

tiamo 2.0





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tiamo 2.0

Online-Help

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1 Introduction

1.1 Welcome to tiamo

Introduction



tiamo = titration and more

tiamo is a control and database software for titrators, dosing devices and sample changers and makes complete laboratory automation possible. It is for that reason that the name **tiamo** stands for «**titration and more**» - **tiamo** can do more than just titrate.

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

Overview of the main program features

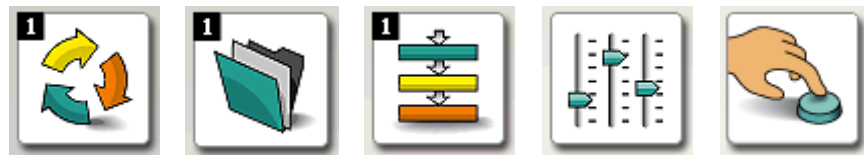
- *Program interface: easy to operate and configure*
- *Simple integration of devices and accessories*
- *Convenient method editor*

- Database-based program with Client/Server functionality
- A wide range of import and export functions
- FDA-compatibility in acc. with 21 CFR Part 11
- Comprehensive online help
- Program versions
- What is new in tiAMO 2.0?

1.2 Operation

Introduction

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



Workplace

Database

Method

Configuration

Manual

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

In the centre of the screen are the **information windows** with the settings, sample entry masks, live curves or results. This view can be set individually for each user with the aid of the new Layout Manager. This means that the users only see the buttons needed for their work. This reduces the introductory period for routine users to a minimum; incorrect operation as a result of overcrowded screens are also a thing of the past.

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

1.3 Connecting devices

Introduction

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

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

Devices that can be used with *tiamo*

- **Titrimo**
808, 809, 835, 836, 841, 842, 855, 857, 888, 890, 901, 902, 904, 905, 906, 907
- **Titrimo**
702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799
- **Conductometer**
712, 856
- **KF coulometer**
756, 831
- **Sample changers**
730, 774, 778, 789, 814, 815, 855, 864, 874
- **Miscellaneous**
846 Dosing Interface, 867 pH module, Avantes spectrometer, balances, barcode readers, IO controllers, ...

1.4 Method editor

Introduction

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

One new feature is that **actions running parallel** in terms of time can now be programmed and linked. Now a sample can be prepared with the new Titrand System and the Robotic Sample Processors while the previous one is being titrated. This saves time and increases sample throughput. The crowning feature is the simultaneous processing of several samples at once. This means that one Titrand can carry out two titrations at the same time, thus doubling sample throughput!

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

Overview of functions

- Graphic method editor (*see Chapter 5.6.1.2, page 410*)
- Method management (*see Chapter 5.3.1, page 389*)
- Separate management of access rights for each method group (*see Chapter 5.4.2.3, page 401*)
- Templates for method development and calculation (*see Chapter 5.2.1, page 376*)
- Plausibility check for methods (*see Chapter 5.2.5, page 385*)
- Comments can be added to the methods (*see Chapter 5.2.4.2.9, page 384*)
- Parallel runs (*see Chapter 5.6.10.3.1, page 1132*)
- Loop functions (*see Chapter 5.6.10.4.1, page 1134*)

1.5 Database

Introduction

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

in this network and can be accessed and processed by all Client PCs. All clients also access the same pool of methods.

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

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

Overview of functions

- Object-oriented Client/Server database (see Chapter 6.2.3.1, page 1170).
- Layout manager for database view (see Chapter 3.1.7, page 89).
- Quick filter (see Chapter 4.5.2.4.3, page 286).
- Efficient search functions (see Chapter 4.5.2.3, page 283).
- Access rights control for every database (see Chapter 4.3.5.3, page 195).
- Automatic database backup (see Chapter 4.3.5.4, page 196).
- Control cards (see Chapter 4.5.2.16, page 324).
- Reprocess determinations (see Chapter 4.5.2.6, page 296).

1.6 Communication

Introduction

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

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

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

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

Overview of functions

- Importing sample data (see Chapter 3.3.1.6, page 101).

- Various export formats , e.g. XML, CSV, SLK (see Chapter 4.4.4.2.1, page 246).
- Automatic data export, e.g. to NuGenesis SDMS, Scientific Software CyberLAB, etc. (see Chapter 5.6.8.5.1, page 1106)
- Report designer (see Chapter 4.4.1.4.1.1, page 203).
- E-mail functions for status messages, error messages or results (see Chapter 2.6, page 83).
- Importing external measured values (see Chapter 5.6.3.9.2, page 839).

1.7 Conformity

Introduction

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

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

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

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

Conformity relevant properties of tiamo

- Conformity is priority in development and validation.
- Centralized user administration (*see Chapter 6.2.1.1, page 1152*).
- Detailed access rights (*see Chapter 6.2.1.2.2, page 1154*).
- Password protection under tiamo or Windows (*see Chapter 6.2.2.2, page 1162*).
- Digital signature on two levels (*see Chapter 2.3, page 20*).

- ## 1.8 Versions

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

	tiamo 2.0 light	tiamo 2.0 full	tiamo 2.0 multi
Product	6.6056.201	6.6056.202	6.6056.203
Maximum number of devices per PC	2	unlimited	unlimited
Compatible with FDA 21 CFR Part 11		•	•
User administration	•	•	•
Security settings		•	•
Traceability («Audit Trail»)		•	•
Client/Server support			•
Number of licenses	1	1	3
Additional licenses as an option			•
XML data export to LIMS		•	•
Parallel titrations		•	•
Upgrade possible	•	•	

1.9 Online help

Introduction

Calling up the Help

tiamo has an extensive and detailed Online Help that can be requested in two ways:

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

Symbols and conventions

The following symbols and styles are used in this documentation:

<i>Device table</i>	Link to other Help topics in which information is shown for the marked term.
Method	Dialog text Designation for names of parameters, menu items, tabs and dialog windows in the software.
100	Designation for parameter values in input fields.
File ► New	Menu or menu item; Path needed to reach a certain point in the program.
[Continue]	Button
	Formula editor Formulae can be entered in fields with this symbol, and the formula editor opens when you click on the symbol (see Chapter 2.4, page 26).
1	Instruction step Carry out these steps in the sequence shown.
	Warning This symbol draws attention to a possible risk of fatal injury or risk of injury.
	Warning This symbol draws attention to a possible hazard due to electrical current.

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

1.10 What is new in tiamo 2.0?

Introduction

1.10.1 New features

New instruments

- TitrandoS
 - 901
 - 902
 - 904
 - 905
 - 906
 - 907
- Avantes Spectrometer
- 856 Conductivity Module
- 867 pH Module
- 864 Balance Sample Processor
- 874 Oven Sample Processor

New commands

- MEAS TC Cond
- MEAS Ref
- MEAS Spec
- MEAS Opt
- CAL Cond
- CAL Spec



News in the program part Workplace

- Ongoing determinations can be protected against unintended live modifications while importing data from balances and barcode readers with the new option **Confirmation necessary to accept data during determination**.
- One can configure which sample data is to be transmitted from one single determination to the next.
- An ongoing command can be interrupted from the live display.
- The application notice of a method can be displayed while editing the sample table.
- Acoustic signal during data import at the workplace.

News in the program part Database

- Determinations can be searched and filtered in accordance with serial numbers (of instruments, dosing units).
- Determinations can be sent per E-mail directly from the database.
- A second y axis can be displayed in the **Curve evaluation** while reprocessing.
- It shows whether the method of a determination was modified live or during reprocessing.

News in the program part Method

- The measuring point list can be exported automatically as a CSV file.
- The formula editor contains a molar mass calculator.
- Methods can be sent directly via E-mail from the method administration.
- **Fixed values** for sample data can be defined in the properties of the method.
- One can specify in the configuration whether or not each track in the method is to be displayed or suppressed in the live display of the workplace.
- The text editor support hyperlinks.
- New look & feel.

News in the program part Configuration

- The user administration can be configured in such a way that only methods which are signed at Level 2 can be carried out.
- RS-232 instruments (balances, Titrinos) can now be connected to or disconnected from the program in the device table manually.
- If the option **Password monitoring by Windows** is activated in the security settings, then a test registration will be demanded automatically. This ensures that a user does not inadvertently lock himself or herself out of the program by activating this option.
- Contact data of E-mail recipients can be saved as E-mail templates.
- New configuration table **Sample solutions (TC conductivity)** for saving the calibration of temperature coefficients.

- ## News in the program part Manual Control

- ### 1.10.2 Improvements

- Improved emergency stop which also shuts off pumps.
- *tiago* starts faster.

- **MEAS Cond**
The command has been completely revised. If MEAS Cond has already been used in a method that was created with *tiamo 1.x*, then the command parameters must be checked.

- The designations of the sample data fields from the method are now displayed when a line in the sample table is being edited.
- The number of sample identifications has been increased from 8 to 16.
- Calculated and external measured values can be displayed as a live measured value.
- The statistics counter of the method is reset again with the new statistics series if it was increased in the preceding series.

- PDF reports now contain extractable text, e.g. for further editing with LIMS.
- Once the reprocessing has been completed, the determination remains selected in the database that had also been chosen during reprocessing.
- Any data field may be selected for display as a legend for the curve overlay. Furthermore, one can modify the configurations to determine whether all of the curves or only the last curve of the same command is displayed.

- A wizard provides the user with support for adjusting the result templates to match the current method.
- The computer name is now contained in the text of E-mails which are generated automatically by the program.



- The **Round** arithmetic function of the formula editor now uses commercial rounding instead of bankers rounding.
- A method now contains its own entire history when it is exported and imported.
- Up to 9 fixed endpoints can be evaluated. The measured quantity which is evaluated can be selected separately for each fixed endpoint.

Configuration program part

- Improved handling of intelligent solutions and intelligent sensors.
 - New type of **Conductivity sensor** with calibration data.
- The standard sensor **Conductivity sensor** is a new type of **Conductivity sensor**. The standard sensor **Conductivity sensor** from *tiamo 1.x* was of the type **Other sensor** and will be renamed in *tiamo 2.0* and no longer treated as a standard sensor.
- Improved export and import of configuration data.
 - It is possible for all of the users of the same user group and administrators to log in again when one user is logged off automatically.
 - Program start and program end are recorded in the Audit Trail.
 - New USB 2.0 driver.

1.10.3 Fixed bugs and problems

General

- Exception errors when layouts are rearranged.

Devices

- Problems with Sartorius balances when weighing data is entered with more than 4 decimal points.
- Exception errors when filling at Titrino.

Commands

- Exception errors with MEAS pH when the measuring point list is absent.
- RECEIVE Start and End does not work for tracks.

Workplace program part

- Query of the modification comment with REQUEST, even when nothing has been entered there.
- Determination series statistics are deleted when one switches to single determination and back again.
- Exception errors with invalid measured values.
- Exception errors when compiling reports that contain JPEG files.

Database program part

- Exception errors when a curve has too few points and smoothing is set.
- Report output window can be empty.
- The backup directory is not automatically updated at the time databases are automatically backed up.

2 General program functions

2.1 Program parts

2.1.1 Program parts

General program functions

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

Workplace program part



- Opening/Closing Workplaces
- Start single determinations and determination series
- Sample tables

Database program part



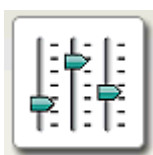
- Opening/Closing databases
- Management of databases
- Reprocess
- Creating report templates

Method program part



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

Configuration program part



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



Manual program part

- Manual control of devices



Note

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

2.1.2 Workplace - Desktop

Program part: **Workplace**

Workplace symbol



Clicking on the workplace symbol in the vertical bar on the left opens the program part **Workplace** while, at the same time, the workplace symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of workplaces currently opened (*see Chapter 3.2.3.1, page 93*).

Elements

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

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

2.1.3 Database - Desktop

Program part: **Database**

Database symbol



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

shown in color. The upper left corner of the symbol contains a black field displaying the number of databases currently opened (*see Chapter 4.2.2, page 190*).

Elements

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

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

2.1.4 Method - Desktop

Program part: **Method**

Method Symbol



Clicking on the method symbol in the vertical bar on the left opens the program part **Method** while, at the same time the method symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of methods currently opened (*see Chapter 5.2.3, page 378*).

Elements

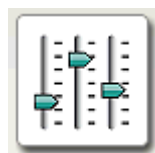
The desktop of the program part **Method** comprises the following elements:

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

2.1.5 Configuration - Desktop

Program part: **Configuration**

Configuration symbol



By clicking on on the configuration symbol in the vertical bar at the left-hand margin the program part **Configuration** is opened, at the same time the configuration symbol is shown in color.

Elements

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

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

2.1.6 Manual control - Desktop

Program part: **Manual Control**

Manual Control symbol



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

Elements

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

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

2.2 Login/Password protection

2.2.1 General information on Login/Password protection

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

Login into tiamo

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

FDA-conforming settings

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



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

Actions

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

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

2.2.2 Login

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

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

User

Entering a short name for the user.

Input	24 characters

Password

Password entry.

Input	24 characters



Note

Users who log in for the first time or users whose status has been reset from **inactive** or **removed** back to **active**, must log in with the **Start password**(see *Chapter 6.2.1.3.1, page 1159*) specified by the administrator. Afterwards, the window **Change password** will automatically be opened, in which a new password has to be entered.



Note

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

Old password

Entry of the previous password.

Input	24 characters

New password

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

Input	24 characters

Confirm password

Confirmation of the new password.

Input	24 characters

2.3 Electronic signatures

2.3.1 Rules for electronic signatures

Program parts: **Method / Database**

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

- **Signature levels**

Signature levels for methods and determinations can be signed at two levels (Signature Level 1 and Signature Level 2) by entering the user name and password.

- **Multiple signing**

Methods and determinations can be signed several times at each level.
All signatures are saved and documented in the Audit Trail.

- **Sign at Level 1**

If Level 2 has been signed then no more signatures are possible at Level 1.

- **Sign at Level 2**

Level 2 can only be signed if signatures already exist at Level 1.

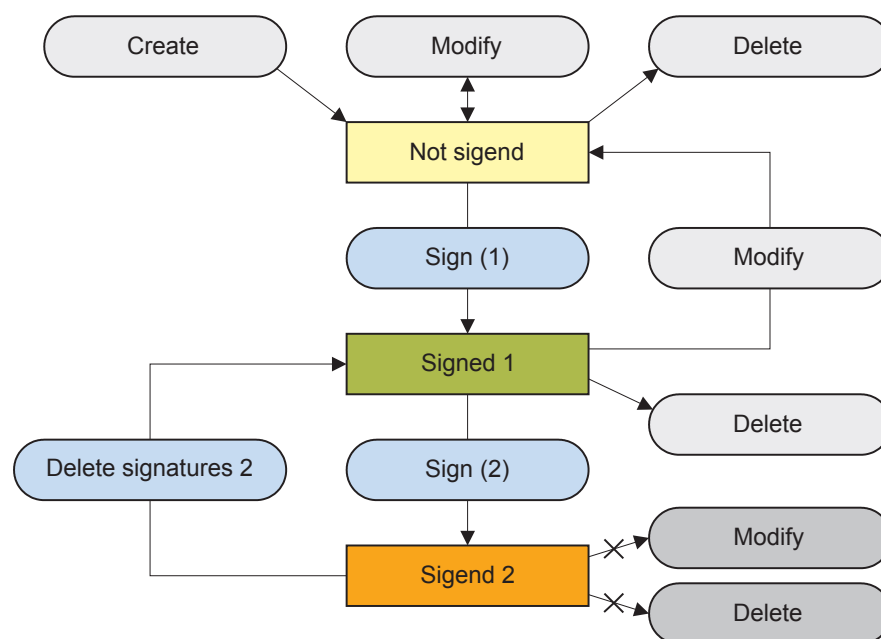
- **Different users**
The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can also be entered.
- **Saved data**
The signature date, user name, full name, reason and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

2.3.2 Procedure for electronic signatures

Program parts: **Database / Method**

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

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



2.3.3 Signature Level 1

Dialog window: Database ► Determinations ► Sign ► Signature 1... ► Signature Level 1

or

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

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



Note

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

Info

Information display for signing and deleting signatures. The following messages are possible:

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

The selected method or determination can be signed.

The selected method or determination can no longer be signed at Level 1 as it has already been signed at Level 2.

The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comments on the signature.

Input	1000 characters

[Sign]

Sign method or determination. The window remains open.



Note

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

2.3.4 Signature Level 2

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

or

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

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



Note

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

Info

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

Selection	Signature possible Signature 2 not possible (signature 1 missing) Signature not possible (accessed by other client)
1	
2	
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100	

Signature possible

The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)

The selected method or determination cannot be signed at Level 2 as it has not yet been signed at Level 1.

Signature not possible (accessed by other client)

The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comments on the signature.

Input	1000 characters



Note

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

2.4 Formula editor

Dialog window: **Formula Editor**

The Formula editor serves as a support when entering formulas for calculating results. It has an automatic **Syntax check**, which is activated when applying the formula. The general rules of priority apply for the calculation operations.

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

- **Input field**
Entry of the calculation formula (*see Chapter 2.4.1, page 26*).
- **Function buttons**
Buttons for the rapid entry of operators and parentheses (*see Chapter 2.4.1, page 26*).
- **Variables**
Selection of the variables available for the calculation formula (*see Chapter 2.4.3, page 29*).
- **Operators/Functions**
Selection of the operators and functions variables available for the calculation formula (*see Chapter 2.4.4.1, page 47*).
- **Description**
Description of the selected variables, operators or functions.

2.4.1 Input field

Dialog window: **Formula Editor**

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

Entry via keyboard

- **Numbers**
Numbers as well as mathematical functions can be entered directly via the keyboard.
- **Text**
Text must be enclosed in quotation marks " (e.g. "**my text**").
- **Variables**
Variables must be entered and ended with an apostrophe ' (e.g. '**MV.my variable**').

Time

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

Entry using the function buttons

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

	Addition		Equal to		Logic AND
	Subtraction		Greater than		Logic OR
	Multiplication		Less than		Round parentheses
	Division		Not equal to		Curly parentheses e.g. for end-point definition (example 'DETpH 1.EP{1}.VOL')
	Potentiation		Less than or equal to		Molar mass calculator
			Greater than or equal to		Undo last action
					Redo last action

Entry via selection

The element selected in the fields **Variables** or **Operators** can be added to the formula by double clicking or **[Insert]**.

2.4.2 Calculation algorithms

Dialog window: **Formula Editor**

Numerical format

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

Rounding off process

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

Examples

2.33 yields **2.3**

2.35 yields **2.4**

2.47 yields **2.5**

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



Note

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

2.4.3 Variables

2.4.3.1 Variables - Overview

Dialog window: **Formula Editor**

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

Variable types

The following types of variables are differentiated:

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

Name	Syntax	Description
<i>Common variables</i>	'CV.Variable name.Variable identification'	Common variables are global variables, which are adopted from the table of the program part Configuration at the start of the determination and assigned to the determination.

Enter variables

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



Note

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

2.4.3.2 Method variables

Dialog window: **Formula Editor** ► **Variables**

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

Syntax

'MV.Variable name.Variable identification'

Examples: 'MV.TestDate', 'MV.RemainingTime.VAL', 'MV.Test-Value.OVF'

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

Method variables

Variable name	Description	Data type
.VAL	Value of the method variable (optional, i.e. ' MV.Factor ' = MV.Factor.VAL ') (Text , Number or Date/Time)	Text, number or date/time

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

2.4.3.3 Command variables

Dialog window: **Formula Editor ► Variables**

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

Syntax

'Command name.Variable identification'

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

You can select the command variables directly in the formula editor under **Variables ► Command Variables** in order to avoid syntax errors.

Command variables

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



Note

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

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

Identification	Description	Commands
.BLV	Blank value for the sensor used for the command (only for ISE sensor) and/or blank value calculated from the calibration (for CAL LOOP Conc)	DET U, MET U, SET U, STAT U, MEAS U, MEAS Conc, CAL LOOP Conc, DOS U
.BP{x}.CNT	Intensity for the break-point x (1...9) in counts	MEAS Opt
.BP{x}.DME	Measured value differential for the break-point x (1...9)	MET
.BP{x}.ERC	ERC or first derivative for the break-point x (1...9)	DET
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TIM	Time for the break-point x (1...9) in s	DET, MET, MEAS (without T/Flow, Ref, Spec)
.BP{x}.TRN	Transmission for the break-point x (1...9) in %	MEAS Opt
.BP{x}.VOL	Volume for the break-point x (1...9) in mL	DET, MET
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started	All except START and END

Identification	Description	Commands
.CBY	Command status; 1 = Conditioning active, 0 = Conditioning not active	SET, KFT, KFC
.CLC	Cell constant of the sensor used in the command (with conductivity sensors)	MEAS Cond, CAL Cond
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled	SET, KFT, KFC
Conc.	Concentration of the solution used for the command	DET, MET, SET, KFT, STAT, ADD, DOS, LQH, STDADD
.CP{#}.MEA	Measured wavelength for the calibration point in nm. If no measured peak can be assigned, then not found will be entered.	CAL Spec
.CP{#}.REF	Reference wavelength of the calibration point in nm.	CAL Spec
.CYL	Cylinder volume of the exchange or dosing unit used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH, PREP, EMPTY
.DBL	Total duration for the processing of the command in s	DET, MET, SET, KFT, KFC, STAT, MEAS, CAL MEAS, STDADD, DOS
.DEF	Default value which is defined in the configuration for an IO port	ANALOG OUT, DIGITAL OUT
.DRI	Current and/or last drift for drift correction in µL/min	SET, KFT, KFC
.DSC	Time for processing all start conditions s	DET, MET, SET, KFT, STAT

Identification	Description	Commands
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s	SET, KFT, KFC
.EGF	Last measured gas flow rate (measured value following processing of the command) in mL/min	MEAS T/Flow
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value	DET, MET, SET, KFT, KFC, STAT, MEAS (without REF, Spec), CAL MEAS, STDADD, DOS
.ENP	Electrode zero point for the sensor used for the command (dimensionless for pH sensor or in mV for the ISE sensor) and/or electrode zero point calculated from the calibration (for STDADD and CAL LOOP)	DET pH, DET U, MET pH, MET U, SET pH, SET U, STAT, MEAS pH, MEAS U, MEAS T, MEAS Conc, STDADD, CAL LOOP, DOS
.EP{x}.CHA	Load for endpoint x (1...9) in mA·s	KFC
.EP{x}.DME	Measured value differential for the endpoint x (1...9)	MET
.EP.DVT	Drift for the endpoint x (1...9) in µg/min	KFC
.EP{x}.ERC	ERC for the endpoint x (1...9)	DET
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value	DET, MET, SET, KFT, KFC
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift	DET, MET, SET, KFT
.EP.QTY	Measured value (water) for the endpoint in µg	KFC
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C	DET, MET. SET, KFT

Identification	Description	Commands
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached	DET, MET, SET, KFT, KFC
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL	DET, MET, SET, KFT
.ETE	End temperature (temperature following processing of the command) in °C	DET, MET, SET, KFT, KFC, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.EVT	End volume (total dosed volume at the end of the command) in mL	DET, MET, SET, KFT, STAT, DOS
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended	All except START and END
.FP{x}.CNT	Intensity for the fixed endpoint x (1...9) in counts	MEAS Opt
.FP{x}.DME	Measured value differential for the fixed endpoint x (1...9)	MET
.FP{x}.DVT	Drift for the fixed endpoint x (1...9) in µg/min	KFC
.FP{x}.ERC	ERC for the fixed endpoint x (1...9)	DET
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV	DET, MET, SET, KFT, STAT
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value	KFC, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.QTY	Measured value (water) for the fixed endpoint x (1...9) in µg	KFC
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C	DET, MET, SET, KFT, STAT, MEAS (without T/Flow, Conc, Ref, Spec)

Identification	Description	Commands
.ITE	Initial temperature (temperature before start conditions are processed) in °C	DET, MET, SET, KFT, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.LCO	Loop counter = current quantity of completed runs, both of <i>Repeat loops</i> and of <i>While loops</i>	LOOP, CAL LOOP
.LP.CAx	Calculated value x (1...3) for the last measuring point of measuring point list	DET, MET, SET, KFT, KFC, STAT, MEAS (without Ref, Spec, Opt), DOS
.LP.CHA	Load for the last measuring point of measuring point list in mA s	KFC
.LP.CNT	Intensity of the last measuring point of measuring point list in counts	MEAS Opt
.LP.DME	Measured value differential for the last measuring point of measuring point list	MET
.LP.DVT	dV/dt for the last measuring point of measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point of measuring point list in µg/min (KFC)	SET, KFT, KFC, STAT, DOS
.LP.ERC	ERC for the last measuring point of measuring point list	DET
.LP.EXx	External value x (1...3) for the last measuring point of measuring point list	DET, MET, SET, KFT, KFC, STAT, MEAS (without Ref, Spec, Opt), DOS
.LP.GFL	Gas flow value for the last measuring point of measuring point list in mL/min	MEAS T/Flow

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

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

Identification	Description	Commands
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range	STAT, DOS
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min	STAT, DOS
.MR.MRT	Mean dosing rate for the whole range in mL/min.	STAT, DOS
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)	DET, MET, SET, KFT, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.NMP	Number of measuring points in the list of measuring points	DET, MET, SET, KFT, KFC, STAT, MEAS (without Ref, Spec), CAL MEAS, DOS
.PK{x}.ABS	Absorbance of the peak x (1...9) in mAU	MEAS Spec
.PK{x}.TRN	Transmission of the peak x (1...9) in %	MEAS Spec
.PK{x}.CNT	Intensity of the peak x (1...9) in counts	MEAS Spec
.PK{x}.CNR	Intensity of the peak x (1...9) in the reference spectrum in counts	MEAS Spec
.PK{x}.CND	Intensity of the peak x (1...9) in the dark spectrum in counts	MEAS Spec
.PK{x}.WVL	Wavelength of the peak x (1...9) in nm	MEAS Spec
.PK{x}.SAT	Detector with peak x (1...9) saturated: 1 = saturated; 0 = not saturated	MEAS Spec

Identification	Description	Commands
.RAN	Current, absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when ending the command)	MOVE
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window x (1...9)	STAT
.RE{x}.DRS	Standard deviation for mean dosing rate in window x (1...9) in mL/min	STAT
.RE{x}.DRT	Mean dosing rate in window x (1...9) in mL/min	STAT
.RE{x}.RWL	Lower limit of the evaluation window x (1...9) in s	STAT
.RE{x}.RWH	Upper limit of the evaluation window x (1...9) in s	STAT
.RES	Calculated result of the standard addition in the selected unit	STDADD
.RPO	Current rack position (entry at time of ending the command); 0 means 'not defined'	MOVE
.RTE	Reference temperature in °C	MEAS Cond
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)	MOVE, SWING
.SLO	Electrode slope of the sensor used for the command (in % for pH sensor or mV for ISE sensor) or electrode slope calculated from the calibration (for STDADD and CAL LOOP)	DET pH, DET U, MET pH, MET U, SET pH, SET U, STAT, MEAS pH, MEAS U, MEAS T, MEAS Conc, STDADD, CAL LOOP, DOS
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value	DET, MET, SET, KFT, KFC, STAT

Identification	Description	Commands
.TC.C4	Coefficient of the Chebyshev polynomial of conductivity of the fourth order	MEAS Cond, MEAS TC Cond
.TC.MIN	Minimum temperature coefficient of the conductivity in %/°C	MEAS Cond, MEAS TC Cond
.TC.MAX	Maximum temperature coefficient of the conductivity in %/°C	MEAS Cond, MEAS TC Cond
.TC.TSTART	Start temperature in °C	MEAS TC Cond
.TC.TSTOP	Stop temperature in °C	MEAS TC Cond
.TITER	Titer value of the solution used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH
.TOU	Timeout status: 1 = Max. waiting time expired; 0 = Max. waiting time not expired	RECEIVE, TRANSFER, SCAN
.UNI	Mapping unit which is defined in the configuration for an IO port (Text)	ANALOG IN, ANALOG OUT
.VAL	Value of the command variables (optional, i.e. ' Command-name.Portname ' = ' Command-name.Portname.VAL ') (Number). The value returned is the value after the ending of the command.	ANALOG IN, ANALOG OUT, DIGITAL IN, DIGITAL OUT
.VAR	Variance of the calculated result of the standard addition in the selected unit	STDADD
.VOL	Dosed volume	STDADD, ADD, DOS, LQH
.WL.CAL	Status of the calibration: 1 = calibrated normally, 0 = canceled , because reference wavelength was not found.	CAL Spec

Identification	Description	Commands
.WL.C0	Coefficient c0 of the calibration curve	CAL Spec
.WL.C1	Coefficient c1 of the calibration curve	CAL Spec
.WL.C2	Coefficient c2 of the calibration curve	CAL Spec
.WL.C3	Coefficient c3 of the calibration curve	CAL Spec
.WL.TOL	Tolerance within which a measured peak of a reference wavelength can be assigned.	CAL Spec

2.4.3.4 Result variables

Dialog window: **Formula Editor** ► **Variables**

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

Syntax

'RS.Result name.Variable identification'

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

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

Result variables

Identification	Description	Data type
.VAL	Result value, optional, i.e. ' RS.RS01 ' = ' RS.RS01.VAL '	Number
.ASD	Absolute standard deviation for the result	Number
max.	Maximum value of the result	Number
min.	Minimum value of the result	Number
.MNV	Mean value of the result	Number
.NSR	Statistics actual counter for the result	Number
.NST	Statistics setpoint counter for the result	Number

Identification	Description	Data type
.OVF	Limit value violation for result; 1 = limit exceeded, 0 = limit not exceeded	Number
.RSD	Relative standard deviation for the result	Number
.STS	Statistics status for the result; 1 = Statistics on, 0 = Statistics off	Number
.UNI	Result unit	Text

2.4.3.5 Determination variables

Dialog window: **Formula Editor** ► **Variables**

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

Syntax

'DV.Variable name'

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

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

Available Determination variables

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

2.4.3.6 System Variables

Dialog window: **Formula Editor** ► **Variables**

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

Syntax

'SV.Variable name'

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

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

Available System variables

Variable name	Description	Data type
ACC	Autostart actual counter	Number
ACE	Autostart setpoint counter	Number
FUN	Full name of the logged-in user	Text
REM	Remarks	Text
RUN	Sample number	Number
SEN	Indication whether the end of the sample table has been reached; 1 = yes, 0 = no	Number
SIN	Indication whether the determination has been started as a single determination or within a series; 1 = single determination, 0 = series determination	Number
SLI	Sample table actual line (number)	Number
STA	Indication whether the statistics is activated; 1 = yes, 0 = no	Number
STC	Start counter	Number
USN	Short name of the logged-in user	Text
ORG	Method sequence: 1 = original determination, 0 = post-processing	Number
STO	Indication whether the determination has been stopped (manual stop, stop via SEND command, emergency stop) or terminated normally ; 1 = stopped, 0 = terminated normally	Number

2.4.3.7 Common variables

Dialog window: **Formula Editor** ► **Variables**

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

Syntax

'CV.Variable name.Variable name'

Examples: 'CV.TestDate', 'CV.TestTime.VAL', 'CV.Average-Temp.UNI'

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

Available Common Variables

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

2.4.4 Operators/Functions

2.4.4.1 Operators/Functions - Overview

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

Overview of the operators and functions

Operators	Functions
Arithmetic: - Addition (+) - Subtraction (-) - Multiplication (*) - Division (/) - Potentiation (^)	Arithmetic: - Exponential function (Exp) - Natural logarithm (Ln) - Common logarithm (Log) - Square root (Sqrt) - Absolute value (Abs) - Fraction (Frac) - Integer (Int) - Round integer (Round) - Sign (sign)
Logic: - AND - OR	Date/Time: - Time() - Time(Date) - Time(Date+Time)
Comparison: - Equal to (=) - Greater than (>) - Greater than or equal to (>=) - Less than (<) - Less than or equal to (<=) - Not equal to (<>)	Type conversion: - NumberToText - NumberToTime - TextToNumber - TextToTime - TimeToNumber - TimeToText
	Text: - TextPosition - SubText - Trim
	Miscellaneous: - Error - Case

Priority rules of the operators

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

	Operators
Arithmetic	$\wedge$
	$*, /$
	$+, -$
Comparison	$<, <=, >, >=$
Logic	AND, OR

2.4.4.2 Arithmetical operators

2.4.4.2.1 Addition

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

Syntax

Operand1 + Operand2

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

Examples

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

Operand1	Operand2	Result	Example	Remark
Time	Number	Number	Time(1999;10;7) + 2.0 = 36441.92 (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	"Metrohm" + Time(1999;10;7) = "Metrohm1999-10-07 00:00:00 UTC+2"	Before the operation, the operand of the type Date/Time is converted to Text .
Time	Text	Text	Time(1999;01;7) + "Metrohm" = "1999-01-07 00:00:00 UTC +1Metrohm"	The same rules apply here as for the previous operation.

