. In the **Reprocessing** window, 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.

Modify method

> ***Note***
> *The method can only be modified if the method is identical for all the determinations that have been selected.*

5. Open tab **Method**.
6. Click on **[Modify method]**.
   The dialog window **Method editor** opens.
7. Modify method as desired and click on **[OK]**.
   Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands.
8. Click on **[Recalculate]**.
   The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result view**.
9. If desired, save the modified method under the same name or under a new name by clicking on **[Save as...]**.
   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 will be generated with the number **1**.
10. In the **Reprocessing** window, 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.

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.*

5. Open tab **Statistics**.
6. In the field **Result name**, select the result whose **Result value** is to be displayed.
7. Select desired determination whose result value(s) should be switched on or off for the statistics.
8. If only the selected result of the determination has to be switched on or off for the statistics, click on **[Result on/off]**.
9. If all results of the selected determination have to be switched on or off for the statistics, click on **[Determination on/off]**.

> ***Note***
> *If the results of a determination are switched off then when this determination is recalculated the statistics for these results will be switched off, 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.*

10. Click on **[Recalculate]**.
    The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result view**.
11. In the **Reprocessing** window, 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.

Edit curve evaluation

> ***Note***
> *The tab **Curve evaluation** is only shown when a single determination that contains curves that can be evaluated has been selected.*

5. Open tab **Curve evaluation**.
6. In the field **Command name**, select the command whose curve is to be displayed.
7. Click on **[Edit]**.
   The window **Curve evaluation** for manually reprocessing the curve evaluation opens.
8. Modify the curve evaluation manually and close window with **[OK]**.
9. Click on **[Recalculate]**.
   The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result view**.

10. In the **Reprocessing** window, 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.

7.3.11 Print determination report

1. Select program part Database.
2. Open desired database.
Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.
4. Click on menu item **File, Print, Report...**.
The dialog window **Report output** opens.
5. Under **Selection**, select desired determinations.
6. Under **Report type**, select original report or desired report template.
7. Under **Output target**, select printer and/or PDF file.

> ***Note***
> *If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.*

8. In the dialog window **Report output**, click on **[OK]**.
The reports of the selected determination are put out.

7.3.12 Print determination overview

1. Select program part Database.
2. Open desired database.
Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.
4. Click on menu item **File, Print, Determination overview...**.
The dialog window **Print determination overview (PDF)** opens.
5. Select desired **Selection** and **Orientation** and click on **[OK]**.
The determination overview is opened as PDF file.

7.4 Databases

7.4.1 Open database

1. Select program part Database.
2. Click on symbol or menu item **File, Open...**.
3. Select desired database in the window **Open database** or enter name in the field **Database name**.
4. Click on **[Open]**.
   Opens the selected database and shows its data records in the Determination overview. The database name is shown in the title line of the program, the number of open databases in the top left corner of the database symbol.

> ***Note***
> *A maximum of 4 databases can be open, but only 2 can be shown simultaneously. Databases that are open when the program is exited will be opened automatically the next time that the program is started.*

7.4.2 Close database

Close individual database

1. Select program part Database.
2. Click on symbol or menu item **File, Close...**.
   The focussed database will be closed.

Close all databases

1. Select program part Database.
2. Click on menu item **File, Close all...**.
   All opened databases will be closed.

7.4.3 Create new database

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Click on menu item **Edit, New...** in the dialog window **Database manager**.
   The window **New database** opens.
4. Enter name for the new database and click on **[OK]**.
   The window **Properties - database** opens for editing the database properties.

> ***Note***
> *The database name must be unique in the whole client/server system.*

5. Enter **Comment** for database on tab **General**.
6. On tab **Access rights**, define access rights for reading and editing the new database for the different user groups.
7. On tab **Backup**, define backup monitoring and automatic backup for the new database.
8. On tab **Monitoring**, define monitoring of size and number of data records.

7.4.4 Backup database

General

In *tiamo* the **determination databases** are also called databases; in contrast to the configuration database they can be generated by the user and contain the determination data. 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 the Local server systems (*tiamo light*, *tiamo full)* the databases are stored on the disk drives managed by the computer and are only available for the users logged in to this computer who have the appropriate rights of access. In the Client-server system (*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 rights of access can use these databases.