2.4.4.2.2 Subtraction

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

Syntax

Operand1 - Operand2

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

Examples

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

Examples

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

2.4.4.2.5 PotentiationDialog window: **Formula editor** ► **Operators/Functions****Syntax****Operand1 ^ Operand2**

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

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	$1.2 ^ 3 = 1.728$	Complex results (which comprise $+bi$, i.e. a real and an imaginary component) are displayed as an error.
Text	Text	Text	$\text{"Metrohm"} ^ \text{"AG"} = \text{invalid}$	This operation is not allowed.

Oper- and1	Oper- and2	Result	Example	Remark
Time	Time	Number	Time(1999;10;07) AND Time(1999;10;07) --> 1	Time() : see <i>Time(Date)</i>
Operands of a different type:				
Number	Text	Number	1.2 AND "1.2" --> 1 0 AND "1" --> 1 0 AND "0" --> 1 0 AND "" --> 0	Before the operation, the operand of the type Number is converted to the type Text , as a conversion from Text to Number is not advisable. During the second operation, the 0 is therefore converted to "0" , which corresponds to the logical value 1 (true), as every character string that is not empty is interpreted as 1.
Text	Number	Number	"Metrohm" AND 1.2 --> 1	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 AND Time(1999;10;7) --> 1 0 AND Time(1999;10;07) --> 0	Before the operation, the operand of the type Date/Time is converted to Number and all data from December 30, 1899 are interpreted as 1 (true).
Time	Number	Number	Time(1999;10;7) AND 2.5 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" AND Time(1999;10;7) --> 1 "" AND Time(1999;10;07) --> 0	Before execution of the operation, the operand of the type Date/Time is converted to the type Text and every character string that is not empty is interpreted as 1 (true).
Time	Text	Number	Time(1999;10;7) AND "Metrohm" --> 1	The same rules apply here as for the previous operation.

2.4.4.3.2 OR

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

Syntax

Operand1 OR Operand2

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

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

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 OR 4 --> 1 4 OR 0 --> 1	Numbers greater than 1 are automatically interpreted as 1 (true)
Text	Text	Number	"Metrohm" OR "AG" --> 1 "" OR "Metrohm" --> 1 "" OR "" --> 0	An empty character string ("") is interpreted as 0 (false), everything else as 1 (true). The first operation therefore corresponds to 1 OR 1 --> 1
Time	Time	Number	Time(1999;10;07) OR Time(1964;02;03) --> 1	Time(): see Time(Date)
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Number	1.2 OR "1.2" --> 1 0 OR "" --> 1	Before the operation, the operand of the type Number is converted to the type Text , as a conversion from Text to Number is not advisable. During the second operation, the 0 is therefore converted to "0", which corresponds to the logical value 1 (true), as every character string that is not empty is interpreted as 1.
Text	Number	Number	"Metrohm" OR 1.2 --> 1	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 OR Time(1999;10;7) --> 1 0 OR Time(1964;02;03) --> 1	Before the operation, the operand of the type Date/Time is converted to Number and all data from December 30, 1899 are interpreted as 1 (true).
Time	Number	Number	Time(1999;10;7) OR 2.5 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" OR Time(1999;10;7) --> 1	Before execution of the operation, the operand of the type Date/Time is converted to the type Text and every character string that is not empty is interpreted as 1 (true).
Time	Text	Number	Time(1999;10;7) OR "Metrohm" --> 1	The same rules apply here as for the previous operation.

2.4.4.4 Relational operators

2.4.4.4.1 Equal to

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

Syntax

Operand1 = Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 = 5 --> 1 4 = 5 --> 0	-
Text	Text	Number	"Metrohm" = "AG" --> 0 "aG" = "AG" --> 0	When making a comparison between two texts the ASCII value of the character sequence is compared (see Chapter 2.4.4.10, page 78). Attention: Uppercase and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) = Time(1964;02;03) --> 0	(see Chapter 2.4.4.6.2, page 66)
Operands of a different type:				
Number	Text	Number	1.2 = "1.2" --> 11.2 = "Metrohm" --> 0	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Text	Number	Number	"Metrohm" = 1.2 --> 0	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 = Time(1999;10;07) --> 0	Before the operation, the operand of the type Date/Time is converted to Number . During execution of the operation, the exact value is always used after this conversion, even if maximum 5 places after the comma can be displayed (see Chapter 2.4.4.7.5, page 71).
Time	Number	Number	Time(1999;10;7) = 2.0 --> 0	The same rules apply here as for the previous operation.

Oper-and1	Oper-and2	Result	Example	Remark
Text	Time	Number	"Metrohm" = Time(1999;10;07) --> 0	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC+2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;07) = "Metrohm" --> 0	The same rules apply here as for the previous operation.

2.4.4.4.2 Greater than

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

Syntax

Operand1 > Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 > 4 --> 1 4 > 5 --> 0	-
Text	Text	Number	"Metrohm" > "AG" --> 1 "Aarau" > "Zug" --> 0	When making a comparison between two texts the ASCII value of the character sequence is compared (<i>see Chapter 2.4.4.10, page 78</i>). Attention: Upper-case and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) > Time(1964;02;03) --> 1	(<i>see Chapter 2.4.4.6.2, page 66</i>)
Operands of a different type:				
Number	Text	Number	1.2 > "Metrohm" --> 0 1.23 > "1.2" --> 1	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (<i>see Chapter 2.4.4.10, page 78</i>).
Text	Number	Number	"Metrohm" > 1.2 --> 1	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 > Time(1999;10;07) --> 0	Before the comparison, the operand is converted from the type Date/Time to a Number .

Oper- and1	Oper- and2	Result	Example	Remark
Time	Number	Number	Time(1999;10;07) > 2.0 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" > Time(1999;10;07) --> 1	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC +2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;7) > "Metrohm" --> 0	The same rules apply here as for the previous operation.

2.4.4.4.3 Greater than or equal to

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

Syntax

Operand1 >= Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 >= 4 --> 1 4 >= 5 --> 0	-
Text	Text	Number	"Metrohm" >= "AG" --> 1	When making a comparison between two texts the ASCII value of the character sequence is compared (see Chapter 2.4.4.10, page 78). Attention: Uppercase and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) >= Time(1964;02;03) --> 1	(see Chapter 2.4.4.6.2, page 66)
Operands of a different type:				
Number	Text	Number	1.2 >= "1.2" --> 1 11.2 >= "Metrohm" --> 0	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Text	Number	Number	"Metrohm" >= 1.2 --> 1	The same rules apply here as for the previous operation.

Oper-and1	Oper-and2	Result	Example	Remark
Number	Time	Number	2.0 >= Time(1999;10;07) --> 0	Before the comparison, the operand is converted from the type Date/Time to a Number .
Time	Number	Number	Time(1999;10;07) >= 2.0 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" >= Time(1999;10;07) --> 1	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC +2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;7) >= "Metrohm" --> 0	The same rules apply here as for the previous operation.

2.4.4.4.4 Less than

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

Syntax

Operand1 < Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 < 4 --> 0 4 < 5 --> 1	-
Text	Text	Number	"Metrohm" < "AG" --> 0	When making a comparison between two texts the ASCII value of the character sequence is compared (<i>see Chapter 2.4.4.10, page 78</i>). Attention: Upper-case and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) < Time(1964;02;03) --> 0	(<i>see Chapter 2.4.4.6.2, page 66</i>)
Operands of a different type:				
Number	Text	Number	1.2 < "Metrohm" --> 11.2 < "1" --> 0	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (<i>see Chapter 2.4.4.10, page 78</i>).

Oper- and1	Oper- and2	Result	Example	Remark
Text	Number	Number	"Metrohm" < 1.2 --> 0	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 < Time(1999;10;07) --> 1	Before the comparison, the operand is converted from the type Date/Time to a Number .
Time	Number	Number	Time(1999;10;07) < 2.0 --> 0	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" < Time(1999;10;07) --> 0	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC +2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;7) < "Metrohm" --> 1	The same rules apply here as for the previous operation.

2.4.4.4.5 Less than or equal to

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

Syntax

Operand1 <= Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 <= 4 --> 0 4 <= 5 --> 1	-
Text	Text	Number	"Metrohm" <= "AG" --> 0	When making a comparison between two texts the ASCII value of the character sequence is compared (see Chapter 2.4.4.10, page 78). Attention: Uppercase and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) <= Time(1964;02;03) --> 0	(see Chapter 2.4.4.6.2, page 66)
Operands of a different type:				

Oper- and1	Oper- and2	Result	Example	Remark
Number	Text	Number	2 <= "1.2" --> 0 1.2 <= "Metrohm" --> 1	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Text	Number	Number	"Metrohm" <= 1.2 --> 0	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 <= Time(1999;10;07) --> 1	Before the comparison, the operand is converted from the type Date/Time to a Number .
Time	Number	Number	Time(1999;10;07) <= 2.0 --> 0	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" <= Time(1999;10;07) --> 0	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999.10.07"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;7) <= "Metrohm" --> 1	The same rules apply here as for the previous operation.

2.4.4.4.6 Not equal to

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

Syntax

Operand1 <> Operand2

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

Examples

Oper- and1	Oper- and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 <> 4 --> 1 5 <> 5 --> 0	-
Text	Text	Number	"Metrohm" <> "AG" --> 1	When making a comparison between two texts the ASCII value of the character sequence is compared (<i>see Chapter 2.4.4.10, page 78</i>). Attention: Uppercase and lowercase letters have different values!
Time	Time	Number	Time(1998;04;06) <> Time(1964;02;03) --> 1	(<i>see Chapter 2.4.4.6.2, page 66</i>)

Oper- and1	Oper- and2	Result	Example	Remark
Operands of a different type:				
Number	Text	Number	1.2 <> "1.2" --> 01.2 <> "Metrohm" --> 1	Before the relational operation, the Number is converted to Text , afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Text	Number	Number	"Metrohm" <> 1.2 --> 1	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 <> Time(1999;10;07) --> 1	Before the comparison, the operand is converted from the type Date/Time to a Number .
Time	Number	Number	Time(1999;10;07) <> 2.5 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" <> Time(1999;10;07) --> 1	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC +2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 78).
Time	Text	Number	Time(1999;10;7) <> "Metrohm" --> 1	The same rules apply here as for the previous operation.

2.4.4.5 Arithmetical functions

2.4.4.5.1 Exponential function

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

Syntax

y = Exp(numberl)

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

Parameters

Zahl Exponent

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

Examples

Exp(1.5) = 4.48169

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



2.4.4.5.2 Natural logarithm

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

Syntax

$$y = \text{Ln}(\text{number})$$

Gives the logarithm of the entered number for base e. Alternative notation for $y = \log_e(\text{number})$, whereby e is the Euler number ($e = 2.71828\dots$).

Parameters

Zahl > 0

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

Examples

$$\ln(3) = 1.09861$$

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

2.4.4.5.3 Common logarithm

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

Syntax

$$y = \text{Log}(\text{number!})$$

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

Parameters

Number > 0

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

Examples

$$\text{Log}(10) = 1$$

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

Square root

Syntax

Parameters

Absolute value

Syntax

2.4.4.5.6 Fraction

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

Syntax

y = Frac(number1)

Gives the fraction of the entered number.



Note

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

Parameters

Number

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

Examples

Frac(-55,325) =325

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

2.4.4.5.7 Integer

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

Syntax

y = Int(number)

Gives the integer of the entered number.

Parameters

Number

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

Examples

$$\text{Int}(-55,325) = -55$$

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

2.4.4.5.8 Round integer

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

Syntax

y = Round(number)

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



Note

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

Parameters

Number

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

Examples

Round(-55.5259) = -56

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

2.4.4.5.9 Sign

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

Syntax

y = Sign(number)

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

Parameters

Number

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

Examples

Sign(-55.3) = -1

Sign(26,115) = 1

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

2.4.4.6 Date/Time fuctions

2.4.4.6.1 Time()

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

Syntax

y = Time()

Gives the current date and the current time.

Parameters

none

Return value

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



Note

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

2.4.4.6.2 Time(Date)

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

Syntax

y = Time(year; month; day)

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

Parameters

year **00...99** or **1000...9999**

month 1...12

day **1...31**

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



Note

Only the integral part is used for all parameters.

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

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

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

Return value

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



Note

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

Examples

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

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

2.4.4.6.3 Time(Date + Time)

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

Syntax

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

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

Parameters

year **00...99** or **1000...9999**

month 1...12

day **1...31**

hour 0...23

minute 0...59

second 0...59

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



Note

Only the integral part is used for all parameters.

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

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

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

Return value

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



Note

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

Examples

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

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

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



Note

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

Examples

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

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

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

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

2.4.4.7.5 TimeToNumber

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

Syntax

y = TimeToNumber(Time)

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



Note

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

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

Parameters

Time

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

Examples

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

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

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

2.4.4.7.6 TimeToText

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

Syntax

y = TimeToText(Time)

Gives the time entered time as **Text**.

y = TimeToText(Time;Format)

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

Parameters

Time

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

Format

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

[illegible]



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

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

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

TextPosition(3362.14;"6") = 3

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

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

y = SubText(Text ; Position ; Length)

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

Text

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

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

Length

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

Examples

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

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

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

2.4.4.8.3 Trim

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

Syntax

y = Trim(Text)

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

y = Trim(Text ; sample text)

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

Parameters

Text

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

Sample text

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



Note

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

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

Examples

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

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

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

2.4.4.9.1 Case

Syntax

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

Parameters

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

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

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

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

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



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

2.4.4.9.2 Error

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

Syntax

y = Error(value)

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

Parameters

Value

The variable to be tested.

Examples

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

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

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

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

2.4.4.10 ASCII table

Dialog window: **Formula editor**

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

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

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

ASCII value (dec)	Characters	ASCII value (dec)	Characters	ASCII value (dec)	Characters
63	Question mark (?)	95	Underscore (<u>)</u>		

2.4.5 Molar mass calculator

Dialog window: **Molar mass calculator**

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

Mode of operation

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

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

Examples

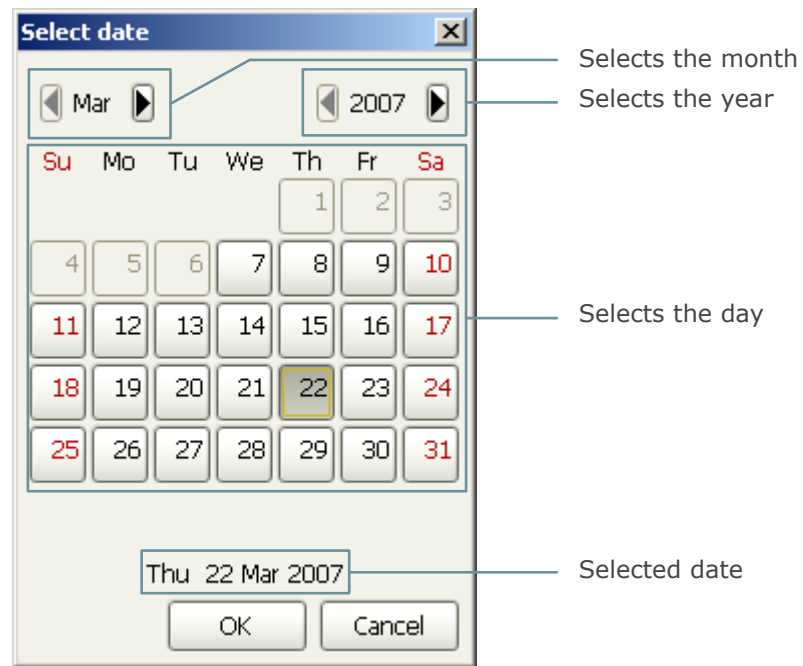
Molecular formula	Molar mass
H ₂ SO ₄	98.0734
Ca(OH) ₂	74.09268
AlCl ₃ *6H ₂ O	238.43174

2.5 Editing

2.5.1 Select date

Dialog window: **Select date**

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



2.5.2 Text editor

Dialog window: **Text editor**

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

The toolbar of the text editor includes the following functions:



Cut selected text and copy it to the clipboard.



Copy selected text to the clipboard.



Paste text from the clipboard.



Open editor for entering a hyperlink (*see Chapter 2.5.3, page 82*).



Open formula editor for entering calculation formulas (*see Chapter 2.4, page 26*).



Note

In order for results of formulas of the type **Date** to be output correctly, they must be converted for text windows with the function **TimeTo-Text**(see Chapter 2.4.4.7.6, page 72) to **Text**.



Font size in pt.



Select font color.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.

2.5.3 Hyperlink

Dialog window: **Hyperlink**

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

Displayed text

Designation of the hyperlink that is displayed.

Link target

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



The button opens a selection dialog in order to link a file as a link target.

2.6 E-mail

2.6.1 Send E-mail

Dialog window: **[E-mail] ► Send E-mail**

E-mail template

Selection of the template for E-mail sending.

Subject

Subject to describe the message.

Message

Text of the message, which is output at the address defined under **[E-mail]**. Clicking on the symbol  opens the dialog window of the text editor (*see Chapter 2.5.2, page 81*).

3 Workplace

3.1 Workplace - General

3.1.1 Workplace - Definition

Program part: **Workplace**

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

3.1.2 Workplace - Desktop

Program part: **Workplace**

Workplace symbol



Clicking on the workplace symbol in the vertical bar on the left opens the program part **Workplace** while, at the same time, the workplace symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of workplaces currently opened (*see Chapter 3.2.3.1, page 93*).

Elements

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

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

3.1.3 Workplace - Menu bar

3.1.3.1 Workplace - Main menu

Program part: **Workplace**

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

- *File*
Create, edit, close workplaces; save methods; open manual control. Create, edit, close workplaces; save methods.

- *View*
Change layout, load views, save views, edit properties of subwindows. Change layout, load views, save views, edit properties of subwindows.
- *Tools*
Manual control, run test, sample tables, sample assignment tables, text templates. Run test, sample tables, sample assignment tables, text templates.
- *Help*
Open Help, show program info.

3.1.3.2 Workplace - Menu File

Program part: **Workplace**

Workplace ►	
New...	Open new workplace (see Chapter 3.2.1, page 92).
Properties...	Edit properties of the selected workplace (see Chapter 3.2.2, page 93).
Close	Close the selected workplace (see Chapter 3.2.4, page 94).
Method ►	
Save	Save the method with the modified live parameters (see Chapter 3.7.3, page 166).
Save as...	Save the method with the modified live parameters under a new name (see Chapter 3.7.3, page 166).
 Logout...	Logout user (see Chapter 2.2.3, page 19).
Exit	End program.

3.1.3.3 Workplace - Menu View

Program part: **Workplace**

 Change layout	Change layout of the loaded workplace view (see Chapter 3.1.7.2, page 90).
 Load view	Load a saved workplace view (see Chapter 3.1.7.3, page 91).
 Save view	Save the current workplace view (see Chapter 3.1.7.4, page 91).
 Split vertically	Split workplace window vertically and display two workplaces side by side (see Chapter 3.2.3.3, page 94).
 Split horizontally	Split workplace window horizontally and display two workplaces below each other (see Chapter 3.2.3.4, page 94).

3.1.4 Workplace - Toolbar

Program part: **Workplace**

 Sample table/New...	Open a new and empty sample table (<i>see Chapter 3.3.1.1, page 94</i>).
 Sample table/Open...	Open a saved sample table (<i>see Chapter 3.3.1.2, page 95</i>).
 Sample table/Manager...	Open the sample table manager (<i>see Chapter 3.3.3.1, page 112</i>).
 Change layout	Change layout of the loaded workplace view (<i>see Chapter 3.1.7.2, page 90</i>).
 Load view	Load a saved workplace view (<i>see Chapter 3.1.7.3, page 91</i>).
 Save view	Save the current workplace view (<i>see Chapter 3.1.7.4, page 91</i>).
 Run test	Carry out run test for determination(s) (<i>see Chapter 3.6.2, page 118</i>).
 Split vertically	Split workplace window vertically and display two workplaces side by side (<i>see Chapter 3.2.3.3, page 94</i>).
 Split horizontally	Split workplace window horizontally and display two workplaces below each other (<i>see Chapter 3.2.3.4, page 94</i>).
 Unsplit	Unsplit the workplace window (<i>see Chapter 3.2.3.2, page 94</i>).
 Logout	Logout user (<i>see Chapter 2.2.3, page 19</i>).
 MagIC Net help	Open MagIC Net Help.

3.1.5 Workplace - Subwindows

Program part: **Workplace**

Selection

The following subwindows can be displayed in the main window:

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



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

Effects

The subwindows can be enlarged or made smaller by pulling the separating bar between the windows.

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

3.1.6 Workplace - Functions

Program part: **Workplace**

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

Views

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

Workplaces

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

Sample tables

- Create sample table
- Open sample table
- Edit sample table
- Edit sample data
- Save sample table
- Print sample table
- Define sample table properties
- Sample table manager

Single determination

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

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

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



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

Automatic save

If under **Options** on the **Save** tab the respective points under **Save on closing** is switched on then the current view of the program will be saved automatically.

Automatic load

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

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

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

Export/Import

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

3.1.7.2 Change layout

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

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

Select layout

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

Selection	Selection of the possible combinations

Available subwindows

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

Selection	Subwindow selection
☐ All ☒ Selected ☐ None	☐ All ☒ Selected ☐ None



[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

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

3.1.7.5 Rename view

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

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

Rename view to

Enter a new name for the view.

Input	50 characters

3.1.7.6 Delete view

Function: **Workplace / Database / Configuration ▶ View ▶ Load / Save View... ▶ [Delete]**

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

3.2 Workplaces

3.2.1 Create new workplace

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

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

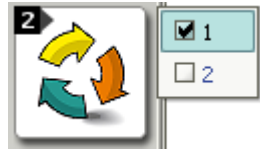
Name

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

Input	50 characters

Color

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



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

3.2.3.2 Displaying single workplaces

Menu item: **Workplace** ▶ **View** ▶ **Unsplit**

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

3.2.3.3 Displaying workplaces next to one another

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

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

3.2.3.4 Displaying workplaces one below the other

Menu item: **Menu item ▶ Workplace ▶ Split horizontally**

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

3.2.4 Close workplace

Menu item: **Workplace** ▶ **File** ▶ **Workplace** ▶ **Close**

With this menu item the selected workplace is closed.

3.3 Sample tables

3.3.1 Edit sample table

3.3.1.1 Create new sample table

Dialog window: **Workplace** ▶ **Tools** ▶ **Sample table** ▶ **New...** ▶ **Sample table 'New sample table'**

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

3.3.1.2 Open sample tables

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

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

List of sample tables

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

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table (*see Chapter 3.3.2.6, page 112*).

Open sample table

Name

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

Input	50 characters

[Open]

Open selected sample table.

3.3.1.3 Edit sample table

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

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

 Filling  Duplicate	the selected cells of a column, starting from the first selected cell. This occurs both with pure numbers as well as with text expressions where a number appears at the end (e.g. ABC10→ ABC11→ ABC12...). Automatically fill selected lines. Duplicate selected line(s). The new lines are inserted underneath the selected range.
Mark lines Unmark lines	Marks selected lines with a red background for the line number. Before the start of such a line the corresponding actions defined under Properties on the tab Process(see Chapter 3.3.2.4, page 108) will be triggered. Removes the line marking for the selected lines.
Set lines inexecutable Set lines executable	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. Sets the selected lines to "executable", i.e. they will be carried out in the run.

[Sample table] contains the following menu items:

 Save Save as...  Print (PDF)...	Save the current sample table under the same name.. Save the current sample table under a new name. Put out sample table as PDF file.
Properties... Import data...	Edit properties of the selected sample table. Import external data (*.csv).

Moving lines with Drag&Drop

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

Copying lines with Drag&Drop

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

3.3.1.4 Edit sample data

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

Method

Entry or selection of the method from the current method group with which the determination is to be made.



Input	50 characters
Selection	Method selection

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



Note

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



Note

The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method (see Chapter 5.6.2.2.5, page 417).

Sample position

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

Range	1 ... 999 (Increment: 1)
Default value	'empty'

ID1...ID16

Sample identifications ID1...ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected (*see Chapter 3.5.1, page 117*).

Input	100 characters
Selection	Selection of text templates

Sample size

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



Note

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



Note

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

Input	Number with a maximum of 10 digits
Default value	1.0

Sample size unit

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

Input	16 characters
Selection	g mg µg mL µL pcs
Default value	g

Navigation

Zeile   5    von 5

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



Jumps to the first line in the sample table.



Jumps to the previous line in the sample table.



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



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

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



Jumps to the last line in the sample table.



Jumps to a new, empty line.

Display application note

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

If this checkbox is activated, then the application note defined in the method is displayed when sample data is being edited.

Functions

[Apply]

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

[Close]

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

3.3.1.5 Duplicate sample data

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

Number

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

Range	1 ... 999
Default value	1

Import sample data

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

The file to be imported must be selected in these dialog windows.

File name

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

Selection	File name

File type

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

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

[Open]

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



Note

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

3.3.1.7 Sample table test

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

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



Note

The **Sample table test** is only used to check whether or not all sample data is correct (in contrast to the **Run test** (see *Chapter 3.6.2, page 118*), which also checks the required hardware).



Line

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

Status displays

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

Selection	Sample table test running... Sample table test stopped manually Sample table test finished without errors Sample table test finished with errors

- Sample table test running...**
This display appears during the test run. A progress bar also appears; the test can be interrupted thereby by means of the [x] next to the bar.
- Sample table test stopped manually**
This display appears if the sample table test was canceled manually by the user.
- Sample table test finished without errors**
This display appears at the end of a sample table test that has been completed without errors.
- Sample table test finished with errors**
This display appears if an error has occurred during the sample table test. The errors that occurred are listed in the **Test report** field.

Test report

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

3.3.1.8 Save sample table

- Dialog window: **Workplace ▶ Sample table / Determination series ▶ [Sample table] ▶ Save as... ▶ Save sample table**
- A name for the working sample table to be saved can be entered or selected in this dialog window.
- List of sample tables**
The list of sample tables contains information about all the saved sample tables.

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

3.3.2 Sample table - Properties

3.3.2.1 Properties - Overview

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

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

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

3.3.2.2 Properties - Display

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

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

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

Operating elements



Note

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

[Pause]/[Cont]

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

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

[Hold]/[Cont]

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

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

 Note

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

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

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

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

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

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

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

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

Enable/disable the display of the statistics fields.

 Note

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

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

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

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

Input	50 characters
Default value	Sample position



ID1 ... ID3

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

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

Input	50 characters
Default value	ID1...3

ID4 ... ID16

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

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

Input	50 characters
Default value	ID4...16

Sample size

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

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

Input	50 characters
Default value	Sample size

Sample size unit

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

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

Input	50 characters
Default value	Unit

3.3.2.3 Properties - Edit

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

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

Options for the editing of the sample table.

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

Request assignment ID

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

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

Actions for marked sample table lines

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

Pause series ([Pause]) and show message

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

Stop series ([Stop])

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



Start the Text editor with which the message can be entered and edited. The Formula editor can also be called up inside the text field (*see Chapter 2.5.2, page 81*).

3.3.2.5 Properties - Data import

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

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

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



Note

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

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

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

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

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

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

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

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

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



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

Import file

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

Input	File name

Import format

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

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

***.CSV**

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

***.csv (Unicode)**

Format for the import of CSV files with Unicode character sets.

3.3.2.6 Properties - Comment

Dialog window: Workplace ► Tools ► Sample
table ► New... ► Sample table ► Properties... ► Properties - Sample
table 'Name'

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

Entering a comment on the sample table.

Comment on sample table

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

Input	1000 characters

3.3.3 Sample table manager

3.3.3.1 Sample table manager

Dialog window: **Workplace** ▶ **Tools** ▶ **Sample table** ▶ **Manager...** ▶ **Sample table manager**

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

List of sample tables

The list of sample tables contains information about all the saved sample tables. The table cannot be edited. With a click on the column title the table

Name

Saved

Saved by

Lines

Comment

Window menus

Rename...	Rename the selected sample table (<i>see Chapter 3.3.3.2, page 113</i>).
Copy	Copy the selected sample table(s) (<i>see Chapter 3.3.3.3, page 114</i>).
Delete...	Delete the selected sample table(s) (<i>see Chapter 3.3.3.4, page 114</i>).
Export...	Export the selected sample table(s) (<i>see Chapter 3.3.3.5, page 114</i>).
Import...	Import the selected sample table(s) (<i>see Chapter 3.3.3.6, page 114</i>).

Dialog window: **Workplace** ▶ **Tools** ▶ **Sample table** ▶ **Manager...** ▶ **[Edit]** ▶ **Rename...** ▶ **Rename sample table**

Rename sample table 'Name' to



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

3.4.1 Sample assignment table

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

Note

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

Delete selected sample assignment.



3.4.2 Sample assignment

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

Assignment ID

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

Input	50 characters
Selection	Selection of text templates



Note

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

Method

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

Selection	Method selection



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

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

3.4.3 Enter assignment ID

Dialog window: **Workplace ▶ Sample assignment**

Assignment ID

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

Input	50 characters

Method

Determination series

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

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

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

Run test running...

Run test error

Run test stopped manually

Run test finished without errors

■■■■■■■ 119

► Cont

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

Tab: **Workplace** ▶ **Run** ▶ **Single determination**

Status

Subwindow: **Run ▶ Sequence ▶ Single determination**

If the option **User name** required is enabled in the security settings, then the abbreviation of the currently registered user will be displayed in this field. This field is then not available for editing. If work is done without registering, then a user name can be entered in this field (only in the status **READY**).

Input	50 characters



Sample number

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

Range	0 ... 99999
Default value	0

Remark

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries (*see Chapter 3.5.1, page 117*).

Note

The field **Remarks** can also be modified live while determinations are running. The context-sensitive menu item **Modify remarks** is used to open the dialog window **Live modifications** (*see Chapter 3.6.3.6, page 125*).

Input	100 characters

Statistics

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

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

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

The second field after **Statistics** shows the number of determinations still to be carried out for the statistics (Setpoint counter). In its default settings, it contains the value **Number of single determinations** defined in the **START** command . This field cannot be edited except when it is in the status **READY**.

Note

At the start of a new statistics series, the setpoint counter will be reset to the value defined in the **START** command.

Tab:Workplace ▶ Run ▶ Single determination

Entry or selection of the method from the current method group with which the determination is to be made.

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



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



The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method (see Chapter 5.6.2.2.5, page 417).

Sample position

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

ID1...ID16

Sample identifications ID1...ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD**

hh:mm:ss. If text templates are defined for the sample identification, then these can be selected (*see Chapter 3.5.1, page 117*).

Input	100 characters
Selection	Selection of text templates

Sample size

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



Note

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



Note

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

Input	Number with a maximum of 10 digits
Default value	1.0

Sample size unit

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

Input	16 characters
Selection	g mg µg mL µL pcs
Default value	g



Note

Sample position, ID1...ID16, Sample size and Sample size unit can be modified live for a determination while it is running (*see Chapter 3.6.3.7, page 125*). Generally speaking, no formula input is possible in these fields.



3.6.3.8 Single determination - Determination run

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

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

1 - Loading the sample data

The sample data entered for the determination is loaded.

2 - Method selection

The following actions are triggered with method selection:

- **Method selection without Assignment ID**
The method selected in the field **Method** is loaded.
- **Method selection by assignment ID**
If the option **Method selection by assignment ID** is enabled in the properties of the single determination on the tab **Process** (see Chapter 3.6.3.9.4, page 132), then the method defined in the sample assignment table will be loaded (see Chapter 3.4, page 115).

3 - Start test

The following checks and actions are triggered with start test:

- **Authorization for carrying out the method?**
Check whether the registered user is authorized to carry out the method required (see Chapter 5.4.2.3, page 401).
- **Method executable?**
Check whether the required method is executable. For methods which are not executable, a prompt appears to perform the method check and to modify the method accordingly (see Chapter 5.2.5, page 385).
- **Check device (modules) and rack**
Check whether the instruments (and/or instrument types), device modules (e.g. measuring input, tower, etc.) and racks required in the instrument-specific commands are present and available and/or assigned. If the instrument in a command is not yet assigned, then the **device assignment** dialog window will open for the assignment of the instrument.
- **Check solutions**
Check whether the solutions required in the instrument-specific commands are present and available.
- **Check sensors**
Check whether the sensors required in the instrument-specific commands are present and available.



Note

When it is in **READY** status, the start test can also be triggered manually with the menu item **Tools ► Run test**.

4 - Conditioning (only for methods with conditioning)

Conditioning is started in the case of methods which contain commands with switched-on conditioning. The requirement for this is that the **Automatic conditioning** option is switched on in the **START** command. Conditioning is not yet part of determination and causes no counters to be incremented (**Sample number, Statistics**).

- **Conditioning condition not fulfilled**

After conditioning starts, the status switches to **COND BUSY**. The determination can be started in this status with **[Start]**, even though the conditioning requirement is not fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the **error track** nor the **exit track** will be run through.

- **Conditioning condition fulfilled**

If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. The determination can be started in this status with **[Start]**. Conditioning can however also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the conditioning requirement will continue to be monitored on a continuous basis.

5 - Method start

The following checks and actions are triggered with method start:

- **Check sample data**

Check whether the sample data entered corresponds to the defined method variables and is valid.

- **Assign determination ID**

A unique determination ID is assigned for the determination.

- Reserve devices (modules)

The devices and/or their function units used by the device-dependent commands in the method are reserved for the duration of the determination, i.e. they can neither be used in other workplaces nor can they be operated manually.

- Increasing sample number

The **sample number** is increased by **+1**.

- **Increasing statistics counter**

If Statistics is switched on, both in the **START** command and on the **Single determination** tab, then the statistics counter will be increased by **+1**. If a new method has been loaded or if the statistics counter corresponds to the setpoint counter, then the current statistics data is deleted beforehand and the statistics counter is set to **0**.

6 - Main procedure

The following actions can be carried out during processing of the method loaded:

- **Processing the main track**

The status switches to **BUSY** after the start of the main track. The main track commands and those of the other tracks it calls up are processed in sequence. If tracks which are not free are called up by the main track, then a waiting period will be observed until these tracks can be started.

- **Interrupt and continue run**

A determination that is running can be interrupted at any time with **[Hold]** and resumed with **[Cont]**. All active tracks are interrupted and resumed together when this is done.

- **Cancel run**

A determination that is running can be canceled at any time with **[Stop]**. The exit track (if present) is run afterwards and the determination is stopped.

- **Stop by error**

If an error occurs while a determination is running that causes the determination to be interrupted, then the error track will be run (if present) and the determination will be ended.

- **Processing exit track**

If the main track and all of the tracks that it has called up are finished, then the exit track (if present) will be run and the determination finished. The status switches to **READY** after the end of the main track.

7 - Conditioning (only for methods with conditioning)

Conditioning is started with the loaded method in the case of methods which contain commands with switched-on conditioning. The requirement for this is that the **Automatic conditioning** option is switched on in the **START** command. The conditioning starts immediately after the end of the track which contains the command with conditions.

- **Conditioning condition not fulfilled**

After conditioning starts, the status switches to **COND BUSY**. A new determination can be started in this status with **[Start]**, even though the conditioning requirement is not fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the error track nor the exit track will be run through.

- **Conditioning condition fulfilled**

If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. A new determination can be started in this status with **[Start]**. Conditioning can however also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the conditioning requirement will continue to be monitored on a continuous basis.

3.6.3.9 Single determination - Properties

3.6.3.9.1 Properties - Overview

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

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

- *Display*
Definition of the columns that are to be displayed on the tab **Single determination**.
- *Edit*
Definition of sample data which are copied automatically into the next determination.
- *Process*
Options for the processing of single determinations.
- *Data import*
Enabling/disabling the import of external data for fields on tab **Single determination**.

3.6.3.9.2 Properties - Display

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

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

Operating elements

[Hold]/[Cont]

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

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

Determination parameters

Sample number

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

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

User**on | off** (Default value: **on**)Enable/disable the display of the field **User**.**Remarks****on | off** (Default value: **on**)Enable/disable the display of the field **Remarks**.**Statistics****on | off** (Default value: **on**)

Enable/disable the display of the statistics fields.

Arrangement ID1...16**Note**

The fields **Sample size** and **Sample size unit** are always displayed next to one another in a line.

Selection	1 Column 2 columns
Default value	1 Column

1 Column

If this option is selected, then the sample identifications **ID1...ID16** are shown in single columns.

2 columns

If this option is selected, then the sample identifications **ID1...ID16** are shown in double columns.

3.6.3.9.3 Properties - Edit

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

Definition of the sample data which is to be applied automatically for the next **single determination**.

Copy automatically into the next determination**Sample size****on | off** (Default value: **on**)**Sample size unit****on | off** (Default value: **on**)

Sample position

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

ID1...ID16

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

3.6.3.9.4 Properties - Process

Tab: **Workplace** ▶ **Run** ▶ **Single determination** ▶ **Properties Run window** ▶ **Properties - Single determination** ▶ **Process**

Options for the processing of single determinations.

Method selection by assignment ID

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

If this option is enabled, then the selected sample identification will be used for the method selection. This identification receives the designation **Assignment ID**, which can then no longer be changed; if this ID matches one of the Assignment IDs from the sample assignment table (*see Chapter 3.4.1, page 115*), then the respective method from this table will be entered in the field **Method**.

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

Request assignment ID

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

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

Autorepeat determination

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

If this option is enabled, then the next determination will be started with the same method automatically after the completion of a determination. The determination must be canceled with **[Stop]** in order to cancel the automatic repetition.

3.6.3.9.5 Properties - Data import

Tab: **Workplace ▶ Run ▶ Single determination ▶ Properties Run window ▶ Properties - Single determination ▶ Data import**

Enabling/disabling the import of external data for fields on tab **Single determination**.



Import from balance

If this option is enabled, then external data from the selected balance will be imported into the fields on the tab **Single determination**. Data can be imported into the fields **ID1...ID4**, **Sample size** and **Unit**.



Balance

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

If this option is selected, then the data sent from the balance is imported into all of the **Single determination** tabs of the open workplaces for which this balance is defined as data source.

If this option is selected, then the data sent from the balance is imported only into the **Single determination** tab of the workplace that is actively selected.

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

Import from barcode reader

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

If this option is enabled, then external data from the selected barcode reader will be imported into the fields on the tab **Single determination**. The device properties of the barcode reader will define the field into which the data is imported (*see Chapter 7.18.4, page 1392*).

Barcode reader

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

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

Always accept data

If this option is selected, then the data sent from the barcode reader is imported into all of the **Single determination** tabs of the open workplaces for which this barcode reader is defined as data source.

Accept data only for active window

If this option is selected, then the data sent from the barcode reader is imported only into the **Single determination** tab of the workplace that is actively selected.

Confirmation necessary to accept data during the determination.

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

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

3.6.3.10 Modification comment for sample data

Dialog window: Workplace ▶ Run ▶ Single determination ▶ Live modifications ▶ Live modifications ▶ Modification comments sample data

Dialog window: Workplace ▶ Sequence ▶ Determination series ▶ [Edit] ▶ Edit line ▶ Edit line - Working sample table - Workplace 'Name' ▶ Modification comment sample data

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then this window must be opened before saving. A reason and a comment on the modification must be entered here (*see Chapter 6.2.2.3, page 1166*).

Comment

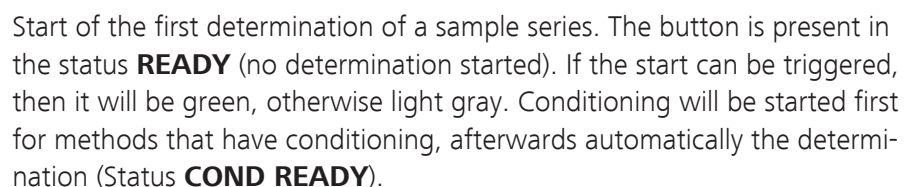
Selection	Selection from default reasons

Input	1000 characters

3.6.4.1 Determination series - Overview

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

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





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

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



Interrupt run

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



Continue run

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



Interrupt series

With this button, the ongoing determination of a sample series will still be carried out to completion, but no new determination will be started. The button is present in the status **BUSY** (determination is running). The button is disabled (light gray) in all other cases. When **[Pause]** is pressed, this button will be replaced in the display by **[Cont]**.



Continue series

Start of the next determination of an interrupted sample series. The button is only present in the status **HOLD** (series interrupted). Pressing **[Cont]** will cause this button to be replaced again in the display by **[Pause]**.

3.6.4.3 Determination series - Status display

Tab: **Workplace** ▶ **Run** ▶ **Determination series**

The current status of the workplace will be displayed on the tab **Determination series**:

Status

Selection	READY BUSY HOLD PAUSE COND BUSY COND READY COND HOLD ERROR

READY

Ready for starting a determination or for conditioning.

BUSY

Determination running.

HOLD

Determination interrupted.

PAUSE

Series interrupted.

COND BUSY

Conditioning running.

COND READY

Conditioning condition fulfilled.

COND HOLD

Conditioning interrupted.

ERROR

Error.

3.6.4.4 Determination series - Determination parameters

Tab: **Workplace** ▶ **Run** ▶ **Determination series**

User

If the option **User name required** is enabled in the security settings, then the abbreviation of the currently registered user will be displayed in this field (*see Chapter 6.2.2.2, page 1162*). This field is then not available for editing. If work is done without registering, then a user name can be entered in this field (only in the status **READY**).

Input	50 characters

Sample number

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

Range	0 ... 99999
Default value	0

Remark

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries (*see Chapter 3.5.1, page 117*).



Note

The field **Remarks** can also be modified live while determinations are running. The context-sensitive menu item **Modify remarks** is used to open the dialog window **Live modifications** (see Chapter 3.6.3.6, page 125).

Input	100 characters

Autostart

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

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

The second field after **Autostart** shows the total number of determinations per series that are still to be carried out (Setpoint counter). It contains in its default settings the entry **Sample table**, which refers to the number of lines of the working sample table. This field cannot be edited except when it is in the status **READY**.



Note

The second field after **Autostart** can also be modified live for a series that is currently running. The **Live modifications** window opens with the context-sensitive menu item **Modify autostart counter**.

Range	1 ... 999
Default value	Sample table

Statistics

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

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

The second field after **Statistics** shows the number of determinations still to be carried out for the statistics (Setpoint counter). In its default settings, it contains the value **Number of single determinations** defined in the **START** command . This field cannot be edited except when it is in the status **READY**.



3.6.4.5 Determination series - Sample data

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

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- **Turquoise background**

Selected line not yet processed.

Loaded

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

Toolbar

	Saving sample table	Save sample table.
	PDF output	Put out sample table as PDF file.
	Reset sample table	Reset lines that have been run, i. e. edit again these lines.
	Duplicate	Duplicate selected line(s). The new lines are inserted underneath the selected range.
	Increment	Automatically increment selected lines.
	Filling	Automatically fill selected lines.
	Test sample table	Check whether or not all sample data in the sample table is correct.

Window menus

[Edit] contains the following menu items:

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

 Increment	Using the cursor, which takes on the form  , the area in a column that is to be incremented automatically can be selected from the table. In doing so, the number to be found at the end of the expression will be automatically increased by 1 in the selected cells of a column, starting from the first selected cell. This occurs both with pure numbers as well as with text expressions where a number appears at the end (e.g. ABC10 → ABC11 → ABC12...).
 Filling	Automatically fill selected lines.
 Duplicate	Duplicate selected line(s). The new lines are inserted underneath the selected range.
Mark lines	Marks selected lines with a red background for the line number. Before the start of such a line the corresponding actions defined under Properties on the tab Process (see Chapter 3.3.2.4, page 108) will be triggered.
Unmark lines	Removes the line marking for the selected lines.
Set lines inexecutable	Sets the selected lines to "inexecutable", i.e. these lines will not be carried out in the method run. Such lines are crossed through with a red line.
Set lines executable	Sets the selected lines to "executable", i.e. they will be carried out in the run.

[Sample table] contains the following menu items:

New	Load new empty sample table.
Load...	Load saved sample table into the working sample table.
 Save	Save the current sample table under the same name..
Save as...	Save the current sample table under a new name.
 Sample table test...	Check whether or not all sample data in the working sample table is correct.
 Print (PDF)...	Put out working sample table as PDF file.
Properties...	Edit properties of the working sample table.
Import data...	Import external data (*.csv).
 Reset	Reset lines that have been run, i. e. edit again these lines.

Moving lines with Drag&Drop

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

2 - Method selection

The following actions are triggered with method selection:

- **Method selection without Assignment ID**
The method selected in the column **Method** is loaded.
- **Method selection by assignment ID**
If the option **Method selection by assignment ID** is enabled in the properties of the determination series on the tab **Process** (see Chapter 3.3.2.4, page 108), then the method defined in the sample assignment table will be loaded (see Chapter 3.4, page 115).

3 - Start test

The following checks and actions are triggered with start test:

- **Authorization for carrying out the method?**
Check whether the registered user is authorized to carry out the method required (see Chapter 5.4.2.3, page 401).
- **Method executable?**
Check whether the required method is executable. For methods which are not executable, a prompt appears to perform the method check and to modify the method accordingly (see Chapter 5.2.5, page 385).
- **Check device (modules) and rack**
Check whether the instruments (and/or instrument types), device modules (e.g. measuring input, tower, etc.) and racks required in the instrument-specific commands are present and available and/or assigned. If the instrument in a command is not yet assigned, then the **device assignment** dialog window will open for the assignment of the instrument.
- **Check solutions**
Check whether the solutions required in the instrument-specific commands are present and available.
- **Check sensors**
Check whether the sensors required in the instrument-specific commands are present and available.
- **Check sample data**
Check whether the sample data entered corresponds to the defined method variables and is valid.



Note

When it is in the status **READY**, the start test can also be triggered manually with the symbol  or the menu items **Tools ► Run test** or **[Sample table] ► Run test...**. In addition, the sample data test will also still be carried out afterwards.

4 - Conditioning (only for methods with conditioning)

Conditioning is started in the case of methods which contain commands with switched-on conditioning. The requirement for this is that the **Automatic conditioning** option is switched on in the **START** command. Conditioning is not yet part of determination and causes no counters to be incremented (**Sample number, Statistics**).

- **Conditioning condition not fulfilled**

After conditioning starts, the status switches to **COND BUSY**. In this status, conditioning can also be interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the **error track** nor the **exit track** will be run through.

- **Conditioning condition fulfilled**

If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. The method is then started automatically afterwards.

5 - Method start

The following checks and actions are triggered with method start:

- **Assign determination ID**

A unique determination ID is assigned for the determination.

- Reserve devices (modules)

The devices and/or their function units used by the device-dependent commands in the method are reserved for the duration of the determination, i.e. they can neither be used in other workplaces nor can they be operated manually.

- Increase sample number

The **sample number** is increased by **+1**.

- Increase statistics counter

If Statistics is switched on, both in the **START** command and on the **Determination series** tab, then the statistics counter will be increased by **+1**. If a new method has been loaded or if the statistics counter corresponds to the setpoint counter, then the current statistics data is deleted beforehand and the statistics counter is set to **0**.

6 - Main procedure

The following actions can be carried out during processing of the method loaded:

- **Process series start track**

The **series start track** is started at the beginning of the first determination of a series. If **[Stop]** is pressed during the running of this track, then the **Exit track** is started; if an error occurs, then the **error track** will be.

- **Process the main track**

The status switches to **BUSY** after the start of the **main track**. The main track commands and those of the other tracks it calls up are processed in sequence. If tracks which are not free are called up by the main track, then a waiting period will be observed until these tracks can be started.

- **Interrupt and continue run**

A determination that is running can be interrupted at any time with **[Hold]** and resumed with **[Cont]**. All active tracks are interrupted and resumed together when this is done.

- **Interrupt and continue series**

A series that is running can be interrupted at any time with **[Pause]**. When this is done, the ongoing determination of the sample series will still be carried out to completion, but no new determination will be started. The next determination of the interrupted sample series is started with **[Cont]**.

- **Cancel run**

A determination that is running can be canceled at any time with **[Stop]**. The **exit track** (if present) is run afterwards and the determination is stopped.

- **Stop by error**

If an error occurs while a determination is running that causes the determination to be interrupted, then the **error track** will be run (if present) and the determination will be ended.

- **Process exit track**

If the main track and all of the tracks that it has called up are stopped, then the **exit track** (if present) will be run and the determination finished.

- **Process series end track**

The **series end track** is started at the end of the last determination of a series. If **[Stop]** is pressed during the running of this track, then the determination will be ended; if an error occurs, then the **error track** will be.

7 - Conditioning (only for methods with conditioning)

In the case of methods which contain commands with conditions switched on and for which the option **Automatic conditioning** is switched on in the **START** command, conditioning with the method loaded will be started automatically for all of these commands, immediately after the end of the track which contains the conditioning command. After conditioning starts, the status switches to **COND BUSY**. In this status, conditioning can be canceled with **[Stop]** or interrupted with and resumed with. If an error occurs during conditioning, then neither (see Chapter 5.5.2.6, page 407) nor (see Chapter 5.5.2.5, page 407) will be run through.

In the case of methods which contain commands with conditions switched on and for which the option **Automatic conditioning** is switched on in the **START** command, conditioning with the method loaded will be started

automatically for all of these commands, immediately after the end of the track which contains the conditioning command.

- **Conditioning condition not fulfilled**

After conditioning starts, the status switches to **COND BUSY**. A new determination can be started in this status with **[Start]**, even though the conditioning requirement is not fulfilled. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the **error track** nor the **exit track** will be run through.

- **Conditioning condition fulfilled**

If the conditioning requirement has been fulfilled, then the status will switch to **COND READY**. A new determination can be started in this status with **[Start]**. Conditioning can also be canceled with **[Stop]** or interrupted with **[Hold]** and resumed with **[Cont]**. As long as the determination has not yet been started, the conditioning requirement will continue to be monitored on a continuous basis.

3.6.4.9 Working sample table

3.6.4.9.1 Load new working sample table

Menu item: **Workplace** ▶ **Run** ▶ **Determination series** ▶ [Sample table] ▶ **New**

A new, empty sample table is loaded as working sample table with the menu item **[Sample table] ► New** on the tab **Determination series**, e. g. all existing sample table lines will be deleted.

3.6.4.9.2 Load sample table

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

One of the globally available sample tables can be selected in this dialog window for loading as working sample table.

List of sample tables

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

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Number of lines in the sample table.

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table (*see Chapter 3.3.2.6, page 112*).

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

Load the data of the selected sample table into the working sample table. In addition, all properties of the sample table, with the exception of the settings for **Import from file** and **Import format** for the working sample table, are applied.

- **Light gray background**
Line already processed, the data of which can no longer be modified.
- **Orange background**
Line currently running. If sample data is not to be modified until after the start of the determination (in the status **BUSY**), then this is considered a live modification.
- **White background**
A line that has not yet been processed and which can still be edited.

Generally speaking, no formula input is possible in the fields of this dialog window.

Entry or selection of the method from the current method group with which the determination is to be made.



Input	50 characters
Selection	Method selection

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



Note

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



Note

The following sample data fields can no longer be edited if they were defined as **Fixed value** in the method (see Chapter 5.6.2.2.5, page 417).

Sample position

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

Range	1 ... 999 (Increment: 1)
Default value	'empty'

ID1...ID16

Sample identifications ID1...ID16. Any text may be entered into this field, the checking for type and limit values does not take place until the start of the determination. For sample identifications of the type **Date/Time**, the entry must be made in the format **YYYY-MM-DD** or **YYYY-MM-DD hh:mm:ss**. If text templates are defined for the sample identification, then these can be selected (see Chapter 3.5.1, page 117).

Input	100 characters
Selection	Selection of text templates

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

Note

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

Note

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

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

Note

If data from the current sample data line is modified for the ongoing determination, then this is regarded as a live modification. If the option **Comment on modification of sample data (live)** is enabled in the security settings, then a reason and a comment on the modification must be entered before saving (*see Chapter 6.2.2.3, page 1166*).

Navigation

Zeile   5    von 5

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



Jumps to the first line in the working sample table.



Jumps to the previous line in the working sample table.

5

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



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



Jumps to the last line in the working sample table.



Jumps to a new, empty line.

Display application note

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

If this checkbox is activated, then the application note defined in the method is displayed when sample data is being edited.

Functions

[Apply]

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

[Close]

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

3.6.4.9.4 Duplicate sample data

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

Number

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

Range	1 ... 999
Default value	1

3.6.4.9.5 Import sample data

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

The file to be imported must be selected in these dialog windows.

File name

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

Selection	File name

File type

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

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

[Open]

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



Note

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

3.6.4.9.6 Sample table test

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

The menu item **[Sample table] ► Sample table test...** or the symbol  is used to perform the sample table test. At the same time, the dialog

window **Sample table test - 'Sample table name'** in which the information concerning the test is displayed opens.



Note

The **Sample table test** is only used to check whether or not all sample data is correct (in contrast to the **Run test** (see *Chapter 3.6.2, page 118*), which also checks the required hardware).

Line

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

Status displays

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

Selection	Sample table test running... Sample table test stopped manually Sample table test finished without errors Sample table test finished with errors

Sample table test running...

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

Sample table test stopped manually

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

Sample table test finished without errors

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

Sample table test finished with errors

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

Test report

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

3.6.4.9.7 Save sample table

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

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

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

Name of the sample table.

Date and time when the sample table was saved.

Short name of the user who saved the sample table.

Number of lines in the sample table.

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table (see Chapter 3.3.2.6, page 112).

Name

Name under which the sample table is to be saved.



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

Input	50 characters

Save the sample table under the desired name.

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



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

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

3.6.4.9.9

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

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

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Output in portrait format.

Landscape

Output in landscape format.

3.6.4.10

3.6.4.10.1

Dialog window: Workplace ► Run ► Determination series ► [Sample table] ► Properties... ► Properties - Determination series

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

The properties for the tab **Determination series** are set on the following tabs:

- *Display*
Definition of the columns that are to be displayed in the working sample table.
- *Edit*
Options for editing the working sample table on the tab **Determination series** and in the the dialog window **Edit line**.
- *Process*
Options for processing the working sample table on the tab **Determination series**.
- *Data import*
Enabling/disabling the import of external data for working sample table fields.
- *Comment*
Entry of comments for the working sample table.

3.6.4.10.2 Properties - Display

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

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

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

Operating elements



Note

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

[Pause]/[Cont]

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

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

[Hold]/[Cont]

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

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

Determination parameters



Note

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

Sample number

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

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

User

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

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

Start the Text editor with which the message can be entered and edited. The Formula editor can also be called up inside the text field (*see Chapter 2.5.2, page 81*).

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

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



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

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

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



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

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

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



Always accept data

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

Accept data only for active window

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

Confirmation necessary to accept data during determination.

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

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

Importing from barcode reader

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

If this option is enabled, then external data from the selected barcode reading device will be imported into the opened sample table. The device properties of the barcode reader will define the field into which the data is imported (*see Chapter 7.18.4, page 1392*).

Barcode reader

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

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

Always accept data

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

Accept data only for active window

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

Confirmation necessary to accept data during determination.

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

If this option is switched on, then data will not be imported during a determination except when the **Data input** dialog of a **REQUEST** command is open.

Entering a comment on the sample table.

Comment on sample table

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

Input	1000 characters

3.6.4.11 Modification comment for sample data

Dialog window: Workplace ▶ Run ▶ Single determination ▶ Live modifications ▶ Live modifications ▶ Modification comments sample data

Dialog window: Workplace ▶ Sequence ▶ Determination series ▶ [Edit] ▶ Edit line ▶ Edit line - Working sample table - Workplace 'Name' ▶ Modification comment sample data

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then this window must be opened before saving. A reason and a comment on the modification must be entered here (*see Chapter 6.2.2.3, page 1166*).

Reason

Selection from the standard reasons for the category **Modifications of sample data** (see Chapter 6.2.2.5, page 1168) that are defined in the security settings.

Selection	Selection from default reasons

Comment

Entry of remarks about the modifications to the sample data.

Input	1000 characters

3.7.4 Method window - Cancel command

Subwindow: **Workplace** ▶ **Method**

If a workplace is in **BUSY** status, then the context-sensitive menu item **Cancel** can be used to stop the running of an active command immediately and to jump directly to the next command. This applies only to commands with live display. This cancellation is documented in the determination (under **Messages**) and in the **Audit Trail**. The data and variables which have already been generated by the command that was canceled will be saved.

3.8 Subwindow Live display

3.8.1 Live display - General

Subwindow: **Workplace** ▶ **Live display**

Subwindow live display

Live curves, measured values and messages concerning the method that has been started in the Run window on the **Single determination** or **Determination series** tab are displayed in the two subwindows **Live display 1** and **Live display 2**. The subwindows can be switched on in the **Workplace** program part during the definition of the layout and thus made visible. They can be enlarged and reduced as required; they can also be maximized.

The display of curves and measured values in the live window can be defined per window and per command type in **Properties**.

Tabs

The subwindows **Live display 1** and **Live display 2** are comprised of the following tabs:

- *Tracks*
A tab is displayed for each track which is lettered with the name of the track.
- *Application note*
Displaying the application notice defined in the **START** command.
- *Messages*
Display of the messages which are generated during the determination.

3.8.2 Live display - Tracks

Subwindow: **Workplace** ▶ **Live display**

The main track of the loaded method (**START** command) is always displayed in the **Live display** subwindow; other tracks are displayed only if the live display is activated in the associated **TRACK** command. A tab is displayed for each track which is lettered with the name of the track.

The live display elements (curve, measured value, message) defined in the **Properties** for the respectively active command are displayed on these tabs. The tabs must be changed manually, i.e. no automatic switching takes place when a different track is called up. It is thus possible to show two simultaneously active tracks next to one another.

The contents of the track tabs are deleted at the start of the determination. The messages, curves and measured value displays specified by the active commands appear afterwards in the track tabs. The titles of the tabs for the active tracks are shown in red thereby. In addition, the command type and the command name of the active command appear in the window title of the **Live display** subwindow.

If all tracks are interrupted with **[HOLD]** or individual tracks with a **SEND** command, then **Track interrupted...** will appear in these tracks.

After the track is finished, **Spur ended** will appear in all tracks, with the exception of the main track. After the end of the determination, depending on the determination sequence, the following will be displayed in the main track:

Selection	Run: regular without remarks Run: regular with remarks Run: Abort Run: Abort by error
Run: regular without remarks	The determination was finished automatically after the it was processed normally and without any remarks.
Run: regular with remarks	The determination was finished automatically after the it was processed normally, but without remarks (<i>see Chapter 4.6.6, page 339</i>).
Run: Abort	The determination or the conditioning was canceled manually with [Stop] , by a stop criterion or with a SEND command.
Run: Abort by error	The determination or the conditioning was interrupted automatically because of an error or not started at all because of an error during Start test .

Context menu

Cancel	Cancel the active command of the track.
Properties - Live display	Set properties of the live display (<i>see Chapter 3.8.5, page 169</i>).

3.8.3 Live display - Application note

Subwindow: **Workplace** ▶ **Live display**

The application note defined in the **START** command for the method loaded is displayed on the **Application note** tab. This tab is opened in the default settings during loading of the method in the **Live display** subwindow.

3.8.4 Live display - Messages

Subwindow: **Workplace** ▶ **Live display**

A scrollable message field is located on the **Messages** tab which contains all of the messages concerning events occurring during the run of the current determination. Entries consist of messages that generate a database entry in the determination but which are not significant enough to result in the run being interrupted, pending confirmation by the user.

Each message consists of **Date**, **Time** and **Message text**.

The message window is deleted when a sequence is started with **[START]**. This way all messages from the last single determination or determination series can be viewed.

The lettering of the tab switches to **red** as soon as a new message is entered. The lettering of the **Messages** tab becomes **black** again after one has viewed the messages and switched to a different tab.

3.8.5 Live display - Properties

Subwindow: **Workplace** ▶ **Live display**

The dialog window **Properties live display #** is opened with the menu item **View, Properties, Properties live display #** or with the context-sensitive menu item **Properties live display #** in the subwindow itself.

Command type

Selection of the command type for which the properties are to be defined for the live display. The curve properties defined per command type are saved per live display window and per client.

Selection	DET MET SET KFT KFC STAT MEAS MEAS T/Flow MEAS TC Cond MEAS Opt DOS
Default value	DET

Measured value display

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

If this option is switched on, then the desired measured values will be displayed in the **Live display** subwindow.

Selection	off Measured value Time dMW/dt Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value Time Intensity Transmission Saturated pixels
Default value	off

Selection	off Measured value Time Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	off

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

x axis

Selection of the quantity to be shown on the x axis.

Selection	Volume Measured value Time Temperature ERC Calculated 1...3 External 1...3
Default value	Volume

Selection	Volume Measured value Time Temperature dMW Calculated 1...3 External 1...3
Default value	Volume

Selection	Time	Measured value	Temperature	Volume
		dV/dt	Calculated 1...3	External 1...3
Default value	Time			

Selection	Time	Measured value	Temperature	Volume
		dV/dt	Calculated 1...3	External 1...3
Default value	Time			

<i>KFC</i>	
Selection	Time Measured value Water Drift Charge dV/dt Ugen Igen Calculated 1...3 External 1...3
Default value	Time

<i>STAT</i>	
Selection	Time Measured value Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	Time

<i>MEAS</i>				
Selection	Time	Measured value	Temperature	dMW/dt
		Calculated 1...3	External 1...3	
Default value	Time			

MEAS T/F/low				
Selection	Time	Measured value	Flow	Calculated 1...3
	3	External 1...3		
Default value	Time			

<i>MEAS TC Cond</i>			
Selection	Temperature	Measured value	Time Calculated 1...3 External 1...3
Default value	Temperature		

MEAS Opt				
Selection	Time	Measured value	Intensity	Transmission
		Saturated pixels		
Default value	Time			

<i>DOS</i>				
Selection	Time	Measured value	Temperature	Volume
		dV/dt	Calculated 1...3	External 1...3
Default value	Time			

y1 axis

Selection of the quantity to be shown on the y1 axis (left-hand y axis).