Backup database manually

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Click on **[Backup]** in the dialog window **Database manager**.
   The window **Backup database** opens.
4. Select **Backup directory.**
5. Select or enter **Backup name**. 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 on restoring.*

6. Start manual backup of the database with **[Start]**.

Backup database automatically

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Select desired database and click on **[Properties]**.
   The window **Properties - database** opens.
4. On tab **General**, enter **Comment** on database.

5. On tab **Backup**, enable the option **Backup monitoring**.
6. Enter **Interval** for backup monitoring or date for **Next backup**.
7. Enable option **Start backup automatically**.
8. Select **Backup directory**.
9. Close window **Properties - database** with **[OK]**.

7.4.5 Restore database

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Click on **[Restore]** in the dialog window **Database manager**.
   The window **Restore databases** opens.
4. Select the **Backup directory** that contains the desired backed up database.
5. Select or enter the **Backup name** for the desired database.
6. For **Save as**, enter name under which the database is to be restored.
7. Start database revovery with **[Start]**.

> ***Note***
> *Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.*

7.4.6 Delete database

1. Select program part Database.
2. Click on symbol or menu item **File, Database manager...**.
   The window **Database manager** opens.
3. Select desired database.
4. Click on menu item **Edit, Delete** in the dialog window **Database manager**.

> ***Note***
> *Databases that are open cannot be deleted.*

7.5 Configuration data

7.5.1 Export configuration data

1. Select program part Configuration.
2. Click on menu item **File, Export**.
   The window **Export configuration data** opens.
3. Select desired configuration data.
4. Close window **Export configuration data** with **[OK]**.
5. Select or enter name and directory for the export file. If an existing export file is selected it will be overwritten.
6. Start export of the configuration data with **[Save]**.
   The selected configuration data is then saved in a file with the extension **.mcfg.**

7.5.2 Import configuration data

1. Select program part Configuration.
2. Click on menu item **File, Import**.
   The window **Open** opens.
3. Select or enter name and directory for the import file ***.mcfg** and click on **[Open]**.
   The window **Import configuration data** opens.
4. Select desired configuration data.

   Note
   Data that is not present in the export file cannot be selected.

5. Start import of the configuration data with **[OK]**.
   The selected configuration data is then imported**.**

7.5.3 Backup configuration data

General

The configuration data in *tiamo* is saved in the **configuration database**. Under configuration data is to be understood all *tiamo* method-embracing settings for devices, titrants/solutions, sensors, common variables and rack data. Configuration data also includes methods, security settings, user administration, program administration, templates, and Audit Trail.

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.

Backup configuration data manually

1. Select program part Configuration.
2. Click on menu item **File, Backup, Manually**.
   The window **Backup configuration data manually** opens.
3. Select **Backup directory.**
4. Select or enter **Backup name**. 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 on restoring.*

5. Start manual backup of the configuration database with **[Start]**.

Backup database automatically

1. Select program part Configuration.
2. Click on menu item **File, Backup, Automatically**.
   The window **Backup configuration data automatically** opens.
3. Enable the option **Automatic backup**.
4. Enter **Interval** for backup monitoring or date for **Next backup**.
5. Select **Backup directory**.
6. Close window **Backup configuration data automatically** with **[OK]**.

7.5.4 Restore configuration data

tiamo light, tiamo full

1. Close *tiamo*.
2. Start **ConfigRestore.exe** in the program directory **...\tiamo\bin**.
   The dialog window **Restore configuration data** opens.
3. Select the **Backup directory** that contains the desired backed up configuration database.
4. Select or enter the **Backup name** for the desired database.
5. Start configuration database revovery with **[Start]**.

tiamo multi

1. Make sure that tiamo is closed on all clients connected to the server and on the server itself.
2. Start **ConfigRestore.exe** in the program directory **...\tiamo\bin** on the server.
   The dialog window **Restore configuration data** opens.
3. Select the **Backup directory** that contains the desired backed up configuration database.
4. Select or enter the **Backup name** for the desired database.
5. Start configuration database revovery with **[Start]**.