<i>DET</i>	
Selection	Measured value Volume Time Temperature ERC Calculated 1...3 External 1...3
Default value	Measured value

MET	
Selection	Measured value Volume Time Temperature dMW Calculated 1...3 External 1...3
Default value	Measured value
SET	
Selection	Volume Measured value Temperature Time dV/dt Calculated 1...3 External 1...3
Default value	Volume
KFT	
Selection	Volume Measured value Temperature Time dV/dt Calculated 1...3 External 1...3
Default value	Volume
KFC	
Selection	Water Measured value Time Drift Charge dV/dt Ugen Igen Calculated 1...3 External 1...3
Default value	Water
STAT	
Selection	Volume Measured value Temperature Time dV/dt Calculated 1...3 External 1...3
Default value	Volume
MEAS	
Selection	Measured value Time Temperature dMW/dt Calculated 1...3 External 1...3
Default value	Measured value
MEAS T/Flow	
Selection	Measured value Time Flow Calculated 1...3 External 1...3
Default value	Measured value
MEAS TC Cond	
Selection	Measured value Time Calculated 1...3 External 1...3
Default value	Measured value
MEAS Opt	
Selection	Measured value Time Intensity Transmission Saturated pixels
Default value	Measured value

<i>MEAS</i>				
Selection	off	Measured value	Time	Temperature
		dMW/dt	Calculated 1...3	External 1...3
Default value	off			

<i>MEAS T/Flow</i>					
Selection	off	 Measured value	 Time	 Flow	 Calculated
	1...3	 External 1...3			
Default value	off				

<i>MEAS TC Cond</i>				
Selection	off	Measured value	Time	Calculated 1...3
		External 1...3		
Default value	off			

<i>MEAS Opt</i>	
Selection	off Measured value Time Intensity Transmission Saturated pixels
Default value	off

DOS				
Selection	off	Measured value	Volume	Temperature
	Time	dV/dt	Calculated 1...3	External 1...3
Default value	off			

Color

Selection of the color of the curve for the quantity to be shown on the y2 axis.

Selection	Color selection magenta
Default value	magenta

Display measuring points

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

If this option is switched on, then the individual measuring points will also be shown next to the curve in the form of little crosses.



Note

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Display grid

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

If this option is enabled, a grid will be displayed

Background

Selection of the color for the curve background.

Selection	Color selection white
Default value	white

3.9 Subwindow Report

3.9.1 Report - General

Subwindow: **Workplace** ▶ **Report**

Subwindow Report

The reports of determinations are displayed in the subwindow **Report**. The subwindow can be switched on in the program part **Workplace** during the definition of the Layout and thus made visible (*see Chapter 3.1.7.2, page 90*). It can be enlarged and reduced as required; it can also be maximized.

Tabs

The subwindow **Report** is comprised of the following tabs:

- *Latest report*
Display of the most recently automatically generated report.
- *Selected report*
Display of the report selected in the report overview.
- *Report overview*
Overview of the reports saved in the workplace.

3.9.2 Latest report

Tab: **Workplace** ▶ **Report** ▶ **Latest report**

The report most recently generated in the method run is automatically displayed on the tab **Latest report**. The content and format of the report are determined by the report template selected.

3.9.3 Selected report

Tab: **Workplace** ▶ **Report** ▶ **Selected report**

The report selected in the report overview is shown on the tab **Selected report**. The content and format of the report are determined by the report template selected.

Tab: **Workplace** ▶ **Report** ▶ **Report overview**

The table contains the following columns, which can be enlarged, reduced and moved with the mouse:

Time of the compilation of the report, together with date, time and time zone (UTC ± ##).

Command name of the **REPORT** command that generated the report.

Method name.

Sample identifications **ID1...ID16.**

Displays the selected report on the tab **Selected Report**.

Deletes the selected reports in the report overview.

Opens the dialog window **Properties - Report overview**.

Dialog window: **Workplace** ▶ **Report** ▶ **Report overview** ▶ **[Properties]** ▶ **Properties**
- **Report overview**

Maximum number of reports that can be saved in the report overview table. If this number is exceeded, then the oldest report will be deleted automatically.

Range	1 ... 100
Default value	20

Elements

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

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

4.1.3 Database - Menu bar

4.1.3.1 Database - Main menus

Program part: **Database**

The menu bar in the program part **Database** includes the following main menu items:

- *File*
Open and close databases, database management, printing.
- *Edit*
Copy selected lines in the determination overview onto the clipboard, mark all lines.
- *View*
Change layout, load view, save view, modify properties in the subwindows.
- *Determinations*
Search, filter, sign, delete determinations; overlay curves, calibration curves, reprocess, etc.
- *Tools*
Report templates, further templates.
- *Help*
Open program help, display program information.

4.1.3.2 Database - Menu File

Program part: **Database**

 Open...	Open database (<i>see Chapter 4.2.1, page 189</i>).
Close all	Close all open databases (<i>see Chapter 4.2.6, page 191</i>).
 Close	Close database (<i>see Chapter 4.2.6, page 191</i>).
 Database manager...	Manage determination databases (<i>see Chapter 4.3.1, page 192</i>).
Print ►	
Determination overview...	PDF file output of the determination overview (<i>see Chapter 4.5.2.11, page 319</i>).

4.1.3.5 Database - Menu Determinations

Program part: **Database**

 Comment	Enter comment on the selected determination (<i>see Chapter 4.5.2.2, page 283</i>).
 Search	Open the window Search for searching for determinations (<i>see Chapter 4.5.2.3, page 283</i>).
Filter ►	
 Last filter	Use last quick or special filter again (<i>see Chapter 4.5.2.4.2, page 286</i>).
 Quick filter	Use quick filter with the content of the selected table cell (<i>see Chapter 4.5.2.4.3, page 286</i>).
 Special filter...	Open the window Special filter for the definition of user-specific filters (<i>see Chapter 4.5.2.4.4, page 287</i>).
 All statistics records	Display all related statistics data sets of the focused determination (<i>see Chapter 4.5.2.4.5, page 288</i>).
 Remove filter	Remove current filter (<i>see Chapter 4.5.2.4.6, page 288</i>).
Sign ►	
 Signature 1...	Sign selected determinations on level 1 (<i>see Chapter 2.3.3, page 22</i>).
 Signature 2...	Sign selected determinations on level 2 (<i>see Chapter 2.3.4, page 23</i>).
Show signatures...	Show all signatures for the focused determination (<i>see Chapter 4.5.2.5.4, page 295</i>).
Delete signatures 2...	Delete signatures at level 2 of the focused determination (<i>see Chapter 2.3.5, page 25</i>).
Send to...	Send selected determinations per E-mail (<i>see Chapter 4.5.2.7, page 317</i>).
Export...	Export selected determinations (<i>see Chapter 4.5.2.8, page 318</i>).
Import...	Import selected determinations (<i>see Chapter 4.5.2.9, page 318</i>).
 Show method...	Show the method used for the focused determination (<i>see Chapter 4.5.2.13, page 321</i>).
 Show history	Show all versions of the focused determination in the determination overview (<i>see Chapter 4.5.2.14, page 322</i>).

 Make current	Make the old version selected in the history view the current version again (<i>see "Make old version current", page 322</i>).
 Display calibration curve...	Display the calibration or standard addition curve for the focused determination (<i>see Chapter 4.5.2.15, page 323</i>).
 Control chart...	Display control chart and statistical evaluation of the selected determination (<i>see Chapter 4.5.2.16, page 324</i>).
 Overlay curves...	Overlay curves of the selected determinations (<i>see Chapter 4.5.2.17, page 324</i>).
 Reprocess...	Reprocess selected determinations (<i>see Chapter 4.5.2.6.1, page 296</i>).
 Delete	Delete selected determinations (<i>see Chapter 4.5.2.10, page 319</i>).

4.1.3.6 Database - Menu Tools

Program part: **Database**

Report templates ▶	
New ▶	
Form report	Open the window Report template with an empty form report (<i>see Chapter 4.4.1.3, page 202</i>).
Tabular report	Open then window Report template with an empty tabular report (<i>see Chapter 4.4.1.3, page 202</i>).
 Open...	Open report template to edit (<i>see Chapter 4.4.1.3, page 202</i>).
Manager...	Manage report templates (<i>see Chapter 4.4.1.1.1, page 200</i>).
Templates ▶	
Control chart templates...	Manage templates for control charts (<i>see Chapter 4.4.2, page 235</i>).
Curve overlay templates...	Manage curve overlay templates (<i>see Chapter 4.4.3.1, page 239</i>).
Export templates...	Manage export templates (<i>see Chapter 4.4.4.1, page 245</i>).

4.1.3.7 Menu Help

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

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

4.1.4 Database - Toolbar

Program part: **Database**

 Open...	Open database (<i>see Chapter 4.2.1, page 189</i>).
 Close	Close database (<i>see Chapter 4.2.6, page 191</i>).
 Database manager...	Manage determination databases (<i>see Chapter 4.3.1, page 192</i>).
 Logout...	Logout user (<i>see Chapter 2.2.3, page 19</i>).
 Copy	Copy the selected lines in the determination overview to the clipboard.
 Update	Update determination overview.
 Change layout...	Modify layout of loaded database view (<i>see Chapter 3.1.7.2, page 90</i>).
 Load view...	Load a saved database view (<i>see Chapter 3.1.7.3, page 91</i>).
 Save view...	Save the loaded database view (<i>see Chapter 3.1.7.4, page 91</i>).
 Split vertically	Split database window vertically and display two databases side by side (<i>see Chapter 4.2.4, page 191</i>).
 Split horizontally	Split database window horizontally and display two databases below each other (<i>see Chapter 4.2.5, page 191</i>).
 Unsplit	Undo the splitting of the database window (<i>see Chapter 4.2.3, page 191</i>).
 Comment	Enter comment on the selected determination (<i>see Chapter 4.5.2.2, page 283</i>).
 Search	Open the window Search for searching for determinations (<i>see Chapter 4.5.2.3, page 283</i>).
 Filter/Last filter	Use last quick or special filter again (<i>see Chapter 4.5.2.4.2, page 286</i>).

4.1.5 Database - Subwindows

Program part: **Database**

Selection

The following subwindows can be displayed in the main window:

- *Determination overview*
Overview of the determinations saved in the database. This subwindow is permanently on display.
- *Information*
Display of information for focused determination.
- *Results*
Display of results for focused determination.
- *Curves 1...5*
Display of curves for focused determination.

Display

The subwindows can be enlarged or made smaller by pulling the separating bar between the windows.

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

4.1.6 Database - Functions

Program part: **Database**

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

Views

- *Modify the layout of the database view*
- *Load database view*
- *Save database view*
- *Rename database view*
- *Delete database view*

Database manager

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

Determinations

- *Overview of functions*

- ## Export/Import

4.1.7.2 Change layout

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

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

Available subwindows

Selection	Subwindow selection
☐ All ☒ Selected ☐ None	☐ All ☒ Selected ☐ None

Displays the subwindows that are shown in the view.

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Opening the database

Database name

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

Input	50 characters

[Open]

Opens the selected database and shows its data sets in the Determination overview. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

4.2.2 Select database

Program part: **Database**

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



No database is opened. **No database loaded** is displayed in the main window.



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



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



A menu with the currently opened databases is displayed by clicking with either the left or right mouse button on the database symbol. The databases displayed in the main window are marked with a checkmark. Clicking on the desired database displays it in the main window in the place of the previously selected one.

4.2.3 Display single database

Menu item: **Database ► View ► Unsplit**

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

4.2.4 Display databases next to one another

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

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

4.2.5 Display databases one below the other

Menu item: **Database ► View ► One below the other**

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

4.2.6 Closing database

Menu items: **Database ► File ► Close / Close all**

Close single database

With the symbol  or the menu item **File ► Close** can be used to close the focused database.

Closing all databases

All the opened databases are closed with the menu item **File ► Close all**.

[Properties]

Opens the window **Database manager** for editing the database selected in the table (see *Chapter 4.3.5.1, page 194*).

[Backup]

Opens the window **Backup the database** for backing up the database selected in the table (see *Chapter 4.3.6, page 197*).

[Restore:]

Opens the window **Restoration of databases** for restoring backed-up databases (see *Chapter 4.3.7, page 198*).

[Close]

Closes the window **Database manager**.

4.3.2 Create new database

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Edit]** ▶ **New...** ▶ **New database**

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

Name

Name of the new database.

Input	50 characters
Default value	New database #



Note

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

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

4.3.3 Rename database

Dialog window: **Database ► File ► Database manager... ► Database manager ► [Edit] ► Rename... ► Rename database**

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

Rename database 'Name' to

Entry of the new database name.

Input	50 characters



Note

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

4.3.4 Deleting database

Menu item: **Database ▶ File ▶ Database manager... ▶ Database manager ▶ [Edit] ▶ Delete**

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



Note

Databases that are open cannot be deleted.

4.3.5 Database properties

4.3.5.1 Database properties - Overview

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Properties]** ▶ **Properties - Database**

The properties for a database are set on the following tabs:

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

4.3.5.2 Database properties - General

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Properties]** ▶ **Properties - Database** ▶ **General**

General information about the database.

Comment

Freely definable remarks about the database.

Input

250 characters

Number of records

Shows the number of data sets on the database.

Shows the size of the database in KB.

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

Full name of the user who created the database.

Shows the date and time of the last modification of the database properties.

Shows the name of the user (abbreviation) who carried out the modifications.

Access rights to the database for user groups.

Shows the user groups defined in the user manager.

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

Enabling/disabling the right to open the database. The database can only be displayed, but not modified (records cannot be deleted or revised).

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

Enabling/disabling the right to edit the database. Records can be revised or deleted.

Note

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



4.3.5.5 Database properties - Monitoring

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Properties]** ▶ **Properties - Database** ▶ **Monitoring**

Defines database monitoring.

Monitoring size

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

enables/disables size monitoring 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 message also appears when the database is opened.

Maximum size

Maximum permitted database size in MB.

Range	1 ... 2147483647 MB
Default value	10 MB

Monitoring number of records

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

enables/disables the monitoring of the number of data sets for the selected database. If this 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 message also appears when the database is opened.

Maximum number

Maximum permitted number of data sets for database.

Range	1 ... 2147483647
Default value	1000

4.3.6 Backup database manually

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

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

Selection of a backup file.

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

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

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

Shows the size of the database in KB.

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 Templates

4.4.1 Report templates

4.4.1.1 Manage report templates

4.4.1.1.1 Report template manager

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager**

The menu item **Tools ▶ Report templates ▶ Manager...** is used to open the window **Report template manager**.

List of report templates

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

Name

Name of report template.

Saved

Date and time when the report template was saved.

Saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Window menus

The menu **[Edit]** below the list of report templates contains the following menu items:

Rename...	Rename the selected report template (<i>see Chapter 4.4.1.1.2, page 201</i>).
Copy	Copy the selected report template(s) (<i>see Chapter 4.4.1.1.3, page 201</i>).
Delete...	Delete the selected report template(s) (<i>see Chapter 4.4.1.1.4, page 201</i>).
Export...	Export the selected report template(s) (<i>see Chapter 4.4.1.1.5, page 201</i>).
Import...	Import report templates (<i>see Chapter 4.4.1.1.6, page 202</i>).

4.4.1.1.2 Rename report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Rename... ▶ Rename report template**

With the menu item **Edit ► Rename...** in the window **Report template manager**, the window **Rename report template** opens for renaming the selected report template.

Rename report template 'Name' to

Entry of the new name for the report template.

Input	50 characters



Note

The name of the report template must be unambiguous in the whole Client/Server system.

4.4.1.1.3 Copy report template

Menu item: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Copy**

With the menu item **Edit ► Copy** in the window **Report template manager** the selected report templates are copied under the name **Copy of 'Report template name'**.

4.4.1.1.4 Delete report templates

Menu item: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Delete...**

With the menu item **Edit ► Delete...** in the window **Report template manager** the selected report templates are deleted.

4.4.1.1.5 Export report templates

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Manager... ▶ Report template manager ▶ [Edit] ▶ Export... ▶ Select directory for export**

With the menu item **Edit ► Export...** in the window **Report template manager** the selected report templates are each exported in a file with the name **'Name'.mrep**. The window **Select directory for export** opens in which the directory for export must be selected.

4.4.1.1.6 Import report templates

Dialog window: **Database** ▶ **Tools** ▶ **Report templates** ▶ **Manager...** ▶ **Report template manager** ▶ **[Edit]** ▶ **Import...** ▶ **Select files for import**

With the menu item **Edit ► Import...** in the window **Report template manager** the dialog window **Select files for import** opens in which the report templates to be imported must be selected. The report templates are then imported.

4.4.1.2 Create new report template

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

New form report

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

In the **Form report** the report section always includes the whole area between the header and the footer. This means that for each determination at least one page will always be produced.

New tabular report

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

In the **Tabular report** the report section can be set with the mouse. For each data set one such report section will be filled with data and placed on the page row by row. In this way tabular reports can be created from several determinations.

4.4.1.3 Open report template

Dialog window: **Database ▶ Tools ▶ Report templates ▶ Open... ▶ Open report template**

With the symbol  or the menu item **Tools ▶ Report templates ▶ Open...** the window **Open report template** opens in which one of the globally available report templates can be selected and opened.

List of report templates

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

Name

Name of report template.

Date and time when the report template was saved.

Short name of the user who saved the report template.

Comment on the report template.

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

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

Which determination data and which other items (e.g. text fields, images, graphics elements) are to be produced in a report are defined in report templates. The templates can be created or edited in their own program window and then saved globally under a unique name. They are used for the automatic production of reports in determinations or for manual report production from the database.

There are two basically different types of report template:

- **Form report**

In the Form report the report section always includes the whole area between the header and the footer. This means that for each determination at least one page will always be produced.

- **Tabular report**

In the Tabular report the report section can be set with the mouse. For each data set one such report section will be filled with data and placed on the page row by row. In this way tabular reports can be created from several determinations.

4.4.1.4.1.2 Report template - Desktop

Program window: **Database** ► **Report template**

Elements

The desktop of the program window **Report template** has the following elements:

- *Menu bar*
- *General toolbar*
- *Module-specific toolbar*
- *Module bar*
- *Main window*

4.4.1.4.1.3 Report template - Menu bar

4.4.1.4.1.3.1 Report template - Main menu

Program window: **Database** ► **Report template**

The menu bar in the program window **Report template** has the following main menu items:

- *File*
Save report template, page setup, page preview, close window.
- *Edit*
Undo, redo, cut, copy, paste, delete, enter comment.
- *View*
Update view, page navigation.
- *Insert*
Insert pages.
- *Tools*
Options.
- *Help*
Open Program Help.

4.4.1.4.1.3.2 Report template - Menu File

Program window: **Database** ► **Report template**

 Save	Save an opened report template (<i>see Chapter 4.4.1.4.2.11, page 216</i>).
Save as	Save an opened report template under a new name (<i>see Chapter 4.4.1.4.2.11, page 216</i>).
Page setup...	Set up the layout for the report template (<i>see Chapter 4.4.1.4.2.2, page 208</i>).
 Page preview	Set up the layout for the report template (<i>see Chapter 4.4.1.4.2.8, page 214</i>).

 Print (PDF)...	Show the report template with the data of the selected determination as a PDF-file.
Close	Close the program window Report template .

4.4.1.4.1.3.3 Report template - Menu Edit

Program window: **Database ► Report template**

 Undo:	Undo the last action.
 Restore:	Restore the undone action.
 Cut	Cut selected items and copy them to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Copy	Copy the selected items to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Insert	Insert out the marked items from the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Delete	Delete the marked items (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Comment	Enter comments on the report template (<i>see Chapter 4.4.1.4.2.9, page 215</i>).

4.4.1.4.1.3.4 Report template - Menu View

Program window: **Database ► Report template**

Update	Update the view.
First page	Show the first page of the report template (<i>see Chapter 4.4.1.4.2.4, page 211</i>).
Previous page	Show the previous page of the report template (<i>see Chapter 4.4.1.4.2.4, page 211</i>).
Next page	Show the next page of the report template (<i>see Chapter 4.4.1.4.2.4, page 211</i>).
Last page	Shows the last page of the report template (<i>see Chapter 4.4.1.4.2.4, page 211</i>).

4.4.1.4.1.3.5 Report template - Menu Insert

Program window: **Database ► Report template**

Page before	Insert a new page in front of the shown page (<i>see Chapter 4.4.1.4.2.4, page 211</i>).
Page after	Inserts a new page after the shown page (<i>see Chapter 4.4.1.4.2.4, page 211</i>).



4.4.1.4.1.3.6 Report template - Menu Tools

Program window: **Database** ► **Report template**

Options...	Set options for the report template (see Chapter 4.4.1.4.2.10, page 215).

4.4.1.4.1.3.7 Report template - Menu Help

Program window: **Database** ► **Report template**

 **tiamo Help** Open tiamo Help.

4.4.1.4.1.4 Report template - General toolbar

Program window: **Database** ► **Report template**

 Save	Save an opened report template (<i>see Chapter 4.4.1.4.2.11, page 216</i>).
 Page preview	Set up the layout for the report template (<i>see Chapter 4.4.1.4.2.8, page 214</i>).
 Print (PDF)...	Show the report template with the data of the selected determination as a PDF-file.
 Undo:	Undo the last action.
 Restore:	Restore the undone action.
 Cut	Cut selected items and copy them to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Copy	Copy the selected items to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Insert	Insert out the marked items from the clipboard (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
 Delete	Delete the marked items (<i>see Chapter 4.4.1.4.2.6, page 212</i>).
	Select zoom level (<i>see Chapter 4.4.1.4.2.7, page 213</i>).
 Grid	Switch the grid display on and off (<i>see Chapter 4.4.1.4.2.10, page 215</i>).
 Snap to grid	Switch snap at grid on and off (<i>see Chapter 4.4.1.4.2.10, page 215</i>).

4.4.1.4.1.5 Report template - Module-specific toolbar

Program window: **Database ► Report template**

Depending on the module selected in the report template, other symbols and input fields are shown below the general toolbar, with which the properties of these modules can be directly edited (see Chapter 4.4.1.4.1.6, page 207).

4.4.1.4.1.6 Report template - Module bar

Program window: **Database ► Report template**

 Select modules	If this option is switched on then modules in the report template can be selected, reduced/enlarged and moved (see Chapter 4.4.1.4.2.6, page 212).
 Text field	If this option is switched on then text fields can be inserted in the report template (see Chapter 4.4.1.4.3.1, page 217).
 Data field	If this option is switched on then data fields can be inserted in the report template (see Chapter 4.4.1.4.3.2, page 218).
 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 (see Chapter 4.4.1.4.3.3, page 220).
 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 (see Chapter 4.4.1.4.3.4, page 222).
 Page number	If this option is switched on then fields can be inserted in the report template in which the page number is entered (see Chapter 4.4.1.4.3.5, page 224).
 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 (see Chapter 4.4.1.4.3.6, page 225).
 Fixed report	If this option is switched on then fixed reports can be inserted in the report template (see Chapter 4.4.1.4.3.7, page 227).
 Group field	If this option is switched on then group fields can be inserted in the report template (see Chapter 4.4.1.4.3.8, page 228).
 Image	If this option is switched on then images can be inserted in the report template (see Chapter 4.4.1.4.3.9, page 229).



 Line	If this option is switched on then lines can be inserted in the report template (see Chapter 4.4.1.4.3.10, page 230).
 Rectangle	If this option is switched on then rectangles can be inserted in the report template (see Chapter 4.4.1.4.3.11, page 232).
 Curve	If this option is switched on then curves can be inserted in the report template (see Chapter 4.4.1.4.3.12, page 233).
Calibration curve	If this option is switched on then calibration curves can be inserted in the report template (see Chapter 4.4.1.4.3.13, page 234).

4.4.1.4.2 Report template - Functions

4.4.1.4.2.1 Report template - Function overview

Program window: **Database** ► **Report template**

In the program window **Report template** the following functions can be executed:

- *Page setup*
- *Define sections in main window*
- *Insert report pages*
- *Insert modules*
- *Edit modules*
- *Zooming*
- *Show page view*
- *Enter comment on report template*
- *Define options for report template*
- *Save report template*

4.4.1.4.2.2 Report template - Page setup

Dialog window: **Report template** ▶ **File** ▶ **Page setup...** ▶ **Page setup**

With the menu item **File ► Page setup...** in the window **Report template** the dialog window **Page setup** opens in which the report format settings can be made.

General

only for form report

Settings

Selection	Apply to current page Apply to all pages
Default value	Apply to current page

Apply to current page

The page settings are only applied for the currently selected report page.

Apply to all pages

The page settings are applied for all report pages.

Page format**Page format**

Selection of the page format. The width and height of the paper can be defined with **User-defined**.

Selection	A4 Letter Legal User-defined
Default value	A4

Width

Width of the page format. This parameter can only be edited for **Page format= User-defined**

Range	0.0 ... 499.0 mm
Default value	210.0 mm

Height

Height of the page format. This parameter can only be edited for **Page format= User-defined**

Range	0.0 ... 499.0 mm
Default value	297.0 mm

Orientation

Selection of the page format.

Selection	Portrait Landscape
Default value	Portrait

Page margins**Top**

Upper page margin.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Bottom

Lower page margin.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Left

Left-hand page margin.

Range	0.0 ... 499.0 mm
Default value	20.0 mm

Right

Right-hand page margin.

Range	0.0 ... 499.0 mm
Default value	20.0 mm

Layout

Header

Height of header.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Footer

Height of footer.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Determination height

Height of the section for a single determination on a tabular report.

only for tabular report

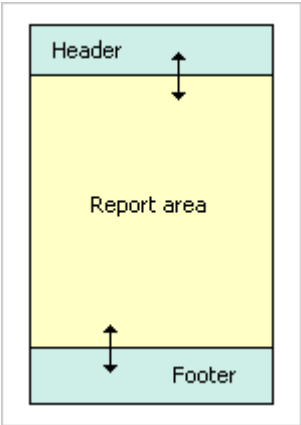
Range	0.0 ... 499.0 mm
Default value	25.0 mm

4.4.1.4.2.3 Report template - Define sections

Program window: Database ▶ Report template

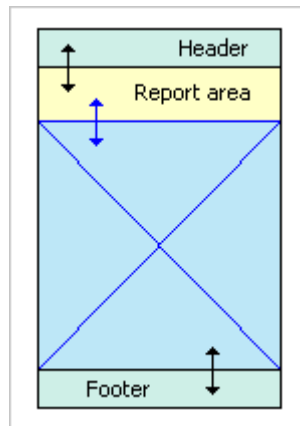
Define sections for form report

The header, footer and report sections can be enlarged and reduced with the left-hand mouse key.



Defining sections for tabular report

The header, footer and report sections can be enlarged and reduced with the left-hand mouse key.



4.4.1.4.2.4 Report template - Insert pages

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

Note

It is not possible to insert pages in templates for tabular reports.

Inserting page before

With the menu item **Insert ► Page before** in the program window **Report template** a new empty report report page is inserted before the report page shown.

Insert page after

With the menu item **Insert ► Page after** in the program window **Report template** a new empty report report page is inserted after the report page shown.

Navigating

In report templates with several pages the navigation bar can be used to switch to the required page.



Jumps to first page.



[Jumps to previous page.](#)



Jumps to next page.



Jumps to last page.

4.4.1.4.2.5 Report template - Insert modules

Program window: **Database** ► **Report template**

In order to insert a module in a report template the corresponding symbol must be selected on the module bar and then placed on the report template by creating a field with the left-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, Retangle, Curve, Calibration curve
- **Report section**
Text field, Data field, Date field, Time field, Fixed report, Group field, Image, Line, Rectangle, Curve, Calibration curve
- **Footer**
Text field, Data field, Date field, Time field, Page number, Number of pages, Image, Line, Retangle, Curve, Calibration curve

Tabular report

The following modules can be inserted in a tabular report:

- **Header**
Text field, Date field, Time field, Page number, Number of pages, Image, Line, Rectangle
- **Report section**
Text field, Data field, Date field, Time field, Group field, Image, Line, Rectangle,
- **Footer**
Text field, Date field, Time field, Page number, Number of pages, Image, Line, Rectangle

4.4.1.4.2.6 Report template - Edit modules

Program window: **Database** ► **Report template**

Enable selection

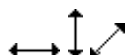


This symbol in the Module bar must be switched on in order to be able to select modules in a report template for editing.

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

Several modules are selected by drawing a frame around the required modules with the left-hand mouse key.

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 reduced and enlarged respectively on the report template with the left-hand mouse key pressed down.

Cut the selected modules and copy them to the clipboard.



Copy the selected modules to the clipboard.



Paste modules from the clipboard.



Delete the selected module.

Open the properties window for the selected module. Alternatively the properties can also be edited directly below the toolbar.

4.4.1.4.2.7

Program window: **Database** ► **Report template**



With this list box on the toolbar the required zoom step for showing the report template can be selected in steps of **25%** from **25%** to **400%**.

4.4.1.4.2.8 Report template - Page preview

Preview window: **Report template** ▶ **File** ▶ **Page preview** ▶ **Report preview**

With the symbol  or the menu item **File ► Page preview** in the program window **Report template** the window **Report preview** opens in which a page preview of the report template is shown with the data of the determinations selected in the determination overview.

Functions



Produces displayed report as PDF-file.



Selects the required zoom step for displaying the report preview, range **25%** to **400%** in steps of **25%**.

Select report page

In report templates with several pages the navigation bar **Page** can be used to switch to the required page.



Jumps to first page.



Jumps to previous page.



Jumps to next page.



Jumps to last page.

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.



Dialog window: **Report template** ▶ **Edit** ▶ **Comment** ▶ **Comment**

Comment

Input	1000 characters

Dialog window: **Report template** ► **Tools** ► **Options...**

Unit

Select the size unit for the report template.

Selection	mm cm inch
Default value	mm

X distance

Grid distance in X-direction.

Range	1.0 ... 100.0 mm
Default value	5.0 mm

Grid distance in Y-direction.

Range	1.0 ... 100.0 mm
Default value	5.0 mm

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

Switch the grid display on the report template on/off.

Snap at grid

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

Switch snapping at grid on the report template on/off.

Default font

Font

Select the default font for the report templates.

Selection	Arial Windows fonts
Default value	Arial

4.4.1.4.2.11 Report template - Save

Dialog window: **Report template ▶ File ▶ Save/Save as ▶ Save report template**

With the symbol  or the menu item **File ▶ Save** an existing opened report template will be saved again under its own name without opening the window **Save report template**.

When saving a newly created report template with the menu item **File ▶ Save** or when saving an existing report template with the menu item **File ▶ Save as** the window **Save report template** opens in which a name for the report template can be entered or selected.

List of report templates

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

Name

Name of report template.

Saved

Date and time when the report template was saved.

Saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Save report template

Name

Name under which the report template is to be saved.



Properties

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width of data field.

Range	0.0000 ... (max. page width) mm

Height of data field.

Range	0.0000 ... (max. page height) mm

Selection of the available Windows fonts.

Font size in pt.

Color selection.

Bold.

Italic.

Underlined.



Left-justified.



Centered.



Right-justified.



Switches line break on/off for multi-line data fields.



Fills the field with dots.

Prefix

Text placed in front of the data field contents.

Input	50 characters

Data field

Shows path and name of selected data field (the field cannot be edited directly). With  a window opens for selecting the data field in which all the available fields for the determination overview are shown in a tree structure. With a double-click on the required field the path and name of the data field are entered.

Suffix

Text placed after the data field contents.

Input	50 characters

Sample

Shows a formatted example of text.

4.4.1.4.3.3 Report template - Date field

Program window: **Database ▶ Report template**

Date fields are used for showing the current date in a report.



Insert

In order to insert a date field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of date field.

Range	0.0000 ... (max. page width) mm

Height

Height of date field.

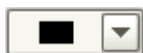
Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the date field contents.

Input	50 characters

Suffix

Text placed after the date field contents.

Input	50 characters

Sample

Shows the formatted date.

4.4.1.4.3.4 Report template - Time field

Program window: Database ▶ Report template

Time fields are used for showing the actual time in the report.

Insert



In order to insert a time field in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of time field.

Range	0.0000 ... (max. page width) mm

Height

Height of time field.

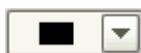
Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the contents of the time field.

Input	50 characters

Suffix

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

Input	50 characters

Sample

Shows the formatted time.

4.4.1.4.3.5 Report template - Page number

Program window: Database ▶ Report template

The actual page number in the report is produced in a page number field.

Insert



In order to insert page number field into a report template the corresponding symbol must be selected on the Module bar and then placed in the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of the page number field.

Range	0.0000 ... (max. page width) mm

Height

Height of the page number field.

Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the page number field.

Input	50 characters

Suffix

Text placed after the page number field.

Input	50 characters

Sample

Shows the formatted page number.

4.4.1.4.3.6 Report template - Number of pages

Program window: **Database ► Report template**

This field shows the total number of pages in the report.



Insert

In order to insert a number of pages field into a report template, the corresponding symbol must be selected on the Module bar and then placed in the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of the field.

Range	0.0000 ... (max. page width) mm

Height

Height of the field.

Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the field contents.

Input	50 characters

Suffix

Text placed after the field contents.

Input	50 characters

Sample

Shows the formatted number of pages.

4.4.1.4.3.7 Report template - Fixed report

Program window: **Database ► Report template**

Fixed reports are used for producing predefined part-reports of the determination in the report.

Insert



In order to insert a fixed report in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

Shows the predefined x-position for the fixed report.

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Shows the predefined width of the fixed report.

Height

Height of fixed report.

Range	0.0000 ... (max. page height) mm

Fixed report

Selection of a predefined fixed report.

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

Command name

Name of the command for which a measuring point list is to be produced. With **not defined**, the lists for all curves present in the determination will be produced as default.

These parameters appear only when **Fixed report = Measuring point list**.

Input	50 characters
Selection	not defined
Default value	not defined

4.4.1.4.3.8 Report template - Group field

Program window: **Database ► Report template**

A group field is for the purpose of grouping together a variety of fields in the report template. All of the fields gathered together in a group field can be moved together as a group. The group field prevents a page break inside the group field.

The group field always extends across the entire width of a page; only the upper edge (Y value) and the height of the field can be configured.



- Fixed report
- Curve
- Calibration curve

Properties

Shows the predefined x-position for the field.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Shows the predefined width of the fixed report.

Height of the field

Range	0.0000 ... (max. page height) mm

Report template - Image

An image field is used for including any external graphics on the report template. The file formats ***.jpg** and ***.gif** are supported.

In order to insert an image into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of image field.

Range	0.0000 ... (max. page width) mm

Height

Height of image field.

Range	0.0000 ... (max. page height) mm

Graphics file

Shows path and name of the selected graphics file (the field cannot be edited directly). With  a window opens for selecting the graphics file. The path and name of the graphics file are then entered.

Size

Entry how the image is to be displayed.

Selection	original proportional non-proportional
Default value	original

- original**
Original size.
- proportional**
Proportional enlargement or diminishment.
- non-proportional**
Non-proportional enlargement or diminishment.

4.4.1.4.3.10 Report template - Line

Program window: Database ► Report template
Any line can be inserted in the report template.



Insert

In order to insert a line in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Length

Length of the line.

Range	0.0 ... (max. page width) mm

Angle

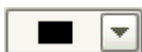
Angle of the line.

Range	0 ... 360.000 °

Thickness

Thickness of the line.

Range	0.1 ... 10.0 mm
Default value	0.5 mm



Selection of the line color.



Selection of the type of line.

4.4.1.4.3.11

Report template - Rectangle

Program window: **Database** ► **Report template**

Any rectangle can be inserted in the report template.

Insert



In order to insert a rectangle into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of the rectangle.

Range	0.0000 ... (max. page width) mm

Height

Height of the rectangle.

Range	0.0000 ... (max. page height) mm

Thickness

Thickness of the line for the rectangle.

Range	0.1 ... 10.0 mm
Default value	0.5 mm



Selection of the line color.



Selection of the type of line for the rectangle.



Switches the fill color on and off.

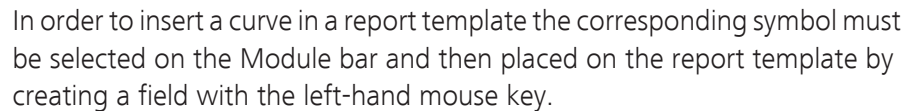


Report template - Curve field

Program window: **Database** ► **Report template**

Curve fields are used for showing determination curves in the report.

Insert



Properties



The properties are saved individually for each curve field. This means that it is possible, e.g., to show several different curves for the same measuring command beside one another in several curve fields.

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of curve field.

Range	0.0000 ... (max. page width) mm

Height

Height of curve field.

Range	0.0000 ... (max. page height) mm

Command type

Shows the command type for which a curve is to be produced.



X pos.

Range	0.0000 ... (max. page width) mm

Range	0.0000 ... (max. page height) mm

Range	0.0000 ... (max. page width) mm

Range	0.0000 ... (max. page height) mm

Default value **not defined**

4.4.2.1 Manage control chart templates

With the menu item **Tools ► Templates ► Control chart templates...** the dialog window **Control chart templates** opens in which the globally available templates for control charts can be managed.

Template table

The table with the defined templates cannot be edited. With a click on the column title it can be sorted according to the selected column in increasing or decreasing sequence.

Template name

Shows the name of the template.

Result

Shows the result for which the template can be used.

Comment

Shows the comments about the template.

Functions

[New]

Create new template. The dialog window **Properties - Control chart template** opens in which the properties for the new template can be defined.

[Properties]

The dialog window **Properties - Control chart template** opens, in which the properties of the template selected in the table can be edited.

[Delete]

Delete template.

[Copy]

Copies the template and saves it under the name **Copy of....**

4.4.2.2 Edit control chart templates

4.4.2.2.1 Control chart template - Properties

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

Template name

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

Input	50 characters

Tabs

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

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

4.4.2.2.2 Control chart template - Graphical parameters

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

Parameters for the graphical display of the control chart.

y axis

Result

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

Selection	RS01 RS02 RS03 RS04 RS05 RS06 RS07 RS08 RS09 RS10 RS11 RS12 RS13 RS14 RS15 RS16 RS17 RS18 RS19 RS20 RS21 RS22 RS23 RS24 RS25
Default value	RS01

Label

Freely definable axis labeling for the y axis.

Input	25 characters
Default value	Result

Background

Background color

Selection of the background color for the control chart.

Selection	Color selection white
Default value	white

Measured values

Shape

Selection of the symbol for the display of the measured values.

Selection	Symbol selection •
Default value	•

Color

Selection of the color for the measuring point symbol.

Selection	Color selection blue
Default value	blue

Link measured values

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

If this option is switched on then the measured value points will be joined together with a line.

4.4.2.2.3 Control chart template - Limit values

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

Definition of warning and intervention limits to be shown on the control chart.

Warning limits

Warning limits are always in **orange** on the control chart.

Lower limit

Lower warning limit.

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

Upper limit

Upper warning limit.

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

Intervention limits

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

Lower limit

Lower intervention limit.

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

Upper limit

Upper intervention limit.

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

4.4.2.2.4

Dialog window: **Database** ▶ **Tools** ▶ **Templates** ▶ **Control chart templates** ▶ **Properties**

Definition of the display of statistics data on the control chart.

Show statistics data

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

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 (Default value: **on**)

If this option is switched on then the **Mean value** will be shown on the control chart as a continuous line in the color of the measured value.

Draw in standard deviation

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

If this 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 chart as dotted lines in the color of the measured value.

4.4.2.2.5

Dialog window: **Database** ▶ **Tools** ▶ **Templates** ▶ **Control chart templates** ▶ **Properties**

Entry of comment on the control chart template.

Comment

Comment on control chart.

Input	1000 characters

4.4.3

4.4.3.1

Menu item: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates**

With the menu item **Tools, Templates, Curve overlay templates** the dialog window **Curve overlay templates** opens in which the globally available templates for curve overlay can be managed.

Template table

The table with the defined templates cannot be edited. With a click on the column title it can be sorted according to the selected column in increasing or decreasing sequence.

Template name

Shows the name of the template.

Command type

Shows the command type for which the template can be used.

Comment

Shows the comments about the template.

Functions

[New]

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 template selected in the table and save it under the name **Copy of...**

4.4.3.2 Edit curve overlay templates

4.4.3.2.1 Curve overlay - Properties

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties**

Template name

Name for the curve overlay template which is saved in the configuration database per client.

Input	50 characters

Command type

Selection of the command type from which curves are to be overlaid.

Selection	DET pH DET U DET Ipol DET Upol MET pH MET U MET Ipol MET Upol SET pH SET U SET Ipol SET Upol MEAS pH MEAS U MEAS Ipol MEAS Upol MEAS T MEAS Conc MEAS Cond CAL MEAS pH CAL MEAS Conc CAL Cond MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Spec MEAS Opt CAL Spec KFT Ipol KFT Upol KFC STAT pH STAT U DOS pH DOS U
Default value	DET pH

Autoscaling

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

If this option is enabled, the. In this case the fields **Start value** and **End value** cannot be edited.

Tabs

Further properties of a template for the overlaying of curves can be set on the following 4 tabs:

- *x axis*
Parameters for the graphical presentation of the overlaid curves on the x axis.
- *y axis*
Parameters for the graphical presentation of the overlaid curves on the y axis.
- *Options*
Options for the graphical display of the overlaid curves.
- *Comment*
Enter comment on the template.

4.4.3.2.2 Curve overlay - x axis

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties**

Parameters for the graphical presentation of the overlaid curves on the x axis.

x axis

Quantity

Selection of the quantity to be shown on the x axis.

Selection	Command-dependent selection

Label

Freely definable axis labeling for the x axis. With **auto** the label from the field **Size** will be used.

Input	25 characters
Default value	auto

Scaling

Start value

Initial value for scaling the x axis.

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

End value

End value for scaling the x axis.

Range	-1.0 E12 ... 1.0 E12
Default value	1000.0

4.4.3.2.3 Curve overlay - y axis

Dialog window: Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties

Parameters for the graphical presentation of the overlaid curves on the y axis.

y axis

Quantity

Selection of the quantity to be shown on the y axis.

Selection	Command-dependent selection

Label

Freely definable axis labeling for the y axis. With **auto** the label from the field **Size** will be used.

Input	25 characters
Default value	auto

Display measuring points

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

If this option is switched on then the individual measuring points will be shown on the curve.



Scaling

Initial value for scaling the y axis.

End value for scaling the y axis.

4.4.3.2.4 Curve overlay - Options

Options for the graphical display of the overlaid curves.

Display grid

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

If this option is enabled then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Grid color

Selection of the grid line color.

■■■■■■■ 243

Show endpoints

on | off (Default value: off)

If this option is enabled then the found endpoints will be indicated on the curve by the symbol  and labeled with **EP#** (potentiometric endpoints), **BP#** (break point) or **FP#** (fixed endpoint).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	Color selection black
Default value	black

Manual EPs

Selects the color for manually set endpoints.

Selection	Color selection pink
Default value	pink

Background

Background color

Selection of the color for the curve background.

Selection	Color selection white
Default value	white

Legend

Display of the data field, which is shown in the legend to identify the curves.



Open the dialog window **Legend - Field selection** for selecting the data field.

Multiple curves of the same command

Setting, which curves are displayed when the command has been run several times, e.g. because of a **LOOP** command or a multiple call of a **Track**.

Selection	Show only last curve Show all curves
Default value	Show only last curve

Show only last curve

Only the curve generated during the last run of the command is displayed.

Show all curves

The curves of all runs of the command are displayed.

Curve overlay - Comment

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties**

Entry of comment on the curve overlay template.

Comment

Comment on curve control chart template.

Input	1000 characters

Export templates

Export templates manager

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

With the menu item **Tools ▶ Templates ▶ Export templates**, the dialog window **Export templates** opens in which the globally available templates for manual or automatic export of determination data can be managed.

Template table

The table with the defined templates cannot be edited. 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 comment on the export template.

Functions

[New]

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

[Properties]

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

[Delete]

Delete the selected export template.

[Copy]

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

4.4.4.2 Edit export templates

4.4.4.2.1 Export template - Properties

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

[Properties] is used to open the dialog window **Export template 'Name'** in which the properties of the selected export template can be edited.

Name

Name of export template.

Input	50 characters

Comment

Freely definable comment on the export template.

Input	250 characters

Target directory

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

Input	1000 characters

File type

Selection of the file format for data export:

Selection	*.mdet (tiamo format) *.csv (comma-separated) *.slk (SLK format) *.xml (XML format) *.csv (measuring point list)
Default value	*.mdet (tiamo format)

***.mdet (tiamo format)**

Program-specific data exchange format that can only be imported into other tiAMO databases.

***.csv (comma-separated)**

Data exchange format with unformatted text that can be imported into other PC programs (e.g. Excel, Access).

***.slk (SLK format)**

Data exchange format with formatted text that can be imported into other PC programs (e.g. Excel).

***.xml (XML format)**

Data exchange format with XML code that can be imported into corresponding PC programs.

***.csv (measuring point list)**

Data exchange format for the measuring point list with unformatted text, which can be imported into corresponding PC programs. The text file contains a document header with date/time of the determination and the determination ID, then the measuring point lists of the separate commands are listed one after the other. Per measuring point list first the command name is listed followed by a header with the designations and the units of the measured values of the command. Then the list of the measuring points follows, each measuring point is listed in a separate line and consists of a time indication and all measured values generated by the command.

[Select fields]

Opens the dialog window **Select fields** in which the required fields for export can be selected, arranged in the required sequence and renamed.



Note

Field selection is only possible for the file types ***.csv** and ***.slk**. With ***.mdet** and ***.xml** always all fields will be exported.

[Options]

Opens the dialog window **Options**, in which the separators can be defined.



Note

The options can only be set for the data types ***.csv (comma separated)** and ***.csv (measuring point list)**.

File name

One of the following options can be selected for the definition of the name of the export file:

Selection	Determination ID Sample identification Request on each export Fixed file name (append data)
Default value	Determination ID

Determination ID

If this option is selected then the name of the export file will be formed from the unambiguous **Determination ID**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format.



Sample identification

If this option is selected then the name of the export file will be formed from the selected sample identification **ID1...ID16**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format. If the generated name already exists in the folder then a version number will additionally be appended to the date.

Request on each export

If this option is selected then the name of the export file will be requested at each export. In addition to the entered name the **Computer name** and the date stamp **-YYYYMMDD-HHMMSS** will be added automatically.

Fixed file name (append data)

If this option is selected then the name of the export file will be formed from the name entered here and the suffix for the format. If the file is already present in the folder then the data will be appended to this file.



Note

The option **Fixed file name** can only be selected for the file type ***.csv (comma separated)** or ***.slk (SLK format)**.

4.4.4.2.2 Export template - Select fields

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Select fields] ▶ Select fields**

With **[Select fields]** in the Properties window for export templates the dialog window **Select fields** opens in which the fields for data export for the file types ***.csv** and ***.slk** can be selected.

Available fields

Shows all the fields that can be exported.

Selected fields

Shows all the fields that will be exported.

Default name

Non-editable name of the field to be exported.

Displayed name

Field name that can be edited by the user for the exported field. The **Default name** is entered as default. If the field name is deleted then the **Default name** appears again.



Add selected field.



Remove selected field.



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



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

4.4.4.2.3 Export template - Options for CSV format

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Options] ▶ Options for CSV format**

With **[Options]** in the Properties window for export templates the dialog window **Options for CSV format** opens in which the separators can be defined.

Field separator

Selection of the field separator.

Selection	; , Tab
Default value	;

Record separator

Selection of the data set separator (**CR** = Carriage return, **LF** = Line feed).

Selection	CR/LF CR LF
Default value	CR/LF

Header

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

If this option is enabled, the column headers are exported at the beginning of the export file.

4.4.4.2.4 Export template - Options for measurement point list

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Options] ▶ Options for measurement point list**

With **[Options]** in the Properties window for export templates the dialog window **Options for measurement point list** opens in which the separators can be defined.

<code><userNameFull val="" /></code>	User name (full name)
<code><clientName val="" /></code>	Client name
<code><progVersion val="" /></code>	Program version - Build number
<code><licenseRoot val="" /></code>	License code
<code></System></code>	
<code></DeterminationReport></code>	



Note

dynamic= means that the following nodes can appear more than once.
The actual data is situated between " ".

4.4.4.3.1 XML export - Determination data

XML export

– <code><Determination></code>	Determination data
– <code><Identification></code>	Information about the identification of the determination.
<code><statisticLinkID val="" /></code>	Statistics ID: Unambiguous and unmistakable identification for the statistically linked determinations.
<code><determinationID val="" /></code>	Determination ID: Unambiguous and unmistakable identification for the determination.
<code><serverName val="" /></code>	Name of the server to which the client was connected when the determination was recorded.
<code><clientName val="" /></code>	Name of the client with which the determination was recorded.
<code><detCounter val="" /></code>	Sample number which was entered in the run window.
<code><startCounter val="" /></code>	Start counter
<code></Identification></code>	
– <code><Acquisition></code>	Information on recording the determination.
<code><determinationStart val="" /></code>	Date and time at start of determination.
<code><determinationDuration val="" /></code>	Duration of the determination from its start to its end or termination in s.

<determinationEndState val=""/>	Determination run (way in which the determination was ended):
	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
	Due to an error, the determination was cancelled automatically.
<userName val=""/>	Short name of user logged in at start of determination.
<userNameFull val=""/>	Full name of user logged in at start of determination.
<determinationNote val=""/>	Remark on determination
<progVersion val=""/>	Program version and build number of the program at recording the determination.
<licenseRoot val=""/>	License start number of the program at recording the determination.
</Acquisition>	
– <Version>	Information on the determination version.
<signOffState val=""/>	Signature status
	no
	Determination not signed.
	Level 1
	Determination signed on level 1.
	Level 2
	Determination signed on level 2.
<version val=""/>	Version of the determination.

<status val="original"/>

Determination status:

original

Determination data unaltered.

modified

Determination data altered.

<recalcDate val=""/>

Date and time when the reprocessed determination version was saved.

<recalcedBy val=""/>

Short name of user logged in when determination was reprocessed.

<recalcedByuserFull val=""/>

Full name of user logged in when determination was reprocessed.

<recalcReason val=""/>

Reason for the determination modification.

<changeComment val=""/>

User comment on the determination modification.

</Version>

– <Miscellaneous>

Different determination data.

<deterComment val=""/>

Comment, which has been entered on the determination.

– <runMessages dynamic="">

Messages

– <data>

Message

<subtype val=""/>

<msgSource val=""/>

Message source:

Shows from where the message comes:

Program

Message that cannot be assigned to a particular command.

Track 'Track name' - Command 'Command name'

Message produced by a command during the run.

<msgText val=""/>

Message text.

<msgTime val=""/>

Time at which the message was created in the run (date, time, UTC in the format **JJJ-MM-TT hh:mm:ss UTC...**).

<msgTitle val=""/>

Message title and number.

</data>

</runMessages>

– <DetermVars dynamic="">

Determination variables

– <data>

Determination variable

– `<comment>...</comment>` Comment on the signature.
`</data>`
`</signOff>`
`</Determination>`

4.4.4.3.2 XML export - Method data

XML export

– `<Method>` Method data
– `<Identification>` Information about the identification of the method.
`<methodName val=""/>` Name of the method.
`<methodGroup val=""/>` Name of method group to which the method belonged when the determination was carried out.
`<methodID val=""/>` Method ID:
Unambiguous and unmistakable identification for the method.
`<methodComment val=""/>` Method comment (**Command comment** on **START** command).
`</Identification>`
– `<Version>` Information about method version.
`<signOffState val=""/>` Signature status
no
Method not signed.
Level 1
Method signed at level 1.
Level 2
Method signed at level 2.
`<version val=""/>` Version of the method.
`<status val="original"/>` Method status:
original
Determination method unaltered.
modified (live)
Determination method has been modified live.
modified (reprocessed)
Determination method altered by **Reprocessing**.

<code><savingTime val=""/></code>	Date and time when the modified method version was saved.
<code><savingUser val=""/></code>	Short name of user logged in when modified method was saved.
<code><savingUserFull val=""/></code>	Full name of user logged in when modified method was saved.
<code><changeReason val=""/></code>	Reason for the method modification.
<code><changeComment val=""/></code>	User comment on the method modification.
<code></Version></code>	
– <code><signOff dynamic=""></code>	Signatures
– <code><data></code>	Signature
<code><subtype val=""/></code>	
– <code><signature></code>	
<code><vr val=""/></code>	Shows at which level the method has been signed (Level 1 or Level 2).
<code><</signature>></code>	
– <code><signDate>...</signDate></code>	Date and time at which the method was signed.
– <code><userName>...</userName></code>	Short name of the user who signed the method.
– <code><userNameFull>...</userNameFull></code>	Full name of the user who signed the method.
– <code><reason>...</reason></code>	Reason for signature.
– <code><comment>...</comment></code>	Comment on the signature.
<code></data></code>	
<code></signOff></code>	
<code></Method></code>	

4.4.4.3.3 XML export - Sample data

XML export

- <Sample>	Sample data
- <Smpl.Data>	Sample data
- <SmplPos>	Sample position.
- <data>	
<vr val=""/>	Variable value.

<vs val=""/>

Variable status:

OK = The value is ok and has not been monitored.

OKL = The value is ok and has been monitored.

LE = The value exceeded the limit and has not been monitored.

LEL = The value exceeded the limit and has been monitored..

NV = The value is invalid and has not been monitored.

NVL = The value is invalid and has been monitored.

<vt val=""/>

Variable type:

TX = Text

NR = Number

DT = Date/Time

NA = Unknown

Variable name

<vn val=""/>

</data>

</SmplPos>

– **<SmplSize>**

Sample size.

– **<data>...</data>**

see above

</SmplSize>

– **<SmplUnit>**

Sample size unit.

– **<data>...</data>**

see above

</SmplUnit>

<InputTime val=""/>

Date and time at which the sample size was entered.

<InputSource val=""/>

Data source for the sample size:

manual = manual data input.

'Device name' = Data input from balance or barcode reader (with Sartorius balances with their own data memory the memory number in parentheses is displayed additionally to the balance name).

'File name' = Data import from a file.

<SmplModReason val=""/>

Reason for the sample data modification.

<SmplModComment val=""/>

Comment on sample data modification.

<code><pr val="" /></code>	Name of the CALC command the result has been generated with.
<code><un val="" /></code>	Unit of the result.
<code><fo val="" /></code>	Formula used for the calculation of the result.
<code>- <fv dynamic=""></code>	Variables used for the calculation of the result.
<code>- <data></code>	
<code><vr val="" /></code>	Variable value.
<code><vs val="" /></code>	Variable status (<i>see above</i>).
<code><vt val="" /></code>	Variable type (<i>see above</i>).
<code><vn val="" /></code>	Variable name.
<code></data></code>	
<code></fv></code>	
<code>- <sme></code>	Mean value of the result.
<code>- <data></code>	
<code><vr val="" /></code>	Mean value with the number of decimal places defined in the CALC command.
<code><vf val="" /></code>	Mean value with full precision.
<code><vs val="" /></code>	Variable status (<i>see above</i>).
<code></data></code>	
<code><sme></code>	
<code>- <abs></code>	Absolute standard deviation of the result.
<code>- <data></code>	
<code><vr val="" /></code>	Absolute standard deviation with the number of decimal places defined in the CALC command.
<code><vf val="" /></code>	Absolute standard deviation with full precision.
<code><vs val="" /></code>	Variable status (<i>see above</i>).
<code></data></code>	
<code><abs></code>	
<code>- <rel></code>	Relative standard deviation of the result.
<code>- <data></code>	
<code><vr val="" /></code>	Absolute standard deviation with the number of decimal places defined in the CALC command.
<code><vf val="" /></code>	Relative standard deviation with full precision.

- <sme>	Mean value of the result.
- <data>	
<vr val="" />	Mean value with the number of decimal places defined in the CALC command.
<vf val="" />	Mean value with full precision.
<vs val="" />	Variable status (<i>see above</i>).
</data>	
<sme>	
- <abs>	Absolute standard deviation of the result.
- <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Absolute standard deviation with full precision.
<vs val="" />	Variable status (<i>see above</i>).
</data>	
<abs>	
- <rel>	Relative standard deviation of the result.
- <data>	
<vr val="" />	Absolute standard deviation with the number of decimal places defined in the CALC command.
<vf val="" />	Relative standard deviation with full precision.
<vs val="" />	Variable status (<i>see above</i>).
</data>	
<rel>	
<n val="" />	Number of the result among the statistically evaluated results.
<nmax val="" />	Maximum number of statistically evaluated results.
</data>	
<RS01>	
<RS02> ... <RS25>	Further single results (<i>see above</i>)
</ResultsSingle>	

4.4.4.3.6 XML export - Command data

XML export

- <CommandData dynamic="">	Command data
- <Command>	Data on command
<subtype val="" />	
<data val="" />	Command name.Index
<commandType val="" />	Command type.
- <CommandVars dynamic="">	Command variables
- <data>	
<vt val="" />	Variable type:
	TX = Text
	NR = Number
	DT = Date/Time
	NA = Unknown
<vn val="" />	Variable identification
<vr val="" />	Variable value.
</data>	
</CommandVars>	
- <Device>	Device data
- <deviceType>	Device type
<vn val="" />	Parameter name.
<vr val="" />	Parameter value.
</deviceType>	
- <deviceName> ... <device- Name>	Device name.
- <instrNo> ...</instrNo>	Device serial number.
- <deviceProgNo> ... <device- ProgNo>	Device program number.
- <rackName> ... </rackName>	Rack name.
- <rackCode> ... </rackCode>	Rack code.
- <towerNoOne> ... </tower- NoOne>	Tower number.

– <swingHeadOneType> ... </swingHeadOneType>	Type of Swing Head on tower 1.
– <swingHeadOneSerial> ... </swingHeadOneSerial>	Serial number of Swing Head on tower 1.
– <towerNoTwo> ... </towerNoTwo>	Tower number.
– <swingHeadTwoType> ... </swingHeadTwoType>	Type of Swing Head on tower 2.
– <swingHeadTwoSerial> ... </swingHeadTwoSerial>	Serial number of Swing Head on tower 2.
– <devicePorts dynamic="">	Data on the peripheral devices connected.
– <Port>	
<subtype val="" />	Type of the device connected to the port: XML_PORT_DEVICE_DOS = Dosing/Exchange unit XML_PORT_DEVICE_REMOTE = Remote box XML_PORT_DEVICE_STIR = Stirrer
– <dosPortName> ... </dosPortName>	Number of the MSB connector the dosing device was connected to.
– <dosType> ... </dosType>	Dosing device type.
– <dosSerial> ... </dosSerial>	Dosing device serial number.
– <exchDosUnit>	Data on exchange/dosing unit.
– <exdosTitle> ... </exdosTitle>	Designation of the exchange/dosing unit.
– <exdosName> ... </exdosName>	Name of the exchange/dosing unit.
– <exdosType> ... </exdosType>	Type of exchange/dosing unit.
– <exdosOrder> ... </exdosOrder>	Order number of exchange/dosing unit.
– <exdosSerial> ... </exdosSerial>	Serial number of exchange/dosing unit.
– <cylVol> ... </cylVol>	Volume of buret cylinder.
– <cylSerial> ... </cylSerial>	Serial number of buret cylinder.
– <Solution>	Data on solution.
– <solTitle> ... </solTitle> ...	Solution title.
– <solutionName> ... </solutionName>	Solution name.

<code><adcSerial val="" /></code>	Serial number of measuring input.
<code><tempSensorType val="" /></code>	Type of temperature sensor (Pt 1000 or NTC).
<code><tempSensorValue25 val="" /></code>	Nominal resistance of connected NTC sensor.
<code><tempSensorSlope val="" /></code>	Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.
<code></measInput></code>	
<code>– <sensorData></code>	Data on sensor.
<code><sensorName val="" /></code>	Sensor name.
<code><sensorType val="" /></code>	Sensor type.
<code><sensorOrderNo val="" /></code>	Order number of sensor.
<code><sensorSerialNo val="" /></code>	Serial number of sensor.
<code><sensorInitDate val="" /></code>	Date on which the sensor was used for the first time.
<code><sensorCellConst val="" /></code>	Cell constant of the conductivity sensor.
<code><sensorSlope val="" /></code>	Slope of the sensor.
<code><sensorPh0 val="" /></code>	Electrode zero point of the pH sensor.
<code><sensorIonVa val="" /></code>	Ion (valency) of the ISE sensor.
<code><sensorE0 val="" /></code>	Electrode zero point of the sensor.
<code><sensorC val="" /></code>	Blank value of the ISE sensor.
<code><sensorCalTemp val="" /></code>	Calibration temperature.
<code><sensorCalDate val="" /></code>	Calibration date.
<code><sensorCalMethod val="" /></code>	Calibration method.
<code><sensorCalMeasInput val="" /></code>	Measuring input at calibration.
<code></sensorData></code>	
<code></Sensor></code>	
<code></Device></code>	
<code>– <CalibData></code>	Calibration data
<code><sensorName val="" /></code>	Sensor name.
<code><sensorType val="" /></code>	Sensor type.
<code><sensorSlope val="" /></code>	Slope of the sensor.
<code><sensorPh0 val="" /></code>	Electrode zero point of the pH sensor.
<code><sensorIonVa val="" /></code>	Ion (valency) of the ISE sensor.
<code><sensorE0 val="" /></code>	Electrode zero point of the sensor.

<variance val="" />	Variance.
– <StdAddTable>	Standard addition solutions.
– <header>	Column headers.
<RowDesc val="" />	Column header for measuring solution.
<dV val="" />	Column header for addition volume.
<MeasVal val="" />	Column header for measured value.
<dU val="" />	Column header for measured value difference.
<Dur val="" />	Column header for measuring time.
</header>	
– <body dynamic="">	
– <data>	
<RowDesc> ... </RowDesc>	Measuring solution.
<dV> ... </dV>	Addition volume in mL.
<MeasVal> ... </MeasVal>	Measured value in mV.
<dU> ... </dU>	Measured value difference in mV.
<Dur> ... </Dur>	Measuring time in s.
</data>	
</body>	
</StdAddTable>	
</StdAddData>	
– <MeasPoints content-Type="table">	Measuring points
– <tableHeader>	Column headers.
– <th>	
<vr val="" />	Column header.
</th>	
</tableHeader>	
– <tableBody>	Measuring points.
– <td>	
<vr val="" />	
<vf val="" />	
</td>	

```

</tableBody>
</MeasPoints>
- <EndPoints dynamic="">
- <data>
<ept val="" />
<epvx val="12.1835" />
<epux val="mL" />
<epvy val="518.5" />
<epuy val="mV" />
</data>
</EndPoints>
- <Monitoring dynamic="">
- <Monitoring>
<subtype val="" />
<monType val="" />
- <MonitorTable>
- <header>
<time val="" />
<limit val="" />
<limitVal val="" />
<monVal val="" />
<volume val="" />
<otherVal val="" />

<action val="" />
</header>
- <body dynamic="">
- <data>
<time> ... </time>
<limit> ... </limit>
<limitVal> ... </limitVal>
<monVal> ... </monVal>

```

Endpoints

Designation of the endpoint
X value of the endpoint.
Unit of the x value of the endpoint.
Y value of the endpoint.
Unit of the y value of the endpoint.

Monitoring data

Data on monitoring.

Monitoring type.

Monitored value.

Event during monitoring.

Column headers.

Column header for time.

Column header for limit value type.

Column header for limit value.

Column header for measured value.

Column header for volume.