7.6 Methods

7.6.1 Open method

1. Select program part Method.
2. Click on symbol or menu item **File, Open...**.
   The window **Open method** opens.
3. Select desired **Method group**.
4. Select desired method or enter name in the field **Method name**.
5. Click on **[Open]**.
   Opens the selected method. The method name is displayed in the title bar of *tiamo*. The number of currently opened methods is displayed in the left upper corner of the method symbol.

> ***Note***
> *10 methods can be opened at maximum but only two can be displayed at the same time.*

7.6.2 Close method

Close individual method

1. Select program part Method.
2. Click on symbol Close or menu item **File, Close...**.
   The focussed database 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.

7.6.3 Create new method

1. Select program part Method.
2. Click on symbol or menu item **File, New...**.
   The window **New method** opens.
3. Select desired method template and click on **[OK]**.
   Opens the selected method template for edition.

7.6.4 Save method

Save method under the same name

1. Click on symbol or menu item **File, Save**.
   The existing, focused method is saved under its name creating a new method version with a new method identification.

   If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for the modification must be entered before the method is saved.

Save method under a new name

1. Click on menu item **File, Save as...**.
   The window **Save method** opens.
2. Select desired **Method group**.
3. Select desired method or enter name in the field **Method name**.
4. Click on **[Save]**.
   The focused method is saved under the desired name in the selected method group as method version **1**.

   If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for the modification must be entered before the method is saved.

7.6.5 Delete method

1. Select program part Method.
2. Click on symbol or menu item **File, Method manager...**.
   The window **Method manager** opens.
3. Select desired **Method group**.
4. Select desired methods.
5. Click on menu item **Edit, Delete**.
   The selected methods with all its method versions are deleted.

   If the option **Comment on modification of methods** is activated in the Security settings, the dialog window **Modification comment method** is displayed where a reason and a comment for deleting the method must be entered before the method is deleted. The reason and the comment are logged in the Audit Trail.

> ***Note***
> *Locked methods (i.e. methods signed at level 2) cannot be deleted.*

7.6.6 Export method

1. Select program part Method.
2. Click on symbol or menu item **File, Method manager...**.
   The window **Method manager** opens.
3. Select desired **Method group**.
4. Select desired methods.
5. Click on menu item **Edit, Export...**.
   The window **Select directory for export** opens.
6. Select the directory where the method should be exported and click on **[OK]**.
   The selected methods are each exported as files named as **'Method name'.mmet**.

> ***Note***
> *The exported methods are stored uncoded but with a checksum. In case a file stored in this manner is being manipulated, it cannot be imported again.*

7.6.7 Import method

1. Select program part Method.
2. Click on symbol or menu item **File, Method manager...**.
   The window **Method manager** opens.
3. Select desired **Method group**.
4. Click on menu item **Edit, Import...**.
   The window **Select files to import** opens.
5. Select desired import files named as **'Method name'.mmet** in the desired directory and click on **[OK]**.
   The selected methods are imported in the currently opened method group.

7.6.8 Sign method

Select method

1. Select program part Method.
2. Click on symbol or menu item **File, Method manager...**.
   The window **Open method** 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.*

5. Click on menu item **Sign, Signature 1...**.
The window **Signature Level 1** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

6. Enter or select **User**, **Password**, **Reason**, and **Comment** and click on **[Sign]**.
The selected method will be signed on level 1.

> ***Note***
> *Methods can be signed several times at level 1. They can 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.*

5. Click on menu item **Sign, Signature 2...**.
The window **Signature Level 2** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

6. Enter or select **User**, **Password**, **Reason**, and **Comment** and 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 make those methods modifiable again, all signatures at level 2 must be deleted*

7.6.9 Make current previous method version

1. Select program part Method.

2. Click on symbol or menu item **File, Method manager...**.
The window **Method manager** opens.

3. Select desired **Method group**.

4. Select desired method.

5. Click on **[History]**.
The window **Method history** showing all **versions** of the selected method opens.

6. Select desired method that should be made current.

7. Click on **[Make current]**.
The selected method version is set 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.