Column header for temperature, measured value pH or measured value mV.

Column header for action.

<code><volume> ... </volume></code>	Volume in mL.
<code><otherVal> ... </otherVal></code>	Temperature, measured value pH or measured value mV.
<code><action> ... </action> ...</code>	Action.
<code></data></code>	
<code></body></code>	
<code></MonitorTable></code>	
<code></Monitoring></code>	
<code></Monitoring></code>	
<code></Command></code>	
<code></CommandData></code>	

4.4.4.3.7 XML export - Common Variables

XML export

<code>- <Comvars dynamic></code>	Common variables
<code>- <data></code>	
<code><subtype val="" /></code>	
<code><vr val="" /></code>	Variable value.
<code><vs val="" /></code>	Variable status:
	OK = The value is ok and has not been monitored.
	OKL = The value is ok and has been monitored.
	LE = The value exceeded the limit and has not been monitored..
	LEL = The value exceeded the limit and has been monitored..
	NV = The value is invalid and has not been monitored.
	NVL = The value is invalid and has been monitored.
<code><vt val="" /></code>	Variable type:
	TX = Text
	NR = Number
	DT = Date/Time
	NA = Unknown
<code><vn val="" /></code>	Variable name.
<code><un val="" /></code>	Unit of the variable.

– <dateRecDarkRefSpec> ... </dateRecDarkRefSpec>	Recording time of dark and reference spectrum.
– <userRecDarkRefSpec> ... </userRecDarkRefSpec>	User during recording of the dark and reference spectrum.
– <methodRecDarkRefSpec> ... </methodRecDarkRefSpec>	Method during recording of the dark and reference spectrum.
– <detIDRecDarkRefSpec> ... </detIDRecDarkRefSpec>	Determination ID of the recording of the dark and reference spectrum.
– <calibDate> ... </calibDate>	Calibration date.
– <calibUser> ... </calibUser>	User during calibration.
– <calibMethod> ... </calibMethod>	Calibration method.
– <calibDetID> ... </calibDetID>	Determination ID of calibration.
– </spectroData>	
– <devicePorts dynamic="">	Data on the peripheral devices connected.
– <Port>	
<subtype val="" />	Type of the device connected to the port: XML_PORT_DEVICE_DOS = Dosing/Exchange unit XML_PORT_DEVICE_REMOTE = Remote box XML_PORT_DEVICE_STIR = Stirrer
– <dosPortName> ... </dosPortName>	Number of the MSB connector the dosing device was connected to.
– <dosType> ... </dosType>	Dosing device type.
– <dosSerial> ... </dosSerial>	Dosing device serial number.
– <exchDosUnit>	Data on exchange/dosing unit.
– <exdosTitle> ... </exdosTitle>	Designation of the exchange/dosing unit.
– <exdosName> ... </exdosName>	Name of the exchange/dosing unit.
– <exdosType> ... </exdosType>	Type of exchange/dosing unit.
– <exdosOrder> ... </exdosOrder>	Order number of exchange/dosing unit.
– <exdosSerial> ... </exdosSerial>	Serial number of exchange/dosing unit.
– <cylVol> ... </cylVol>	Cylinder volume of exchange/dosing unit.
– <cylSerial> ... </cylSerial>	Cylinder serial number of exchange/dosing unit.

– <usedSensors dynamic="">	Sensor data
– <Sensor>	Data on sensor.
<subtype val="" />	Type of sensor: XML_SENSOR_OTHER = Other sensor XML_SENSOR_PH = pH sensor XML_SENSOR_ION = ISE sensor XML_SENSOR_METAL = Metal sensor XML_SENSOR_TEMP = Temperature sensor XML_SENSOR_COND = Conductivity sensor
– <measInput>	Data on measuring input.
<adcInputName val="" />	Number of measuring input.
<adcType val="" />	Type of analog/digital converter.
<adcSerial val="" />	Serial number of measuring input.
<tempSensorType val="" />	Type of temperature sensor (Pt 1000 or NTC).
<tempSensorValue25 val="" />	Nominal resistance of connected NTC sensor.
<tempSensorSlope val="" />	Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.
</measInput>	
– <sensorData>	Data on sensor.
<sensorName val="" />	Sensor name.
<sensorType val="" />	Sensor type.
<sensorOrderNo val="" />	Order number of sensor.
<sensorSerialNo val="" />	Serial number of sensor.
<sensorInitDate val="" />	Date on which the sensor was used for the first time.
<sensorSlope val="" />	Slope of the sensor.
<sensorCellConst val="" />	Cell constant of the conductivity sensor.
<sensorPh0 val="" />	Electrode zero point of the pH sensor.
<sensorIonVa val="" />	Ion (valency) of the ISE sensor.
<sensorE0 val="" />	Electrode zero point of the sensor.
<sensorC val="" />	Blank value of the ISE sensor.
<sensorCalTemp val="" />	Calibration temperature.
<sensorCalDate val="" />	Calibration date.

</TcSampleSolution>
</TcSampleSolutions>

4.4.4.3.11 XML export - Method parameters

XML export

– <MethodParams dynamic=""> Method parameters
– <Command> Data on command.
<subtype val="" />
<COMMANDTYPE val="" /> Command type.
– <BLOCKNAME> Command name.
<vn val="" /> Parameter designation.
<vr val="" /> Parameter value.
</BLOCKNAME>
– <'Parameter name'> Data on tab or parameter.
<vn val="" /> Parameter name.
<vr val="" /> Parameter value.
<un val="" /> Parameter unit.
</'Parameter name'>
</Command>
</MethodParams >

4.4.4.3.12 XML export - Statistical data

XML export

– <Statistics> Statistical data
<subtype val="" />
<nMax val="" /> Maximum number of statistically evaluated results.
– <StatisticsShort dynamic=""> Statistical data on the separate results.
– <data>
<subtype val="" />
– <resName>
<vr val="" /> Result name.
</resName>
– <n> ... </n> Number of the result among the statistically evaluated results.

4.5 Determination overview

4.5.1 Determination overview - General

4.5.1.1 Determination overview - Overview

Subwindow: **Database ► Determination overview**

General

The subwindow **Determination overview** shows selected data for the determinations contained in the open database in tabular form. It is always shown in the program part **Database**, i.e. it cannot be removed from the Database view. The subwindow can be enlarged and reduced as required; it can also be maximized.

Elements

The subwindow **Determination overview** includes the following tools:

- *Determination table*
- *Filter selection*
- *Navigation bar*

4.5.1.2 Determination overview - Table

Subwindow: **Database ► Determination overview**

Data display

In the determination table the information about the determinations defined under **Column display** is shown. If the contents of a field is larger than the column width then the whole contents will be shown as a **tooltip** if the mouse cursor is kept on the field.

If the value of a result is monitored and lies within the limits defined, then it will be shown in **green**. If it is outside these limits then the value will be shown in **red**.



Note

Lines that contain red entries will also show the line number with a red background.

Updating

As long as the program part **Database** remains open alterations in the determination table, caused by running determinations or by other users (addition, editing or deletion of data sets), will not be shown automatically. The table must either be updated with **View ► Update** or newly sorted or filtered. Each switch from a different program part to the program part **Database** automatically updates the determination table.



Move selected column downwards.

Subwindow: **Database ▶ Determination overview**

Selection of the filter according to which the Determination table is to be filtered:

The table is filtered according to the selected and saved **Special filter**.

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.

Only the last determination is shown for all statistics series.

[Page Up]

Pages backward within the current set.

[Page Down]

Pages forward within the current set.

[Alt] [End]

Jumps to last determination (of all).

[Alt] [Home]

Jumps to first determination (of all).

[Alt] [↑]

Jumps to first data set of previous set.

[Alt] [↓]

Jumps to first data set of next set.

In the determination table it is not possible to show more than 200 determinations at once. If more than 200 determinations are present in the database then the Navigation bar must be used to switch to further sets of determinations.

4.5.1.7 Determination overview - Data record selection

Subwindow: **Database ► Determination overview**

The determinations selected in the table are shown in **turquoise**, the focused determination whose data is shown in the other Subwindows is indicated by an arrow in front of the line number. When a database is opened the first determination is always selected and focused.

The following possibilities are available for the selection of determinations in the determination table:

- **Single determinations**

Single determinations are selected by clicking on them with the mouse within the line (including line number). This determination, whose data is shown in the other opened subwindows, is now focused and receives an arrow in front of the line number.

- **Several determinations in sequence**

In order to select several determinations in sequence the required range can be selected with the left-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.

4.5.1.8 Determination overview - Functions

Subwindow: **Database ▶ Determination overview**

With the determinations selected in the Determination table the following functions can be carried out:

Editing determinations

- *Update determination overview*
- *Enter determination comment*
- *Sign determinations*
- *Export determinations*
- *Import determinations*
- *Reprocess determinations*
- *Delete determinations*

Search and filter determinations

- *Search determinations*
- *Filter determinations*

Other functions

- *Display determination method*
- *Display determination history*
- *Display calibration curve*
- *Display control chart*
- *Overlay curves*
- *Print control chart*
- *Print report*

4.5.2 Determination overview - Functions

4.5.2.1 Update determination overview

Menu item: **Database ▶ View ▶ Update**

The menu item **View ► Update** or the symbol  is used to update the determination table.



4.5.2.2 Determination comment

Dialog window: **Database** ▶ **Determinations** ▶ **Comment...** ▶ **Determination comment**

With the menu item **Determinations ► Comment...** or the symbol  the dialog window **Determination comment** opens in which new comments on the selected determination can be entered an existing comment can be edited.

Comments entered this way appear automatically as a Tooltip text when the cursor line is kept on the number field of a line in the determination table for more than 1 second. In addition, it is also displayed in the subwindow **Information**.

4.5.2.3 Search determinations

Dialog window: **Database ► Determinations ► Search... ► Search - Database**

With the menu item **Determinations ▶ Search...** or the symbol , the dialog window **Search - Database** opens for the search for determinations.

Search in

Selects the data field in which the search is to be carried out.

Selection	All fields 'Field name'
All fields	
A search is made in all fields of the database.	
'Field name'	
A search is made only in the selected field. The 10 most recently selected fields are always available for selection.	

[Other...]

Open the dialog window **Search - Field selection**. All fields are listed in tree-form. A field can be included in the search by marking it and then closing the dialog with **[OK]**.

Details

Depending on the data field, further selection fields are created under Details in order to be able to select the desired property.

Search options

Type

Selection of the type of format for fields in which several types are possible.
For fields with a fixed type only this type will be shown.

Selection	Text Date Number
Default value	Text

Operator

Selection of the comparison operator for the search criterion.

for fields of the type = text

Selection	=	<> empty not empty
Default value	=	

for fields of the type = date

Selection	= <> < <= > >= empty not empty invalid out of limits Today
Default value	=

invalid

A search is made for values with the entry **invalid**.

out of limits

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

Today

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

for fields of the type = number

Selection	= <> < <= > >= empty not empty invalid out of limits
Default value	=

invalid

A search is made for values with the entry **invalid**.

out of limits

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

Search word

Enters the search term for the search in the selected data field. For fields where **Type = Date**, the date can be selected by pressing [...] in the dialog window **Select date**.

Input	256 characters Definition of a text expression as search term. The last 10 search terms are saved and can be selected. The following wildcards can be used in the search term:
Selection	^? ^# ^\$ ^*

Wildcard for any character.

Wildcard for any number.

Wildcard for any letter.

Wildcard for any character string.

Input	all possible date values Definition of a date as search term. The last 10 search terms are saved and can be selected.

Range	-9999 ... 9999
Default value	0
	Definition of a numerical value as a range in days in which, starting from the current date, the search is to be carried out. The last 10 search terms are saved and can be selected.

Input	all possible numerical values Definition of a numerical value as search term. The last 10 search terms are saved and can be selected.

Selects the search direction.

Total

A search will be made down to the end of the database and then again from above down to the selected data set.

Downward

A search will be made to the end of the database.



Upward

A search will be made to the beginning of the database.

Match case

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

If this option is enabled, then differentiation will be made between upper and lower case letters during searches in **Text**-type fields.

Search for whole word only

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

If this option is enabled, then the field contents must be identical with the search term during searches in **Text**-type fields (no part-search).

[Find next]

Search next occurrence of the search term.

4.5.2.4 Filter determinations

4.5.2.4.1 Filter determinations - Overview

Subwindow: **Database ▶ Determination overview**

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

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

4.5.2.4.2 Determinations - Last filter

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

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

4.5.2.4.3 Determinations - Quick filter

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

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



Note

The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

Dialog window: **Database ▶ Determinations ▶ Filter ▶ Special filter... ▶ Special filter**
- Database "Database name"

Selects the filter to be loaded for processing.	
Selection	'Filter name' New filter
Default value	New filter

'Filter name'
The saved filter is loaded.
New filter
An empty table with the name New filter is loaded.

Selects the filter to be loaded for processing.

'Filter name'

New filter

An empty table with the name **New filter** is loaded.

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.

The overview table shows all the defined filter criteria and cannot be directly edited. The filter conditions will be numbered automatically in sequence. The table view can be adapted with the left-hand mouse key as follows:

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If the contents of a field is larger than the column width then the whole contents will be shown as a **tooltip** if the mouse cursor is kept on the field.

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

Functions

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

Edit line	Open the dialog window Edit filter criterion in which the filter criterion of the line selected in the table can be edited.
Inserting a new line	Insert a new empty line above the line selected in the table. The dialog window Edit filter criterion opens automatically.
Zeilen ausschneiden	Transfer selected lines to clipboard.
Zeilen kopieren	Copy selected lines to the clipboard.
Zeilen einfügen	Insert lines from the clipboard above the selected line.
Zeilen löschen	Delete the selected lines.

[Apply filter]

Applies filter criteria to Determination table.

4.5.2.4.5 Determinations - All statistics data sets

Menu item: **Database ▶ Determinations ▶ Filter ▶ All statistics data sets**

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

4.5.2.4.6 Determinations - Delete filter

Menu item: **Database ▶ Determinations ▶ Filter ▶ Delete filter**

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

4.5.2.4.7 Determinations - Save filter

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

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

All the saved special filters are shown in the upper field.

Name under which the special filter is to be saved.

Input	50 characters

Saves filter under given name.



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

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

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

Selection of the logic operator with the previous filter criterion.

Selection **AND | OR**

Default value **AND**

Logical "AND" link

Logical "OR" link

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

Selection	'Field name'

Filtering is carried out only for the selected field. The 10 most recently selected fields are always available for selection.

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

Depending on the data field, further selection fields are created under Details in order to be able to select the desired property.



Condition

Type

Selection of the type of format for fields in which several types are possible. For fields with a fixed type only this type will be shown.

Selection	Text Number Date
Default value	Text

Operator

Selection of the comparison operator for the filter criterion.

For fields of the type = text

Selection	= <>
Default value	=

For fields of the type = date

Selection	= <> < <= > >= Today
Default value	=

Today

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

For fields of the type = number

Selection	= <> < <= > >= empty not empty invalid out of limits
Default value	=

invalid

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

out of limits

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

Comparative value

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

Only for fields of the type = text

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

Input	all possible date values Definition of a date as comparison value.

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

Input	all possible numerical values Definition of a numerical value as comparison value

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

Use asterisk (*) as wildcard

on | off (Default value: **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.

4.5.2.5 Signing determinations

4.5.2.5.1 Rules for electronic signatures

Program parts: **Method / Database**

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

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

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

4.5.2.5.2 Signature Level 1

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

or

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

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



Note

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

Info

Information display for signing and deleting signatures. The following messages are possible:

Selection	Signature possible (signature 2 exists)	Signature 1 not possible (accessed by other client)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
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95		
96		
97		
98		
99		
100		

The selected method or determination cannot be signed as it is already marked to be signed on a different client.

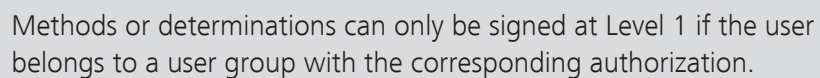
Input	24 characters

Input	24 characters

Selection	Selection from the Default reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
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82	82
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84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Input	1000 characters

Sign method or determination. The window remains open.



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

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



Note

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

Info

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

Selection	Signature possible Signature 2 not possible (signature 1 missing) Signature not possible (accessed by other client)
1	
2	
3	
4	
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99	
100	

Signature possible

The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)

The selected method or determination cannot be signed at Level 2 as it has not yet been signed at Level 1.

Signature not possible (accessed by other client)

The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
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86	86
87	87
88	88
89	89
90	90
91	91
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96	96
97	97
98	98
99	99
100	100

Comment

Entry of comments on the signature.

Input	1000 characters

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comments on the signature.

Input	1000 characters

[Delete]

Delete Signatures 2.



Note

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

4.5.2.6 Determinations - Reprocess

4.5.2.6.1 Reprocessing - General

Dialog window: **Reprocessing**

Reprocessing determinations

The determinations saved in the database can be reprocessed at any time. The variables, methods, statistics and curve evaluation can be modified and the results recalculated. The reprocessed determination can then be saved in the database as a new version.



Note

Determinations that have a signature at level 2 cannot be reprocessed.

Opening the reprocessing window

The reprocessing of determinations that have been selected in the sub-window **Determination overview** takes place in the independent dialog window **Reprocessing** which is opened with **Determinations ▶ Reprocess...** or the symbol . When the window is opened the first of the selected determinations is always shown as standard.

Closing the reprocessing window

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



Note

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

4.5.2.6.2 Reprocessing - Window

Dialog window: **Reprocessing**

Subwindow

The dialog window **Reprocessing** contains the following two subwindows that can be enlarged and reduced by dragging the separating bar between them:

- *Modifications*
Modification of variables, method, statistics, curve evaluation
- *Result view*
Shows current results

Functions

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

[Recalculating]

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

During recalculation a progress bar appears, the recalculating can there be canceled with  next to the bar. The results of this recalculation are entered automatically in the subwindow **Result display**.

This button is inactive until modifications have actually been made. After the recalculation further data can be modified and then recalculation triggered again.



[Reset]

Reset all modifications made and unsaved during reprocessing to the original data and results.

This button is inactive for as long as no modifications have been made or when the recalculation has not yet been triggered.

[OK]

Close the dialog window **Reprocessing**. Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1**.

This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could have been recalculated.

[Cancel] or

Close the dialog window **Reprocessing**. The result of the reprocessing made since the last saving will not be saved.



Note

If the option **Comment on modification of determinations** is enabled under **Configuration ► Tools ► Safety settings ► Audit Trail/Modifications**, the dialog window **Modification comment determination** is displayed before saving.

4.5.2.6.3 Reprocessing rules

Dialog window: **Reprocessing**

The following rules apply for reprocessing the selected and modified determinations:

- **Number of determinations**
No more than 100 determinations (including statistically linked determinations) may be selected for reprocessing.
- **Statistically linked determinations**
If determinations are selected for reprocessing that are statistically linked with other determinations that have not been selected then these determinations will also be automatically reprocessed when saving and then saved as new versions. Determinations that are statistically linked with each other must always be reprocessed in the same sequence as they were recorded. If no modification is made to a determination then this determination will retain its original determination status (i.e. **original** for non-modified determinations).



Note

If the selected determination belongs to a statistics series still running, the results modified during reprocessing will not be taken into account in the automatically generated reports of the following determinations of the statistics series.

In this case, the end of the statistics series has to be waited for. After this, all determinations of the statistics series contain the right results and the original reports can be printed from the database.

- **Start test**

During the start test all device tests and device monitoring will be ignored.

- **Special tracks**

During reprocessing the series start, series end and error tracks are not run through again.

- **Tracks with "Return immediately"**

If the method contains tracks with the option **Return immediately** switched on then a warning will appear, that it can no longer be guaranteed that the method will proceed in the same way during reprocessing as during the determination itself.

- **Monitoring** If the method contains monitoring of variables and results then the corresponding messages will be shown and included in the report, but no E-mails will be sent nor will beeps be produced. If one of the two actions **Stop determination** or **Stop determination and series** is switched on then reprocessing will be canceled.

- **Titration and measuring commands**

For DET, MET, SET, KFT, KFC, MEAS, CAL MEAS only the evaluations with existing data will be recalculated, all other parameters will be ignored. For commands that generate data, which are carried out during the determination but are no longer carried out during reprocessing, all the existing values will be deleted. If commands that generate data are carried out for the first time during the recalculation then the recalculation will be canceled.

- **Waiting and timeout periods**

All waiting and timeout periods of commands are set to **0** during recalculating.

- **Non-executed commands**

The commands REQUEST, WAIT, RECEIVE, SEND, TRANSFER, STIR, SCAN, CTRL, MOVE, SWING, LIFT, PUMP, RACK, HEATER, FLOW, ADD, LQH, PREP and EMPTY will be run through but not executed.



- **Report commands**

The command REPORT is run through and a new original report is generated, but the defined output targets will be ignored. The command REPORT only can be executed correctly during reprocessing when the defined report template already has been used by a REPORT command during the regular determination run. If the necessary report template is not existing in the original determination, a message entry is created, the REPORT command is skipped and the reprocessing will be continued.

- **Command variables**

If a method contains calculations using command variables the determination can only be recalculated correctly if the DATABASE command is executed after the corresponding commands.

- **Solution variables**

If titrants are modified in the method then their associated variables (e.g. **Titer**, **Slope**) will in any case (even when at the same time the corresponding variables have been modified under **Variables**) be taken from the (*see Chapter 6.6.2.1, page 1214*) and updated for the recalculation.

- Assing 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]**.

4.5.2.6.4 Modifications

4.5.2.6.4.1 Modifications - Overview

Subwindow: **Database** ▶ **Determination overview** ▶ **Determinations** ▶ **Repro-**
cess... ▶ **Reprocessing** ▶ **Modifications**

In the subwindow **Modifications** of the dialog window **Reprocessing** modifications can be made on the following 4 tabs:

- *Variables*

Modification of the variables used in the selected determination.

- *Method*

Modification of the method used in the selected determination.

- *Statistics*

Modification of statistics data.

The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.

- *Curve evaluation*

Manual modification of the curve evaluation.

The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

Modifications - Variables

Tab: **Database** ▶ **Determination overview** ▶ **Determinations** ▶ **Repro-**
cess... ▶ **Reprocessing** ▶ **Modifications** ▶ **Variables**

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

Variable table

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

Variable

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

Value

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

[Modify]

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



Note

If a variable is modified, then with **[Recalculate]** all the selected determinations will be recalculated with the new value. If one variable is not modified then when several determinations are recalculated the original value of the variable will be used (i.e. variables with the same name but different values will not be overwritten until they are deliberately altered).

4.5.2.6.4.3 Modifications - Method

Tab: **Database** ▶ **Determination overview** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Modifications** ▶ **Method**

On the tab **Method** the method used in the selected determination and its tracks and commands are displayed. A precondition is that the method is identical for all the selected determinations. The method structure can be modified as required for the recalculation, i.e. all the functions of the Method editor are available.



Method name:

Shows the method name.

Version:

Shows the version of the method. For original methods the additional text **(original)** appears after the version number. As soon as the method has been modified the additional text **(modified)** appears after the version number. This information is saved in the determination data when saving the recalculated determination.

Saved:

Shows the date and time when the method version was saved.

[Save as]

Saves the modified method under the same name or under a new name. If the modified method is saved under the name of an existing method then all the earlier method versions will be deleted and a new version with the number **1** will be generated.

[Modify method]

Open the dialog window **Method editor**. Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands; however, the modified method cannot be directly saved there. If the dialog window is closed with **[OK]**, the method will be checked (see Chapter 5.2.5, page 385). The modified method then appears on the tab **Methods** with the addition **(modified)**. This modified method is then applied to the selected determinations with **[Recalculate]** and can be saved at any time with **[Save as]**.

4.5.2.6.4.4 Modifications - Statistics

Tab: [Database](#) ▶ [Determination overview](#) ▶ [Determinations](#) ▶ [Reprocess...](#) ▶ [Reprocessing](#) ▶ [Modifications](#) ▶ [Statistics](#)

On the tab **Statistics** the single results for the statistics calculation can subsequently be switched on and off.

Results with statistics

Result name

Selection of the statistically evaluated result by using the result name for which the single results of all determinations are shown.

Selection	Result name

Table of individual results

For the result selected above the following data for the individual determinations is shown:

Shows the date and time at which the determination was started.

Shows the version number of the determination.

Shows the sample size.

Shows the result value. The statistics data (mean value, standard deviations, etc.) for the selected determination are listed in the subwindow **Result view** (see Chapter 4.5.2.6.5, page 315).

All single results of the selected determination for statistical calculations can be switched off or on. If the determination is switched off then an asterisk (*) appears behind all result values in the table and the line is shown as inactive (gray); if it is switched on again then the asterisks will disappear. However, updating the statistics data always only takes place with **[Recalculate]**.

Switch the selected single result for the statistical calculations off or on. If the result is switched off, an asterisk (*) appears behind the result value, if it is switched on again, the asterisk disappears. However, updating the statistics data always only takes place with **[Recalculate]**.



If the results of a determination are switched off, the statistics for these results will be switched off when this determination is recalculated, i.e. no data for the mean value and standard deviations will be shown. However, the determinations remain statistically linked to each other so that the results can also be switched on again.

Tab: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Modifications** ▶ **Curve evaluation**

On the tab **Curve evaluation** the curves that can be manually evaluated are displayed.

Command name

Selection of the measuring command (**command name.index - command type**) for which the curve is to be shown for reprocessing.

Selection	Command name

[Edit]

The dialog window **Curve evaluation** opens for manually reprocessing the curve evaluation.

4.5.2.6.4.5.2 Edit curve evaluation

Dialog window: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Modifications ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation**

In the dialog window **Curve evaluation** the evaluation of the selected curve can be reprocessed manually.

In the curve those EP's are indicated, which have values for the dimensions of the x and y axis, i.e. manually set EP's are possibly not indicated.

Command name

Selection	Command name

Command name

Selection of the measuring command for which the curve is to be shown for reprocessing.

Toolbar

The toolbar above the curve contains symbols for the following functions for re-evaluation of the curve:



Set EP manually

By moving the mouse a point on the curve is selected. The current X and Y values are shown graphically with a blue cross hair and numerically above the curve. A new endpoint 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 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 second tangent is set with clicking the left-hand mouse key and at the same time a new endpoint is set at the point where both tangents intersect.



Set EP with parallel tangents

By moving the mouse a point on the curve is selected to which the tangent is automatically applied. At the same time a tangent parallel to it is applied to the other leg of the curve. The two tangents are set with a click of the left-hand mouse key and at the same time a new endpoint is set at the intersection of the middle line of the two tangents with the curve.



Note

If new endpoints are set manually or by intersection or tangent evaluation or if existing endpoints are deleted then the endpoints will always be renumbered from left to right. During recalculation the automatic evaluations will generally no longer be used for curves, i.e. the endpoints defined in the curve evaluation are retained.



Set horizontal auxiliary lines

By moving the mouse a horizontal auxiliary line is drawn in the graph; this can be set by clicking the left-hand mouse key. This function is only active when under **Curve evaluation ► Properties ► Properties - Curves 1 ► Options** 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 the left-hand mouse key. This function is only active when under **Curve evaluation ► Properties ► Properties - Curves 1 ► Options** the option **Show evaluation lines** is switched on.



Delete endpoints and auxiliary lines

With the context-sensitive menu item **Delete EP#** the selected endpoint can be deleted, with **Delete ###.###** the selected auxiliary line can be deleted.



Zooming

By drawing out a rectangle with the left-hand mouse key the selected area can be zoomed.



Reset zoom

The graph will be reset to zoom level 100%.



Copy to clipboard

The content of the curve window is copied to the clipboard.



Define properties for the graph display

The dialog window **Properties - Curves #** is opened for graph display. The curve properties defined for each command type are saved for the reprocessing window per client.



Show EP list

The dialog window **Endpoints** is opened in which all endpoints of the selected curve are displayed in a table. If an endpoint is added to or deleted from the curve then the table will be updated automatically.

Show coordinates

The current coordinates of the cursor are shown in the coordinate display:

X:

X-coordinate.

Y:

Y-coordinate.

4.5.2.6.4.5.3 Curve evaluation - Endpoint list

Dialog window: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Modifications ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Show EP list ▶ Endpoints**

In the dialog window **Endpoints** all automatically found and manually set endpoints of the selected curve are shown in tabular form. The endpoints are sorted according to ascending volume, if an endpoint is deleted from or added to the curve then the table will be updated automatically.

Endpoint

Name of the endpoint with number. The following names are possible:

Selection	EP#

EP#

Endpoint that has been determined automatically by potentiometric evaluation or set manually by using the intersection or tangent method.

Selection	BP#

BP#

Endpoint that has been determined by automatic break point evaluation.

Selection	FP#

FP#

Endpoint that has been determined by automatic fixed point evaluation.

Volume

Volume value in mL for endpoint.

Measured value

Measured value (pH) for endpoint.

ERC

ERC value for the endpoint.

Time

Time for the endpoint.

Temperature

Temperature for the endpoint.

**Note**

Manually set endpoints only have two measured quantities, for the other measured quantities **invalid** is entered.

[Delete]

Delete selected endpoint.

[Close]

Close dialog window.

4.5.2.6.4.5.4 Curve evaluation - Properties**4.5.2.6.4.5.4.1 Properties curve evaluation - Overview**

Dialog window: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties**

The properties of the curve display in the curve evaluation window can be set on the following 4 tabs:

- *x axis*
Parameters for the graphical presentation of the curves on the x axis.
- *y axis*
Parameters for the graphical presentation of the curves on the left y axis.
- *y2 axis*
Parameters for the graphical presentation of the curves on the right y axis.
- *Options*
Options for graphical presentation of curves.

4.5.2.6.4.5.4.2

Properties curve evaluation - x axis

Tab: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties ▶ x axis**

On the tab **x axis** the parameters for the graphical presentation of the curves on the x axis can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection	Command-dependent selection

Command-dependent selection

Selection of the size to be shown on the x axis.

Label

Freely definable axis labeling for the x axis.

Selection	50 characters auto
Default value	auto

auto

The label from the field **Size** will be used.

Scaling

Fixed scaling of the x axis between the start value and the end value.

Start value

Initial value for scaling the x axis.

Only editable when the option Autoscaling is disabled.

Range	-1.0E12 ... 1.0E12
Default value	-1.0E12

End value

End value for scaling the x axis.

Range	-1.0E12 ... 1.0E12
Default value	1.0E12

Range	-1.0E12 ... 1.0E12
Default value	-1.0E12

End value

End value for scaling the y-axis.

Only editable when the option Autoscaling is disabled.

Range	-1.0E12 ... 1.0E12
Default value	1.0E12

Curve

Curve color

Selection of the color for the curve line.

Selection	13 colors blue
Default value	blue

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	5 symbols No symbol
Default value	No symbol

No symbol

Measuring points are not shown.



Note

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	13 colors blue
Default value	blue

Smoothing

Smoothing

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

Switches smoothing on/off for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Range	0.01 ... 1000
Default value	0.01

Smoothing factor y-axis

Factor for smoothing on the y axis.

Range	0.01 ... 1000
Default value	0.01

Show with original curve

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

If this option is enabled then the original curve (solid line) will be shown in addition to the smoothed curve (dotted line, same color).

4.5.2.6.4.5.4.4

Properties curve evaluation - y2 axis

Tab: **Database ▶ Determinations ▶ Reprocessing ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties ▶ y2 axis**

On the tab **y2 axis** the parameters for the graphical presentation of the curves on the y2 axis (right y axis) can be set.

Command type

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection	Command-dependent selection off
Default value	off

Command-dependent selection

Selection of the size to be shown on the y2 axis.

Label

Freely definable axis labeling for the y2 axis.

Selection	50 characters auto
Default value	auto

auto

The label from the field **Size** will be used.

Curve

Curve color

Selection of the color for the curve line.

Selection	13 colors red
Default value	red

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	5 symbols No symbol
Default value	No symbol

No symbol

Measuring points are not shown.



Note

With curves, for which the distance between two measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	13 colors red
Default value	red

Smoothing

Smoothing

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

Switches smoothing on/off for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Range	0.01 ... 1000
Default value	0.01

Smoothing factor y-axis

Factor for smoothing on the y axis.

Range	0.01 ... 1000
Default value	0.01

Properties curve evaluation - Options

On the tab **Options** the parameters for the graphical presentation of the curves can be set.

Shows the type of command for which the curve properties can be defined. The curve properties defined for each command type for the reprocessing window are saved per client.

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Display grid

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

If this option is enabled then a grid will be shown against the background.

Selection of the type of grid line.

Grid color

Selection of the grid line color.

Background color

Selection of the color for the curve background.

■■■■■■■ 313

Show endpoints

Show endpoints

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

If this option is enabled then the endpoints found will be shown on the curve by the symbol  and labeled with **EP#** (potentiometric endpoint), **BP#** (break point), **FP#** (fixed endpoint), **HP** (HNP), **MI** (minimum value) or **MA** (maximum value).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	13 colors black
Default value	black

Manual EPs

Selects the color for manually set endpoints.

Selection	13 colors pink
Default value	pink

Show evaluation lines

Show evaluation lines

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

If this option is enabled then the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Selection of the color for the tangents and auxiliary lines.

Selection	13 colors light green
Default value	light green

Auxiliary lines

Selection of the color for the auxiliary lines.

Selection	13 colors blue
Default value	blue

4.5.2.6.4.6 Modify variable

Dialog window: **Reprocessing** ▶ **Modifications** ▶ **Variables** ▶ **[Modify]** ▶ **Modify variable**

In the dialog window **Modify variable** the value of the selected variable is modified.

Shows the name of the variable.

Value of the variables. With variables of the type **Date** the date must be entered in the dialog window (see Chapter 2.5.1, page 80).

Range	-1.0 E+99 ... 1.0 E+99 (for Type = Number)
Input	100 characters (for Type = Text)
Selection	'Date' (for Type = Date/Time)

Subwindow: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Result view**

In the subwindow **Result view** of the dialog window **Reprocessing** results and raw data are displayed on the following two tabs:

Subwindow: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Result view**

In the subwindow **Result view** of the dialog window **Reprocessing** the results calculated during the **CALC** commands and the variables used for are displayed and updated with each recalculation.

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

Name of the calculation command.

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

Results of the statistical evaluation (mean value, absolute and relative standard deviations, number of measured values used for the statistics and statistics set counter).

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between showing the results of the individual determinations:



Jump to first determination.



Jump to previous determination.



Jump to next determination.



Jump to last determination.



Note

If a result value is monitored and lies inside the limits defined in the **CALC** command then the text will be shown in **green**, if it lies outside the limits the value will be shown in **red**.

4.5.2.6.5.2 Result view - Raw data

Subwindow: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Result view**

On the tab **Raw data** of the subwindow **Result view** the raw data generated in commands with evaluations will be shown and updated at each recalculation.

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between showing the results of the individual determinations:



Jump to first determination.



Jump to previous determination.



Jump to next determination.



Jump to last determination.

4.5.2.6.6

Dialog window: **Database ► Determinations ► Delete/Reprocess...**

If the option **Comment on modification of determinations** is switched on in the security settings then before the modified sample data is accepted the window **Modification comment determination** appears first, in which a **Reason** must be selected and a **Comment** on the modification must be entered.

Reason

Selection from the default reasons defined for the category **Modifications of determinations** in the **Security settings** dialog window.

Selection	Selection from default reasons

Comment

Entry of a comment on the modification of the determinations.

Input	1000 characters

4.5.2.7

Dialog window: **Database ► Determinations ► Send to...**

The menu item **Determinations ► Send to...** opens the dialog window **Send determinations per E-mail**.

File name

Selection of the following options:

Selection	Determination ID Sample identification Name
Default value	Determination ID

Determination ID

The name of the export file is formed out of an unambiguous determination ID, the computer name, the date stamp **-JJJMMDD-HHMMSS** and the suffix for the format.

Sample identification

Selection of the sample identification **ID1 ... ID16**. The name of the export file is formed out of this ID, the computer name, the date stamp **-JJJJMMDD-HHMMSS** and the suffix for the format. If the created name exists already in the directory a version number will additionally be appended to the date.

Name

Enter the file name



Note



Note



Note

4.5.2.10 Deleting determinations

With the symbol  or the menu item **Determinations ▶ Delete**, the selected determinations are deleted after the confirmation request.

4.5.2.11 Determination overview - Print

The Menu item **File ▶ Print ▶ Determination overview...** opens the dialog window **Print determination overview (PDF)**.

Selection

Selection	Selected determinations All filtered determinations
Default value	Selected determinations



Selected determinations

If this option is selected, then a list with all determinations that are selected (marked) in the determination table will be produced.

All filtered determinations

If this option is selected, then a list with all the determinations in the determination table that meet the filter criterion will be produced.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

If this option is selected then the determination table will be produced in portrait format.

Landscape

If this option is selected then the determination table will be produced in landscape format.

[OK]

The determination table is produced in the required format as a PDF file and opened directly with Acrobat Reader; it can then be printed out and/or saved.

4.5.2.12 Determinations - Print report

Dialog window: **Database** ▶ **File** ▶ **Print** ▶ **Report...** ▶ **Report output**

The menu item **File ▶ Print ▶ Report...** opens the dialog window **Report output**.

Selection

Selection	Selected determinations All filtered determinations
Default value	Selected determinations

Selected determinations

If this option is selected, then the reports will be produced for all determinations that are selected (marked) in the determination table.

All filtered determinations

If this option is selected, then the reports will be produced for all the determinations in the determination table that meet the filter criterion.

Report type

Selection	Original report(s) Report template
Default value	Original report(s)

Original report(s)

If this option is selected then the reports produced during the determination will appear at the **Output target** defined below.

If this option is selected then reports according to the selected Report template will be produced at the **Output target** defined below.



In order to print the report of the non-reprocessed determination the determination 1 must be selected.

Printer

If this option is enabled, the reports are printed on the selected printer.

If this option is switched on then the reports will be produced as a PDF file under the entered file name.



If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

Menu item: **Database ► Determinations ► Show method...**

Show command properties

With a double-click on a command or the context-sensitive menu item **Properties** the properties window of the corresponding command opens in which the parameters are shown.

4.5.2.15 Determinations - Show calibration curve

Dialog window: **Database ▶ Determinations ▶ Show calibration curve... ▶ Calibration curve**

With the menu item **Determinations, Show calibration curve...** or the symbol  the calibration or standard addition curve is shown for the calibration selected in the dialog window **Calibration curve**.

Calibration curve for CAL LOOP pH

In the dialog window **Calibration curve** a tab marked with the command name showing the calibration curve and calibration data will be displayed for each CAL LOOP pH command (see Chapter 5.6.5.4, page 978). The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Listed below are the individual measured values and the results for **Slope**, **E(0)** and **Variance**.

Calibration curve for CAL LOOP Conc

In the dialog window **Calibration curve** a tab marked with the command name showing the calibration curve and calibration data will be displayed for each CAL LOOP Conc command (see Chapter 5.6.5.6, page 997). The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured values. Listed below are the individual measured values and the results for **Slope**, **E(0)**, **c(blank)** and **Variance**.

Calibration curve for STDADD

In the dialog window **Calibration curve** a tab marked with the command name showing the calibration curve and evaluation data will be displayed 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. Listed below are the individual measured values and the results for **Determination, Show calibration curve...**, **E(0)**, **Determination, Show calibration curve...** 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 which contains the fixed report.

 **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**).

Selection of the command, whose curves are to be displayed with the selected template.

[Templates]

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

Shows the curves according to the settings of the selected template. The command type (e.g. **DET pH**) is shown centrally above the graph. At the right of the curve the legend is shown with the line number in the determination table belonging to the determination.

The legend consists of the content of a data field which can be defined in the options of the template and of a counter, which identifies the curves if the same command has been executed several times during a determination.

Open the dialog window **Print curves (PDF)** (see Chapter 4.5.2.18, page 325). The content of the curve overlay with legend can be shown as a PDF file in the required format.

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

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

Orientation

Selection	Portrait Landscape
Default value	Landscape

Portrait

Produces control chart in portrait format.

Landscape

Produces control chart in landscape format.

Comment

Possibility of entering comments on the control chart which will be produced together with the control chart.

Input	1000 characters

[OK]

Close dialog window. The control chart is shown in the required format as a PDF file and opened directly with the Acrobat Reader; it can then be printed out and/or saved.

4.5.2.19 Print control chart

Dialog window: Database ▶ Determinations ▶ Control chart... ▶ Control chart ▶ [Print (PDF)] ▶ Print control chart (PDF)

In the dialog window **Print control chart (PDF)** the format for the printout of the control chart is indicated.

Orientation

Selection	Portrait Landscape
Default value	Landscape

Portrait

Produces control chart in portrait format.

Landscape

- Produces control chart in landscape format.

Comment

Possibility of entering comments on the control chart which will be produced together with the control chart.

Input	1000 characters

[OK]

The control chart is shown in the required format as a PDF file and opened directly with the Acrobat Reader; it can then be printed out and/or saved.



Sample number:

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

Start counter:

Shows the start counter which is increased by +1 at the start of each determination. The start counter is saved for each client and cannot be reset.

Recording

Information about recording the determination.

Determination start:

Date and time at start of determination.

Determination duration:

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

Determination run:

Way in which the determination was ended:

Selection **Regular without messages | Regular with remarks | Abort | Abort by error**

Regular without messages

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

Regular with remarks

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

Abort

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

Abort by error

Due to an error, the determination was cancelled automatically.

User (short name):

Short name of the user.



Note

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings (see Chapter 6.2.2.2, page 1162).

Active User who started the determination.

Inactive	User logged in when finishing determination.

Full name of the user.

Note

User logged in when finishing determination.

determinations without modification of determination data, *tiamo* will be displayed here.

Reprocessed by (full name):

Full name of user logged in when determination was reprocessed. If a new version was generated automatically by reprocessing statistically linked determinations without modification of determination data, **New generated version for statistics** will be displayed here.

Reprocessed with program version:

Display of program version and build number of **tiamo** the determination was reprocessed with.

Modification reason determination:

Reason for the determination modification.

Modification comment determination:

User comment on the determination modification.

Signature Level #

Information about the signatures at Level 1 or Level 2 in chronological order.

Signature date:

Date and time at which the determination was signed.

Signed by (short name):

Short name of user who signed the determination.

Signed by (full name):

Full name of user who signed the determination.

Signature reason:

Reason for signature selected by user.

Signature comment:

User comments on signing the determination.

4.6.3 Information - Method

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

Shows general information about the method used.

Identification

Information about the identification of the method.

Name of the method.

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

Unambiguous and unmistakable identification for the method.

Method comment (**Command comment** on **START** command).

Information about method version.

Selection	original modified (live) modified (reprocessed)
original	
Method when creating the determination.	
modified (live)	
Method has been modified live.	
modified (reprocessed)	
Method has been reprocessed.	

Version of the method the determination was created with.

Date and time when the modified method version was saved.

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

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

Reason for the method modification.

User comment on the method modification.

Signature Level #

Information about the signatures at Level 1 or Level 2 in chronological order.

Signature date:

Date and time at which the method was signed.

Signed by (short name):

Short name of the user who signed the method.

Signed by (full name):

Full name of user who signed the method.

Signature reason:

Reason for signature selected by user.

Signature comment:

User comments on signing the method.

4.6.4 Information - Sample

Tab: **Database** ▶ **Information** ▶ **Sample**

Shows general information about the sample used.

Sample data

Information about the sample. The only sample data shown is that for which a value is available.

Sample size:

Value for the sample size.

Sample size unit:

Unit of sample size.

Input date:

Date and time at which the sample size was entered.

Data source:

Data source for the sample size: For manual input **manual** is shown, for automatic input from a balance or barcode reader the corresponding device name, for data import from a file the corresponding file name.



M-# 429).

Position of the sample.

Information about the sample identifications.

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



Batch (ID2)).

Information on the last live modification of sample data.

Reason for the sample data modification.

User comment on modification of sample data.

Tab: **Database** ▶ **Information** ▶ **Configuration**

Device 'Device name'

be shown).

Stirrer type:

Type of stirrer.

Serial number:

Serial number of the stirrer.

Dosing device:

Dosing connection at device.

Dosing device type:

Dosing device type.

Dosing unit serial number:

Serial number of the dosing unit.

Solution name:

Name of the solution.

Concentration:

Concentration value and units of the solution.

Production date:

Date at which the solution was produced.

Titer:

Titer value and units of the solution.

Date titer det.:

Date of the titer determination.

Titer method:

Method with which the titer was determined.

Exchange/Dosing unit:

Type of exchange or dosing unit.

Name:

Name of exchange or dosing unit.

Order number:

Order number of exchange or dosing unit.

Method calibration:

Method the wavelength calibration of the spectrometer has been carried out with.

Determination ID calibration:

Determination the wavelength calibration of the spectrometer has been carried out in.

Sensor 'Sensor name'

Information about the sensor used.

Sensor type:

Type of sensor (+ designation **IS** for intelligent sensors).

Ion:

Ion and valency for ISE electrodes.

Order number:

Order number of sensor.

Sensor serial number:

Serial number of sensor.

Device:

Name of device to which sensor is connected.

Measuring input:

Number of the measuring input to which the sensor is connected (+ designation **iConnect** for intelligent sensors).

Slope:

Electrode slope of the sensor used (in % for pH sensor or in mV for ISE).

E (0):

Electrode zero point of the sensor used (in mV only for ISE).

pH (0):

Electrode zero point of the sensor used (dimensionless for pH sensor).

c (blank):

Blank value of the ISE sensor used.

Cell constant:

Cell constant of the conductivity sensor used.



Calibration temperature:

Temperature during the calibration.

Calibration date:

Shows the date and time of the calibration.

Calibration method:

Shows the method the calibration was carried out with.

User:

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

Measuring input

Shows the measuring input the calibration was carried out with.

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.

Sample solution (TC conductivity) 'Name'

Information on the sample solution used.

Assignment date:

Date and time of last value assignment.

Assignment method:

Method with which the value was assigned.

Start temperature:

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

Stop temperature:

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

c0:

Coefficient of the Chebyshev polynomial of the zeroth order

c1:

Coefficient of the Chebyshev polynomial of the first order

c2

Coefficient of the Chebyshev polynomial of the second order

c3

Coefficient of the Chebyshev polynomial of the third order

c4

Coefficient of the Chebyshev polynomial of the fourth order

User:

Name of the user logged in at the start of the determination.

Measuring input:

Shows the type of measuring input and serial number (e.g. 1.845.0010 11458 for iConnect).

Determination ID:

Unambiguous and unmistakable identification for the determination.

4.6.6 Information - Messages

Tab: **Database ► Information ► Messages**

Shows messages generated during the determination run.

'Time'Shows the time at which the message was generated in the run (date, time, UTC in the format **YYYY-MM-DD hh:mm:ss UTC.....**).**Message title:**

Shows the message title and number.

Message text:

Shows the message.

Message source:

Shows from where the message comes:

Selection	Program Track 'Track name' - Command 'Command name'



Program

Message that cannot be assigned to a particular command.

Track 'Track name' - Command 'Command name'

Message produced by a command during the run.

4.6.7 Information - Determination comment

Tab: **Database** ▶ **Information** ▶ **Determination comment**

Shows the comment on the determination.

Determination comment:

Shows the Comment entered for the determination.

4.7 Subwindow Results

4.7.1 Results - General

Subwindow: **Database** ▶ **Results**

In the subwindow **Results** in the program part **Database** the results calculated in the calculation commands and the variables used for are shown. It shows the results overview, the raw data of the commands with evaluations as well as the results calculated in the calculation commands, statistical evaluations, formulas and all variables used for for the determination selected in the determination overview.

When navigating in the determination overview this data will be updated automatically (with a certain delay).

The subwindow **Results** can be switched on and made visible in the definition of the layout in the program part **Database**. It can be enlarged and reduced as required; it can also be maximized.

Tabs

The results of the determination are shown on the following tabs:

- *Results overview*
Shows the results overview for all calculation commands.
- *Raw data*
Display of evaluation raw data for commands with evaluations.
- *"Command name"*
Show the results for a single calculation command. A tab with the corresponding command name is provided for each calculation command.

Tab: **Database** ▶ **Result** ▶ **Results overview**

Minimum:

Shows the minimum value for statistically evaluated results.

Maximum:

Shows the maximum value for statistically evaluated results.

n:

Shows the number of measurements for statistically evaluated results.

4.7.3 Results - Raw data

Tab: **Database** ▶ **Results** ▶ **Results**

On the tab **Raw data** the evaluation results of commands with evaluations are shown.

"Command name"

For each CALC command the raw data is displayed in six columns:

Column 1

Display of the command type.

Column 2

Shows the variable designation for the raw data.

Columns 3-6

Shows the raw data.

The following tables show the raw data depending on the command type. For each variable the **Variable name**, **Unit** and **Number of decimal places** is indicated.

Table 1 Command DET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, pH, 3	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, pH, 3	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, pH, 3	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, pH, 3	GP.TIM, s, 1.	GP.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, μA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, μA, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, μA, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, μA, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, pH, 3	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, pH, 3	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, pH, 3	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, pH, 3	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 6 Command MET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 7 Command MET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 8 Command MET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, μA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, μA, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, μA, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, μA, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 9 Command SET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, pH, 3	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1

Table 10 Command SET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Table 11 Command SET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Table 12 Command SET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, µA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, µA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, µA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, µA, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	EP.VOL, mL, 4	EP.MEA, mV, 1	EP.TIM, s, 1	EP.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	EP.VOL, mL, 4	EP.MEA, μA, 1	EP.TIM, s, 1	EP.TEM, °C, 1
DRI	DRI, μL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	EP.MEA, mV, 1	EP.QTY, µg, 1	EP.TIM, s, 1	
DRI	DRI, µg/min, 1			
DTI	DTI, s, 1			
FP#	FP#.MEA, mV, 1	FP#.QTY, µg, 1	FP#.TIM, s, 1	

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	MR.MRT, mL/min, 4	MR.MRS,mL/min, 4	MR.MRC, "empty", 3	
RE#	RE#.DRT, mL/min, 4	RE#.DRS,mL/min, 4	RE#.DRC , "empty", 3	
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1

Table 17 Command STAT U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	MR.MRT, mL/min, 4	MR.MRS, mL/min, 4	MR.MRC, "empty", 3	
RE#	RE#.DRT, mL/min, 4	RE#.DRS, mL/min, 4	RE#.DRC, "empty", 3	
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 3	MA.TIM, s, 1	MA.TEM, °C, 1

Table 18 Command MEAS pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, pH, 3			
ETE	ETE, °C, 1			
FP#	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1	
MI	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1	
MA	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1	
BP#	BP#.MEA, pH, 3	BP#.TIM, s, 1	BP#.TEM, °C, 1	

Table 19 Command MEAS U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, mV, 1			
ETE	ETE, °C, 1			
FP#	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1	
MI	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1	
MA	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1	
BP#	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1	

Table 20 Command MEAS Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, mV, 1			
ETE	ETE, °C, 1			
FP#	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1	
MI	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1	
MA	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1	
BP#	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1	

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, μA , 1			
ETE	ETE, $^{\circ}\text{C}$, 1			
FP#	FP#.MEA, μA , 1	FP#.TIM, s, 1	FP#.TEM, $^{\circ}\text{C}$, 1	
MI	MI.MEA, μA , 1MI.MEA, μA , 1	MI.TIM, s, 1	MI.TEM, $^{\circ}\text{C}$, 1	
MA	MA.MEA, μA , 1	MA.TIM, s, 1	MA.TEM, $^{\circ}\text{C}$, 1	
BP#	BP#.MEA, μA , 1	BP#.TIM, s, 1	BP#.TEM, $^{\circ}\text{C}$, 1	

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, °C, 1			
FP#	FP#.MEA, °C, 3	FP#.TIM, s, 1		
MI	MI.MEA, °C, 1	MI.TIM, s, 1		
MA	MA.MEA, °C, 1	MA.TIM, s, 1		
BP#	BP#.MEA, °C, 1	BP#.TIM, s, 1		

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

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, "selected unit", 3			
ETE	ETE, °C, 1			

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

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MI	MI.MEA, mS/cm, 2	MI.TIM, s, 1	MI.TEM, °C, 1	
MA	MA.MEA, mS/cm, 2	MA.TIM, s, 1	MA.TEM, °C, 1	
BP#	BP#.MEA, mS/cm, 2	BP#.TIM, s, 1	BP#.TEM, °C, 1	

Table 26 Command MEAS TC Cond

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
TC	TC.MIN, %/°C, 2	TC.MAX, %/°C, 2		

Table 27 Command MEAS Ref

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

Table 28 Command MEAS Spec

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

Table 29 Command MEAS Opt

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, mAU, 1			
FP#	FP#.MEA, mAU, 1	FP#.TIM, s, 1		
MI	MI.MEA, mAU, 1	MI.TIM, s, 1		
MA	MA.MEA, mAU, 1	MA.TIM, s, 1		
BP#	BP#.MEA, mAU, 1	BP#.TIM, s, 1		

Table 30 Command CAL LOOP pH

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

Table 31 Command CAL LOOP Conc

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	SLO, mV, 1			
ENP	ENP, -, 3			
BLV	BLV, "unit from configuration ", 2			

Table 32 Befehl CAL Cond

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

Table 33 Command CAL Spec

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
CP#	CP#.REF, nm, 1	CP#.MEA, nm, 1	± CP#.TOL, nm, 1	
WL	WL.C0, -, 4			
	WL.C1, -, 4			
	WL.C2, -, 4			
	WL.C3, -, 4			
	WL.C4, -, 4			

Table 34 Command STDADD

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	SLO, mV, 1			
ENP	ENP, mV, 1			
RES	RES, "selected unit", 1			
VAR	VAR, "empty", 3			

Table 35 Command DOS pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	MR.MRT, mL/min, 4	MR.MRS, mL/min, 4	MR.MRC, "empty", 3	

Table 36 Command DOS U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MR	MR.MRT, mL/min, 4	MR.MRS, mL/min, 4	MR.MRC, "empty", 3	

4.7.4 Results - Calculation

Tab: **Database** ▶ **Results** ▶ **Command**

For each calculation command the results and (if existent and desired) the corresponding statistical evaluations are displayed on a separate tab **Calculation_#**. The sequence of the shown results corresponds to that defined in the calculation command. The display of the statistical evaluations can be selected in the dialog window **Properties result window**

Result "Result name"

Display of the result with variable name.



"Result"

Note

Mean value:

s(abs):

s(rel):

Minimum:

Maximum:

n:

Shows the number of measurements for statistically evaluated results.

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

Shows the statistics results.

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

Shows the assignment.

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

Shows the calculation formula.

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

Displays the variables used in the formula.

4.8 Subwindow Curves

4.8.1 Curves - General

Dialog window: **Database ► Curves****Subwindow Curves**

The subwindows **Curves 1...5** are subwindows in the program part **Database**, in which the measuring points generated by the measuring commands for the focused determination in the **Determination table** are shown as a graph. When navigating in the determination overview this data will be updated automatically (with a certain delay).

The subwindows **Curves 1...5** can be switched on in the program part **Database** during the definition of the layout and thus made visible. They can be enlarged and reduced as required; they can also be maximized.

Tabs

In the curve window a tab with the corresponding command name and the run index (e.g. **Chloride.1**) is provided for each execution of a measuring command; their sequence is determined by the method.

Show curves

The curves of the selected determination are shown on the tabs with the properties defined per window and per command type. The command type (e.g. **DET pH**) is shown above the left-hand y axis.

Curves can be **zoomed** as often as required by spanning a section of the curve display with the left-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 monitoring report

With the context-sensitive menu item **Monitoring report...** in the curve window the dialog window **Monitoring report - 'Command name'** opens for displaying the measuring point list with the selected curve.

The column **Monitoring** is displayed as default for **STAT** and **DOS** commands and can contain the following entries:

Selection	<code>_Meas.v.</code> <code>¬Meas.v.</code> <code>_Dos.r.</code> <code>¬Dos.r.</code> <code>_Temp.</code> <code>¬Temp.</code> *
Default value	*

_Meas.v.

Lower limit value for measured value monitoring exceeded.

- Meas.v.

Upper limit value for measured value monitoring exceeded.

_Dos.r.

Lower limit value for dosing rate monitoring exceeded.

-Dos.r.

Upper limit value for dosing rate monitoring exceeded.

Temp.

Lower limit value for temperature monitoring exceeded.

Temp.

Upper limit value for temperature monitoring exceeded.

*

Dosing stopped.

4.8.2 Curves - Measuring point list

Dialog window: **Database** ► **Curves**

With the context-sensitive menu item **Measuring point list...** in the curve window the dialog window **Measuring point list - 'Command name.'** opens for showing the measuring point list for the selected curve.

4.8.3 Curves - Monitoring report

If the method contains commands of the type **STAT** or **DOS**, then with the context-sensitive menu item **Monitoring report...** in the curve window the dialog window **Monitoring report - 'Command name'** can be opened. In this window information on limit violations occurred are displayed for each monitoring switched on

Time [s]

Limit

[pH]/[U]

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

Volume [mL]

Temp. [°C]

Action

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Stop command (only Titrando)

The running **STAT** command was quit, then the next command was started.

Wait for [Continue]

Reagent dosing in the current **STAT** command was interrupted until it was continued by a manual command.

Wait for limit ok

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

none

No action was taken.

4.8.4 Properties

4.8.4.1 Curve properties - Overview

Dialog window: **Database** ► **Curves** ► **Properties curves #**

The properties for the display of curves can be set on the following 5 tabs:

- *x axis*
Parameters for the graphical presentation of the curves on the x axis.
- *y1 axis*
Parameters for the graphical presentation of the curves on the y1 axis (left-hand y axis).
- *y2 axis*
Parameters for the graphical display of the curves on the y2 axis (right-hand y axis).
- *Options*
Options for graphical presentation of curves.
- *Measuring point list*
Parameters for showing the measuring point list.

4.8.4.2 Curve properties - x axis

Dialog window: **Database** ▶ **Curves** ▶ **Properties curves #** ▶ **x axis**

Parameters for the graphical presentation of the curves on the x axis.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC STAT DOS
Default value	DET



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Range	-1.00E+12 ... +1.00E+12
Default value	-1.00E+12

End value for scaling the x axis.

Range	-1.00E+12 ... +1.00E+12
Default value	+1.00E+12

Dialog window: **Database** ► **Curves** ► **Properties curve #** ► **y1 axis**

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC STAT DOS
Default value	DET



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.

Selection of the size to be shown on the y1 axis.

Selection	Wavelength [nm] Absorbance [mAU] Intensity [Counts] Intensity Dark [Counts] Intensity Ref [Counts] Transmission [%] Saturated pixels
Default value	Absorbance [mAU]

Selection	Time [s] Measured value Intensity [Counts] Transmission [%] Saturated pixels
Default value	Measured value

Selection	Wavelength [nm] Intensity [Counts] Saturated pixels
Default value	Intensity [Counts]

Label

Freely definable axis labeling for the y1 axis. With **auto** the label from the field **Size** will be used.

Selection	50 characters auto
Default value	auto

Scaling

Start value

Initial value for scaling the y1 axis.

Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	-1.00E+12

End value

End value for scaling the y1 axis.

Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	+1.00E+12

Curve

Curve color

Selection of the color for the curve line.

Selection	Time [s] Measured value Intensity [Counts] Transmission [%] Saturated pixels off
Default value	off

Selection	Wavelength [nm] Intensity [Counts] Saturated pixels off
Default value	off

Freely definable axis labeling for the y1 axis. With **auto** the label from the field **Size** will be used.

Selection	50 characters auto
Default value	auto

Curve color

Selection	13 colors pink
Default value	pink

Selection of the symbol for the display of the individual measuring points.

Selection	5 symbols No symbol
Default value	No symbol

Measuring points are not shown.



With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Selection of the color for the measuring point symbol.

Not editable for MEAS Ref and MEAS Spec commands

Selection	13 colors pink
Default value	pink

Smoothing

Smoothing

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

Switches smoothing on/off for the curve.

Smoothing factor x axis

Factor for smoothing on the x axis.

Range	0.01 ... 1000
Default value	0.01

Smoothing factor y-axis

Factor for smoothing on the y axis.

Range	0.01 ... 1000
Default value	0.01

4.8.4.5 Curve properties - Options

Dialog window: **Database** ▶ **Curves** ▶ **Properties curves #** ▶ **Options**

Options for graphical presentation of curves.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC STAT DOS
Default value	DET



Note

When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

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

Display grid

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

Selection of the type of grid line.

Selection of the grid line color.

Selection of the color for the curve background.

Show endpoints

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

Selection of the color for automatically set endpoints.



Manual EPs

Selects the color for manually set endpoints.

Selection	13 colors pink
Default value	pink

Show evaluation lines

Show evaluation lines

on | off (Default value: off)

If this option is enabled then the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Selection of the color for the tangents and auxiliary lines.

Selection	13 colors light green
Default value	light green

Auxiliary lines

Selection of the color for the auxiliary lines.

Selection	13 colors blue
Default value	blue

4.8.4.6 Curve properties - Measuring point list

Dialog window: Database ▶ Curves ▶ Properties curves # ▶ Options

Parameters for showing the measuring point list.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC STAT DOS
Default value	DET



Note

When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Available columns

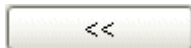
Shows all fields that can be displayed as columns in the measuring point list.

Displayed columns

Shows all fields that will be shown as columns in the measuring point list.



Adds the selected column to the measuring point list.



Removes the selected column from the measuring point list.



Modifies the sequence of displayed columns by moving the selected column up and down.

further modifications. Methods are stored in the **configuration database** and globally accessible for all clients.

5.1.2 Method - Desktop

Program part: **Method**

Method Symbol



Clicking on the method symbol in the vertical bar on the left opens the program part **Method** while, at the same time the method symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of methods currently opened (see Chapter 5.2.3, page 378).

Elements

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

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

5.1.3 Method - Menu bar

5.1.3.1 Method - Main menus

Program part: **Method**

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

- *File*
Create, open, save, close, check, manage, print methods; log out.
- *Edit*
Define method properties, recalculate calibration data, update calibration data and chromatograms.
- *View*
Switch toolbar on and off.
- *Insert*
Command, track.
- *Help*
Open tiamo help, display information on the program.

5.1.3.2 Method - Menu File

Program part: **Method**

 New...	Create a new method (<i>see Chapter 5.2.1, page 376</i>).
 Open...	Open an existing method (<i>see Chapter 5.2.2, page 376</i>).
 Save	Save the selected method (<i>see Chapter 5.2.6, page 385</i>).
Save as...	Save the selected method under a new name (<i>see Chapter 5.2.6, page 385</i>).
Close all	Close all opened methods (<i>see Chapter 5.2.9, page 388</i>).
 Close	Close the selected method (<i>see Chapter 5.2.9, page 388</i>).
 method check	Check the selected method for plausibility (<i>see Chapter 5.2.5, page 385</i>).
 Method manager...	Open the method manager (<i>see Chapter 5.3.1, page 389</i>).
 Method groups...	Open the method groups manager (<i>see Chapter 5.4.1, page 400</i>).
 Print (PDF)...	PDF file output of the method report (<i>see Chapter 5.2.8, page 387</i>).
 Logout...	Logout the user. The dialog window Login opens (<i>see Chapter 2.2.3, page 19</i>).
Exit	End program.
1 'Method name'	Open the selected method

5.1.3.3 Method - Menu Edit

Program part: **Method**

 Properties...	Open the properties window of the command selected in the method (<i>see Chapter 5.2.4.2.8, page 384</i>).
 Undo:	Undo the last modification of the method.
 Restore:	Restore the last undone modification of the method.
 Cut	Cut selected elements (commands, tracks) and copy them to the clipboard.
 Copy	Copy selected elements (commands, tracks) to the clipboard.