7.6.10 Print method report

1. Select program part Method.
2. Click on symbol or menu item **File, Open...**.
   The window **Open method** opens.
3. Select desired **Method group**.
4. Select desired method or enter name in the field **Method name**.
5. Click on **[Open]**.
   Opens the selected method. The method name is displayed in the title bar of *tiamo*. The number of currently opened methods is displayed in the left upper corner of the method symbol.
6. Click on 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.

7.7 Method groups

7.7.1 Create new method group

1. Select program part Method.
2. Click on symbol or menu item **File, Method groups...**.
   The window **Method groups** opens.
3. Click on **[New]**.
   The dialog window **Properties - Method group - New Group** opens.
4. On tab **General**, enter **Name** of the new method group and **Comment**.
5. On tab **Access rights**, assign access rights for method groups and their methods per user group.

   > ***Note***
   > *The user group **Administrators** does always have both access rights. They cannot be switched off.*

6. Close dialog window **Properties - Method group - New Group** with **[OK]**.

7.7.2 Delete method group

1. Select program part Method.
2. Click on symbol or menu item **File, Method groups...**.
   The window **Method groups** opens.
3. Select desired method group.
4. Click on **[Delete]** and confirm deletion.
   The selected method group is deleted.

7.8 Sample tables

7.8.1 Create new sample table

1. Select program part Workplace.
2. Click on symbol or menu item **Tools, Sample table, New...**.
   The window **Sample table** opens and displays an empty sample table.
3. Click on menu item **Sample table, Properties...** in the dialog window **Sample table**.
   The window **Properties - Sample table** opens.
4. Define properties for the new sample table and close the window with **[OK]**.
5. Click on menu item **Edit, Edit line** in the dialog window **Sample table**.
   The window **Edit line - Sample table** opens.
6. Select **Method** out of the desired method group, enter **Sample position**, sample identifications **ID1...ID8**, **Sample size** and **Sample size unit** and click on **[Apply]**.
   The current sample data will be entered in the corresponding line of the sample table.
7. Repeat step 6 for each desired determination.
8. Close window **Edit line - Sample table** with **[Close]**.
9. Click on menu item **Sample table, Save as...** in the dialog window **Sample table**.
   The window **Save sample table** opens.
10. Enter desired name in the field **Name** and click on **[Save]**.
    The sample table is saved under the required name.

7.8.2 Edit sample table

1. Select program part Workplace.
2. Click on symbol or menu item **Tools, Sample table, Open...**.
   The window **Open sample table** opens.
3. Select desired sample table and click on **[Open]**.
   The window **Sample table** opens and displays the selected sample table.
4. Click on menu item **Sample table, Properties...** in the dialog window **Sample table**.
   The window **Properties - Sample table** opens.
5. Define properties for the sample table and close the window with **[OK]**.
6. Select desired line to be changed in the dialog window **Sample table**.
7. Click on menu item **Edit, Edit line** in the dialog window **Sample table**.
   The window **Edit line - Sample table** opens.
8. Select **Method** out of the desired method group, enter **Sample position**, sample identifications **ID1...ID8**, **Sample size** and **Sample size unit** and click on **[Apply]**.
   The current sample data will be entered in the corresponding line of the sample table.
9. Repeat step 8 for each desired determination.
10. Close window **Edit line - Sample table** with **[Close]**.
11. Click on menu item **Sample table, Save** in the dialog window **Sample table**.
    The sample table is saved.

7.8.3 Load working sample table

1. Select program part Workplace.
2. In subwindow **Run**, click on tab **Determination series**.
3. Click on menu item **Sample table, Load...** in subwindow **Run**.
   The window **Load sample table** opens.
4. Select desired sample table anc click on [Load].
   The sample data of the selected sample table is loaded into the working sample table.

7.8.4 Edit working sample table

1. Select program part Workplace.
2. In subwindow **Run**, click on tab **Determination series**.
3. If desired, load existing sample table into working sample table.
4. Click on menu item **Sample table, Properties...** in subwindow **Run**.
   The window **Properties - Determination series** opens.
5. Define properties for the determination series and close the window with **[OK]**.
6. Select desired line to be changed in subwindow **Run**.
7. Click on menu item **Edit, Edit line** in subwindow **Run**.
   The window **Edit line - Working sample table** opens.
8. Select **Method** out of the desired method group, enter **Sample position**, sample identifications **ID1...ID8**, **Sample size** and **Sample size unit** and click on **[Apply]**.
   The current sample data will be entered in the corresponding line of the working sample table.
9. Repeat step 8 for each desired determination.
10. Close window **Edit line - Working sample table** with **[Close]**.
11. Click on menu item **Sample table,Save as...** in subwindow **Run**.
    The window **Save sample table** opens.
12. Enter desired name in the field **Name** and click on **[Save]**.
    The working sample table is saved under the required name as sample table.

7.9 Reports

7.9.1 Create new report template

1. Select program part Database.
2. Click on menu item **Tools, Report templates, New, Form report...** or **Tools, Report templates, New, Tabular report...**.
   The program window **Report template** opens with an empty report template.
3. In the program window **Report template**, click on **File, Page setup...**.
   The dialog window **Page setup** opens.
4. Define Page setup settings and close window with **[OK]**.
5. In the program window **Report template**, click on **Tools, Options...**.
   The dialog window **Options for report templates** opens.
6. Define options for report template and close window with **[Save]**.
7. Select desired module symbol on the Module bar and place it on the report template by creating a field with the left-hand mouse key.
   The properties window of the corresponding module opens automatically.
8. Enter desired properties for the module and close property window with [OK].
9. Repeat steps 7 and 8 for each desired new module.
10. Click on symbol or menu item **File, Save as...**.
    The window **Save report template** opens.
11. Enter desired name in the field **Name** and click on **[Save]**.
    The report template is saved under the required name.

7.9.2 Edit report template

1. Select program part Database.
2. Click on symbol or menu item **Tools, Report template, Open...**.
3. Select desired report template and click on **[Open]**.
   The program window **Report template** opens with the selected report template.
4. In the program window **Report template**, click on **File, Page setup...**.
   The dialog window **Page setup** opens.
5. Define Page setup settings and close window with **[OK]**.
6. In the program window **Report template**, click on **Tools, Options...**.
   The dialog window **Options for report templates** opens.
7. Define options for report template and close window with **[Save]**.

Edit existing modules

8. Select symbol on the Module bar and click on desired module in the report template.
   The properties window of the selected module opens automatically.
9. Enter desired properties for the module and close property window with [OK].
10. Repeat steps 8 and 9 for each desired module.

Create new modules

11. Select desired module symbol on the Module bar and place it on the report template by creating a field with the left-hand mouse key.
    The properties window of the corresponding module opens automatically.
12. Enter desired properties for the module and close property window with [OK].
13. Repeat steps 11 and 12 for each desired new module.
14. Click on symbol or menu item File, Save.
    The report template is saved.

7.9.3 Print determination report

1. Select program part Database.
2. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
3. Select desired determinations.
4. Click on menu item **File, Print, Report...**.
   The dialog window **Report output** opens.
5. Under **Selection**, select desired determinations.
6. Under **Report type**, select original report or desired report template.
7. Under **Output target**, select printer and/or PDF file.

> ***Note***
> *If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.*

8. In the dialog window **Report output**, click on **[OK]**.
   The reports of the selected determination are put out.

7.9.4 Print method report

1. Select program part Method.
2. Click on symbol or menu item **File, Open...**.
   The window **Open method** opens.
3. Select desired **Method group**.
4. Select desired method or enter name in the field **Method name**.
5. Click on **[Open]**.
   Opens the selected method. The method name is displayed in the title bar of *tiamo*. The number of currently opened methods is displayed in the left upper corner of the method symbol.
6. Click on 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.

7.9.5 Print determination overview

8. Select program part Database.
9. Open desired database.
   Opens the selected database and shows its data records in the Determination overview.
10. Select desired determinations.
11. Click on menu item **File, Print, Determination overview...**.
    The dialog window **Print determination overview (PDF)** opens.
12. Select desired **Selection** and **Orientation** and click on **[OK]**.
    The determination overview is opened as PDF file.

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