 Insert	Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
 Delete	Delete selected elements (commands, tracks).
 Comment...	Enter a new comment or edit a comment on the selected command (<i>see Chapter 5.2.4.2.9, page 384</i>).

5.1.3.4 Method - Menu View

Program part: **Method**

 Split vertically	Split method window vertically and display two methods side by side (<i>see Chapter 5.2.3.2, page 379</i>).
 Split horizontally	Split method window horizontally and display two methods below each other (<i>see Chapter 5.2.3.3, page 379</i>).
 Unsplit	Undo the splitting of the method window (<i>see Chapter 5.2.3.1, page 379</i>).
Toolbar	Switch toolbar display on/off.

5.1.3.5 Method - Menu Insert

Program part: **Method**

 New command...	Insert a new command above the selected command (<i>see Chapter 5.2.4.2.1, page 382</i>).
 New track...	Insert a new track on the right hand side of the selected track (<i>see Chapter 5.2.4.1.1, page 380</i>).

5.1.3.6 Menu Help

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

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

5.1.4 Method - Toolbar

Program part: **Method**

 New...	Create a new method (<i>see Chapter 5.2.1, page 376</i>).
 Open...	Open an existing method (<i>see Chapter 5.2.2, page 376</i>).



 Save	Save the selected method (<i>see Chapter 5.2.6, page 385</i>).
 Close	Close the selected method (<i>see Chapter 5.2.9, page 388</i>).
 Method manager...	Open the method manager (<i>see Chapter 5.3.1, page 389</i>).
 Method groups...	Open the method groups manager (<i>see Chapter 5.4.1, page 400</i>).
 Print (PDF)...	PDF file output of the method report (<i>see Chapter 5.2.8, page 387</i>).
 method check	Check the selected method for plausibility (<i>see Chapter 5.2.5, page 385</i>).
 Properties...	Open the properties window of the command selected in the method (<i>see Chapter 5.2.4.2.8, page 384</i>).
 Undo:	Undo the last modification of the method.
 Restore:	Restore the last undone modification of the method.
 Cut	Cut selected elements (commands, tracks) and copy them to the clipboard.
 Copy	Copy selected elements (commands, tracks) to the clipboard.
 Insert	Insert the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
 Delete	Delete selected elements (commands, tracks).
 Comment...	Newly enter or edit a comment on the selected command. (<i>see Chapter 5.2.4.2.9, page 384</i>).
 New command...	Insert a new command above the selected command (<i>see Chapter 5.2.4.2.1, page 382</i>).
 New track...	Insert a new track on the right hand side of the selected track (<i>see Chapter 5.2.4.1.1, page 380</i>).
 100 % Zoom method	Select zoom level (<i>see Chapter 5.2.3.4, page 379</i>).
 Manual Control	Manual control of the connected devices (<i>see Chapter 8.1, page 1395</i>).
 Split vertically	Split method window vertically and display two methods side by side (<i>see Chapter 5.2.3.2, page 379</i>).

 Split horizontally	Split method window horizontally and display two methods below each other (see Chapter 5.2.3.3, page 379).
 Unsplit	Undo the splitting of the method window (see Chapter 5.2.3.1, page 379).
 Logout...	Logout user (see Chapter 2.2.3, page 19).
 tiamo Help	Open <i>tiamo</i> Help.

5.1.5 Method - Functions

Program part: **Method**

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

Method editor

- *Create new method*
- *Open method*
- *Select method*
- *Edit tracks*
- *Check method*
- *Save method*
- *Close method*

Manage methods

- *Manage methods*
- *Rename method*
- *Copy method*
- *Move method*
- *Delete method*
- *Export method*
- *Import method*
- *Sign methods*
- *Show method history*

Manage method groups

- *Manage methods*
- *Edit method groups*



5.2 Method editor

5.2.1 Create new method

Menu item: **Method ▶ File ▶ New...**

With the symbol  or with the menu item **File ▶ New...** the window **New method** is opened in which a method template can be selected for the new method.

Templates

Selection	Method templates Blank method
Default value	Blank method

- Method templates**
Selecting a method template as a basis for creating a new method.
- Blank method**
A template, containing only the commands **START** and **END**, is loaded.

Description

Description of the selected method template.

[OK]

Open the selected method to edit.

5.2.2 Open method

Menu item: **Method ▶ File ▶ Open...**

With the symbol  or the menu item **File ▶ Open** the window **Open method** is opened. One of the globally available methods can be selected and opened.

Method group

Method group

Selection of the Method group whose methods will be displayed in the method table (*see Chapter 5.4.1, page 400*).

Selection	Method groups Main group
Default value	Main group

Method table
The method table contains information about all methods of the selected method group. The table cannot be edited. With a click on the column title (columns **Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name of the method.

Date and time when the method was saved.

Short name of the user who saved the method.

Full name of the user who saved the method.

Version number of the method.

Display if and at which level the method has been signed.

Selection	no	Level 1	Level 2
no	The method has not been signed. It can be edited and deleted.		
Level 1	The method has been signed electronically 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 electronically at level 2. The method is locked now and it can neither be edited nor deleted.		

Comment on the method entered as (see Chapter 5.2.4.2.9, page 384) in the command **START**.

Open method

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

Input	50 characters

Open the selected method in the main window in the place of the method that is already opened. The method name is displayed in the title bar of the

program; the number of currently opened methods is displayed in the left upper corner of the method symbol.



Note

A maximum of 9 methods can be opened but only two can be displayed at the same time (see Chapter 5.2.3.1, page 379).

5.2.3 Select method

Program part: **Method**

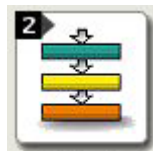
The number of the currently opened methods is displayed in the left upper corner of the method symbol. If 2 or more methods are opened, then these two methods, which can displayed either (*see Chapter 5.2.3.2, page 379*) or (*see Chapter 5.2.3.3, page 379*) in the main window, can be selected with the aid of the method symbol.



No method is opened. No method is displayed in the main window.



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



Two methods are opened. Normally only one method is displayed in the main window but the option exists of displaying two methods at once, either (*see Chapter 5.2.3.2, page 379*) or (*see Chapter 5.2.3.3, page 379*).



A menu with the currently opened methods is displayed by clicking with either the left or right mouse button on the method symbol. The methods displayed in the main window are marked with a checkmark. Clicking on the desired method displays it in the place of the previously selected one.

5.2.3.1 Display single method

Menu item: **Method** ▶ **View** ▶ **Unsplit**

In the default settings, the most recently opened method is displayed singularly in the main window. If the display of two methods is switched on, the display can be changed to only one method with the icon  or the menu item **View ► Unsplit**.

5.2.3.2 Display methods next to one another

Menu item: **Method ▶ View ▶ Split vertically**

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

5.2.3.3 Display method one below the other

Menu item: **Method** ▶ **View** ▶ **One below the other**

With the symbol  or the menu item **View ▶ Split horizontally** two methods are displayed one below the other in the main window.

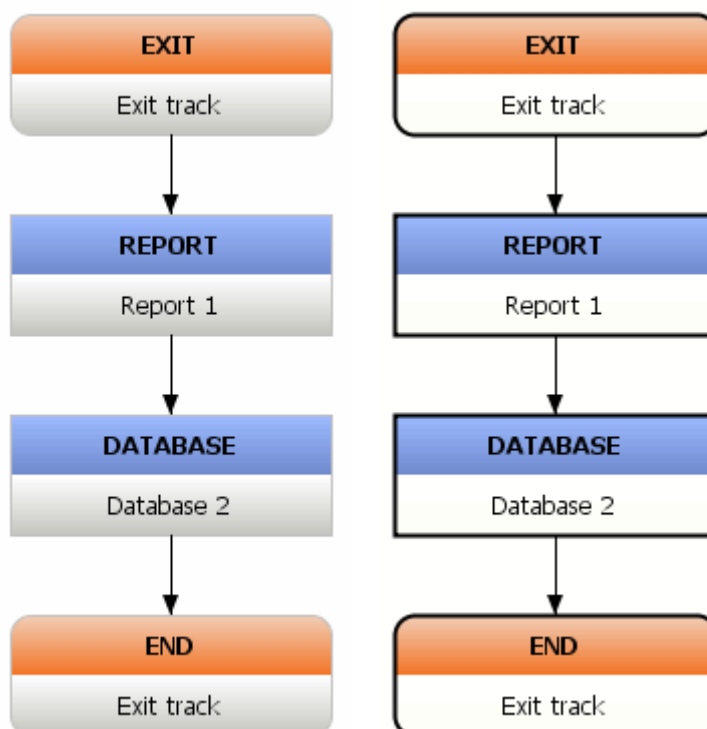
5.2.3.4 Zoom for methods

Context-sensitive menu item: **Zoom**

The following zoom levels for the display of the method can be selected either with the context-sensitive menu item **Zoom** or with the icon



Selection	200 % Zooms in the view to 200%.
Selection	150 % Zooms in the view to 150%.
Selection	100 % Adjusts view to 100%.
Selection	75 % Zooms out of the view to 75%.
Selection	50 % Zooms out of the view to 50%.
Selection	25 % Zooms out of the view to 25%.
Selection	Fit to width Adjust to width of the window.
Selection	To height Adjust to height of the window.



5.2.4.1.3 Move track

Program part: **Method** ► **Method window**

Move track with Drag&Drop

To move a track with Drag&Drop it has to be selected first. It can then be moved to the desired position with left mouse button pressed. A red vertical arrow indicates the possible positions.

Move track via the clipboard

To move a track via the clipboard it has to be cut first. It can then be inserted to the right of the selected track.

5.2.4.1.4 Copy track

Program part: **Method** ► **Method window**

Copy track with Drag&Drop

To copy a track with Drag&Drop it has to be selected first and can then be copied to the desired position with left mouse button and Ctrl key simultaneously pressed. A red vertical arrow indicates the possible positions.

Copy track to the clipboard

The selected track is copied to the clipboard with **Edit ► Copy**, the context-sensitive menu item **Copy** or with the icon .



5.2.4.1.5 Cut track

Menu item: **Method** ▶ **Edit** ▶ **Cut**

The selected track is moved to the clipboard with **Edit ► Cut**, the context-sensitive menu item **Cut** or with the icon .

5.2.4.1.6 Insert track

Menu item: **Method** ▶ **Edit** ▶ **Insert**

The track copied to the clipboard is inserted to the right of the selected track with **Edit ► Paste**, the context-sensitive menu item **Paste** or with the icon .

5.2.4.1.7 Delete track

Menu item: **Method** ▶ **Edit** ▶ **Delete**

The selected track is deleted with **Edit ► Delete**, the context-sensitive menu item **Delete**, with the icon  or with the Delete key.

5.2.4.2 Edit commands

Subwindow: **Method**

The following functions for commands are available for a method currently opened in the main window:

5.2.4.2.1 Insert new command

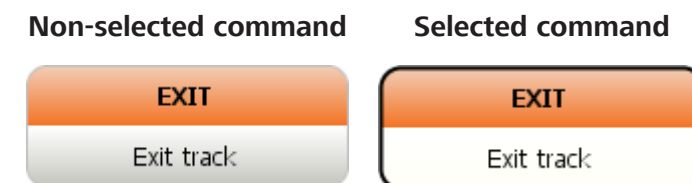
Menu item: **Method ▶ Insert ▶ New command...**

With the icon  or with the menu item **Insert ► New command...**, the window **New command** is opened, in which the desired command can be selected out of the following categories:

- **Titration**
DET, MET, SET, KFT, KFC, STAT
- **Measuring**
MEAS, STDADD
- **Calibration**
CAL LOOP pH, CAL MEAS pH, CAL LOOP Conc, CAL MEAS Conc, CAL Cond, CAL Spec
- **Dosing**
ADD, DOS, LQH, PREP, EMPTY
- **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

5.2.4.2.2 Select command

A command is selected with a left mouse click. The selected command is marked with a black border. Further commands within the same track can be selected by pressing-down the Ctrl key while clicking on the desired command with the left mouse button.

Subwindow: **Method**

To move commands with Drag&Drop they have to be selected first. They can then be moved to the desired position between two commands with the left mouse button pressed. A red arrow indicates the possible positions.

To move commands via the clipboard they have to be cut first. They can then be inserted above a selected command in an existing track.

Subwindow: **Method**

To copy commands with Drag&Drop they have to be selected first. They can then be copied to the desired position with the left mouse button and Ctrl key simultaneously pressed. A red arrow indicates the possible positions.

The selected commands are copied to the clipboard with **Edit ► Copy** the context-sensitive menu item **Copy** or with the icon .

Menu item: **Method** ► **Edit** ► **Cut**

The selected commands are moved to the clipboard with **Edit ► Cut** the context-sensitive menu item **Cut** or with the icon .

5.2.4.2.6 Insert command

Menu item: **Method** ▶ **Edit** ▶ **Insert**

The commands copied to the clipboard are inserted above the selected command with **Edit ► Paste**, the context-sensitive menu item **Paste** or with the icon .

5.2.4.2.7 Delete command

Menu item: **Method** ▶ **Edit** ▶ **Delete**

The selected commands are deleted with **Edit ► Delete** the context-sensitive menu item **Delete**, with the icon  or with the Delete key.

5.2.4.2.8 Command properties

Menu item: **Method** ▶ **Edit** ▶ **Properties**

With **Edit ► Properties**, the context-sensitive menu item **Properties**, with the icon  or with a double-click on the command, the properties window is opened, in which the command parameters can be set.



Note

For most of the command parameters with numerical input a **formula** can be entered instead of the parameter value. The formula can be entered with the **Formula editor** which is opened by a click with the right mouse button on the input field.

Example

Enter a start volume proportional to the sample size: **Start volume =**
'MV.Sample size' * 0.5

5.2.4.2.9 Command comment

Menu item: **Method** ▶ **Edit** ▶ **Comment**

With **Edit ► Comment...**, the context-sensitive menu item **Comment** or with the icon  the dialog window **Command comment** opens, in which a new comment on the selected command can be entered or edited.

Commands with a comment are marked with a red triangle in the right upper corner. If the cursor is near the triangle for more than 1 s, the comment is displayed as a tooltip.

[illegible]

5.2.5 Check method

Menu item: **Method ▶ File ▶ Method check**

With the symbol  or menu item **File ▶ Method check** a method check for the method in focus is triggered. The following points are checked:

- Are the tracks defined in **CALL** commands available?
- Are the targets of loop commands defined?
- Are the variables defined in calculation formulas available?
- Does a track contain more than one command with conditioning activated?
- Does a special track (Series start track, Series end track, Exit track and Error track) contain a command with conditioning activated?

A message is displayed for each error found. The method check has to be started again afterwards. When the method check has been completed successfully, it is confirmed with a message.

5.2.6 Save method

Menu item: **Method ▶ File ▶ Save / Save as...**

With the symbol  or the menu item **File ▶ Save** an existing selected method is saved again under its name without the window **Save method** being opened..

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, in which the method group can be selected and a method name can be entered or selected.

Method group

Method group

Selection of the method group where the method should be stored (see *Chapter 5.4.1, page 400*).

Selection	Method groups Main group
Default value	Main group

Method table

The method table contains information about all methods of the selected method group. The table cannot be edited. With a click on the column title (columns **Name**, **Saved**, **User**, **Full name**, **Version**, **Signed**, **Method comment**) the table can be sorted according to the selected column in increasing or decreasing sequence.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who saved the method.

Version

Version number of the method.

Signed

Display if and at which level the method has been signed.

Selection	no	Level 1	Level 2

no

The method has not been signed. It can be edited and deleted.

Level 1

The method has been signed electronically 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 electronically at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

Comment on the method entered as (see Chapter 5.2.4.2.9, page 384) in the command **START**.

Save method

Method name

Name under which the Method is to be saved.

Input	50 characters



Note

The method name must be unique in the whole Client/Server system.

[Save]

Save the selected method under the desired method name in the selected method group.

A new method version with a new identification is created after each storage of a modified method (see *Chapter 5.3.11, page 399*). If the option **Comment on modification of methods** is activated in the **Security settings ▶ Audit Trail ▶ Changes** in the program part **Configuration** (see *Chapter 6.2.2.3, page 1166*), the window **Modification comment method** (see *Chapter 5.2.7, page 387*) is displayed before the method is saved.

5.2.7 Modification comment on method

Menu item: **Method** ▶ **File** ▶ **Save / Save as...**

If the option **Comment on modification of methods** is activated in the **Security settings ► Audit Trail ► Modifications** in the program part **Configuration** (see Chapter 6.2.2.3, page 1166), the dialog window **Modification comment method** is opened, in which a reason and a comment on the modification must be entered, when saving a modified method or when deleting methods.

Reason

Selection from the **Default reasons** defined for the category **Modification of methods** in the **Security settings** dialog window (see Chapter 6.2.2.5, page 1168).

Selection	Selection from the Default reasons

Comment

Entry of a comment for modifying the method.

Input	1000 characters

5.2.8 Print method report

Menu item: **Method** ▶ **File** ▶ **Print (PDF)...**

With menu item **File ► Print (PDF)...** or the symbol  the window **Print method reports (PDF)** is opened in which the desired report for the selected method can be selected and output as PDF file.

Report selection

Selection of the method report to be put out.

Selection	Method sequence Method parameters Titration and measurement parameters
Default value	Method sequence

Method sequence

Output of the method sequence in graphic format.

Method parameters

Output of the entire report of all the method parameters including signatures and method history.

Titration and measurement parameters

Output of the report of all parameters of the titration and measuring commands.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Output in portrait format.

Landscape

Output in landscape format.

5.2.9 Close method

Menu item: **Method ▶ File ▶ Close / Close all**

Close single method

With the symbol  or the menu item **File ► Close**, the selected method is closed. 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.

5.3.1 Manage methods

Method group

Signed

Display if and at which level the method has been signed.

Selection	no	Level 1	Level 2

no

The method has not been signed. It can be edited and deleted.

Level 1

The method has been signed electronically 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 electronically at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

Comment on the method entered as (see Chapter 5.2.4.2.9, page 384) in the command **START**.

Window menus

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

Rename...	Rename selected method (<i>see Chapter 5.3.2, page 391</i>).
Copy	Copy selected method(s) in the same method group (<i>see Chapter 5.3.3, page 391</i>).
Move...	Move selected method(s) to a different method group (<i>see Chapter 5.3.4, page 391</i>).
Delete...	Delete selected method(s) (<i>see Chapter 5.3.5, page 392</i>).
Send to...	Export the selected method(s) as an attach to an E-mail (<i>see Chapter 5.3.6, page 392</i>).
Export...	Export selected method(s) (<i>see Chapter 5.3.7, page 393</i>).
Import...	Import selected method(s) (<i>see Chapter 5.3.8, page 393</i>).

The menu **[Sign]** below the method table contains the following menu items:

Signature 1...	Sign selected method on level 1 (<i>see Chapter 2.3.3, page 22</i>).
Signature 2...	Sign selected method on level 2 (<i>see Chapter 2.3.4, page 23</i>).

Show signatures...Show all signatures of the selected method (*see Chapter 5.3.10.4, page 397*).**Delete signatures 2...**Delete all signatures at level 2 of the selected method (*see Chapter 2.3.5, page 25*).**[History]**Opens the dialog window **Method history** of the selected method (*see Chapter 5.3.11, page 399*).**[Close]**

Close dialog window and save entries.

5.3.2 Rename methodDialog window: **Method ▶ File ▶ Manage method... ▶ Method manager ▶ [Edit] ▶ Rename... ▶ Rename method**The dialog window **Rename method** for renaming the selected method is opened with the menu item **Edit ▶ Rename...****Rename method 'Method name' to**

Enter the new method name.

Input

50 characters**Note**

The method name must be unique in the whole Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

5.3.3 Copy methodMenu item: **Method ▶ File ▶ Manage method... ▶ Method manager ▶ [Edit] ▶ Copy**With menu item **[Edit] ▶ Copy** the selected methods are saved in the same method group under the name **Copy of 'Method name'**.**5.3.4 Move method**Dialog window: **Method ▶ File ▶ Manage method... ▶ Method manager ▶ [Edit] ▶ Move... ▶ Move method(s)**The selected methods are moved to the desired method group with the menu item **Edit ▶ Move....** The method group can be selected in the window **Move method(s)**.



Select method group

Selection of the method group to which the selected methods should be moved.

Selection	Method groups



Note

Locked methods (methods signed at **Level 2**) cannot be moved.

5.3.5 Delete method

Menu item: **Method** ► **File** ► **Method manager...** ► **Method manager** ► **[Edit]** ► **Delete**

The selected methods and all method versions are deleted with the menu item **[Edit] ► Delete....**

If the option **Comment on modification of methods** is activated in the **Security settings** (see Chapter 6.2.2.3, page 1166), then the dialog window **Modification comment method** (see Chapter 5.2.7, page 387) is displayed when methods are deleted.



Note

Locked methods (methods signed at **Level 2**) cannot be deleted.

5.3.6 Send method to

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Send to...**

The selected methods are each exported as a file with the name '**Method name**'.mmet with the menu item **Edit ► Send to....**

Afterwards, the Windows Standard E-mail Client will open with an empty message and the export files of the highlighted objects will automatically be added as an attachment. The user can complete the E-mail himself/herself and send it on. The exported methods are stored only temporarily on the computer and will be deleted automatically after the E-mail has been sent.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

5.3.7 Export method

Menu item: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Edit] ▶ Export...**

The selected methods can each be exported as a file named '**Method name**'.mmet with the menu item **Edit ▶ Export...**. The window **Select directory for export** opens in which the directory for export must be selected.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

5.3.8 Import method

Menu item: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Edit] ▶ Import...**

With the menu item **Edit ▶ Import...** the dialog window **Select files for import** opens. Here you must select the methods to be imported and the method groups into which the methods are to be imported. These methods are imported in the opened method table.

Sample methods

In the program directory under ...**\tiamo\examples\methods\...** you will find examples of methods that can be imported into the open method table.

5.3.9 Rename imported method

Menu item: **Method ▶ File ▶ Method manager... ▶ Method manager ▶ [Edit] ▶ Import...**

Methods with the same name as methods already imported can only be imported under a new name. The window **Import method** opens for renaming the method.

Rename imported method 'Method name' to

Entering the new method name.

Input **50 characters**



Note

The method name must be unique in the whole Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

 **Note**

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

Information display for signing and deleting signatures. 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 can no longer be signed at Level 1 as it has already been signed at Level 2.

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

Entry of the user name (short name).

Password

Password entry.

Reason

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

Comment

Entry of comments on the signature.

Input	1000 characters



[Sign]

Sign method or determination. The window remains open.



Note

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

5.3.10.3 Signature Level 2

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

or

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

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



Note

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

Info

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

[illegible]

Signature possible

The selected method or determination can be signed.

Signature 2 not possible (signature 1 missing)

The selected method or determination cannot be signed at Level 2 as it has not yet been signed at Level 1.

Signature not possible (accessed by other client)

The selected method or determination cannot be signed as it is already marked to be signed on a different client.

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comments on the signature.

Input	1000 characters

[Sign]

Sign method or determination. The window remains open.



Note

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

5.3.10.4 Show method signatures

Dialog window: **Method ▶ File ▶ Method Manager... ▶ Method Manager ▶ [Sign] ▶ Show signatures...**

The dialog window **Signatures - Method 'Method name'** opens by means of the menu item **[Sign] ► Show signatures...** with a table in which the information for all of the signatures for the selected method is given.

Signature

Shows at which level the method has been signed (**Level 1** or **Level 2**).

Signature date

Date and time at which the method was signed.

User

Short name of the user who signed the method.

Full name

Full name of the user who signed the method.

Reason

Reason for signature.

Signature comment

Comment on the signature.

5.3.10.5 Delete Signature Level 2

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

or

Dialog window:Method ▶ File ▶ Method Manager... ▶ Method Manager ▶ [Sign] ▶ Delete signatures 2... ▶ Delete Level 2 signatures

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comments on the signature.

Input	1000 characters

[Delete]

Delete Signatures 2.



Note

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

Dialog window: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[History]** ▶ **Method history**



User group

Names of the user groups

Execute

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

Authorization to start methods from a method group. Methods in this group can only be opened and started but can not be edited or deleted.

Edit

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

Authorization to edit methods from a method group. Methods in this group can be opened, started, edited and deleted. New methods can be added as well.

5.5 Tracks

5.5.1 Tracks - General

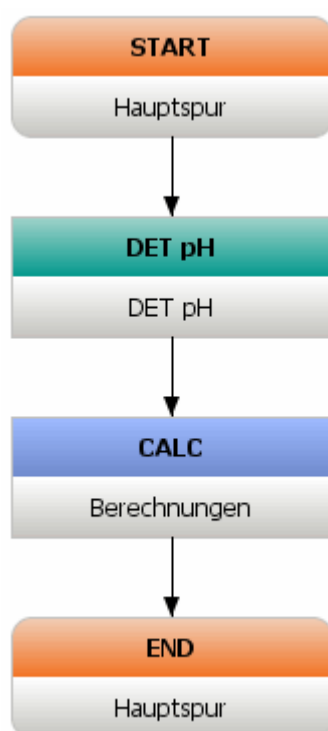
Subwindow: **Method**

Definition

A **track** is a partial sequence of a **method** comprised of **commands**. In addition to the **main track** that is present in each method, there are also **normal tracks** which are generated by the user and called up with a **CALL** command and **special tracks** (series start track, series end track, exit track and error track), which cannot be called up but which are started automatically with certain events.

Structure

Each track contains a **START** or **TRACK** command respectively and an **END** command, between which as many commands can be inserted as needed.



Presentation

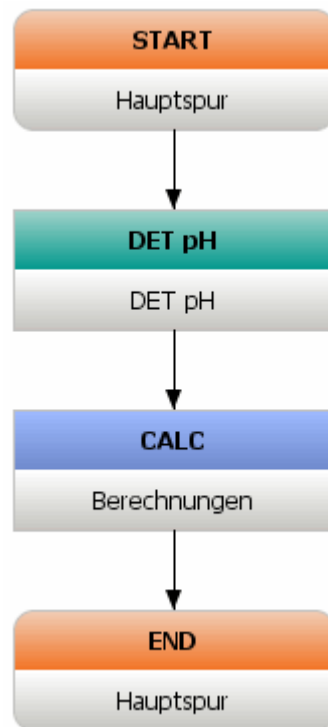
The individual tracks are arranged side by side in the method window. The track name is displayed in the **START** or **TRACK** command, respectively, as well as in the **END** command.

5.5.2 Track types

5.5.2.1 Main track

Subwindow: **Method**

The **main track** contains the main sequence of the method and exists in each method. It starts with a *(see Chapter 5.6.2.2, page 413)* and finishes with an *(see Chapter 5.6.2.8, page 427)*. The method variables required are defined in the **START** command. The **END** command indicates the end of the method run. The main track can neither be deleted nor moved.



5.5.2.2 Normal track

Subwindow: **Method**

A **normal track** is a track that can be created manually by the user with **Paste ► New track... ► Normal track** or with the icon . It starts with a start command (see *Chapter 5.6.2.3, page 422*) and finishes with an end command (see *Chapter 5.6.2.8, page 427*).

Normal tracks can be called up with the command **CALL** and entering the corresponding name. Branching and parallel processes can be implemented this way. A distinction is made between the following two cases when calling up normal tracks:

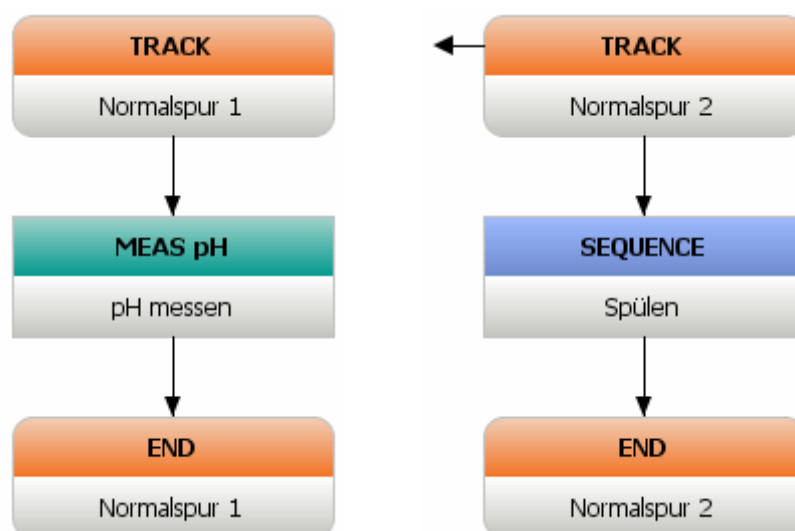
- Sequential running normal track

If the **Return immediately** check box in the (see Chapter 5.6.2.3, page 422) command is deactivated, then all of the commands of this track will be executed in sequence. Afterwards, the track sends an acknowledgement to the (see Chapter 5.6.10.3, page 1132) command that did the calling up, and the run is continued there.

■ Parallel running normal track

If the check box **Return immediately** in the (see Chapter 5.6.2.3, page 422) command is activated, then the corresponding command will be highlighted with an arrow (see below). The execution of the commands in the normal track is started when this track is called, but it sends an acknowledgement immediately to the track containing the corresponding (see Chapter 5.6.10.3, page 1132) command. This means the execution of the calling track will also be continued, i.e. the two tracks will be executed simultaneously.

Sequential running normal track Parallel running normal track

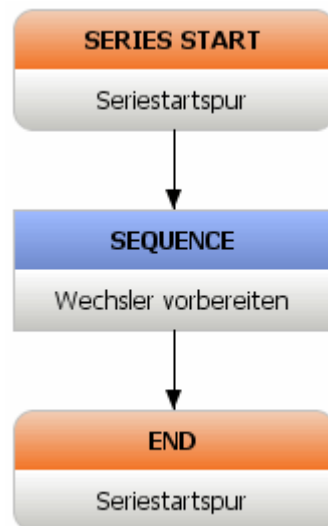


5.5.2.3 Series start track

Subwindow: **Method**

A **series start track** is a track that the user can create manually with **Paste ► New track... ► Series start track** or with the icon . It starts with the start command (see Chapter 5.6.2.4, page 424) and finishes with an end command (see Chapter 5.6.2.8, page 427). Only one series start track can be inserted per method.

The series start track is executed only once during the run: at the beginning of the first determination of a series and even before the (see Chapter 5.5.2.1, page 403). Sample Processors can, for example, be initialized with it at the beginning of a determination series.

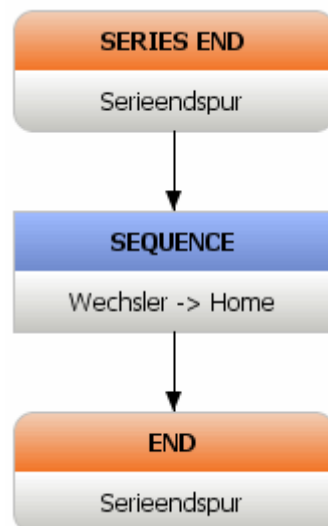


5.5.2.4 Series end track

Subwindow: **Method**

A **series end track** is a track that can be created manually with **Paste ► New track... ► Series end track** or with the icon . It starts with a start command (see Chapter 5.6.2.5, page 424) and finishes with an end command (see Chapter 5.6.2.8, page 427). Only one series end track can be inserted per method.

The series end track is executed only once during the run: at the end of the last determination of a series after the (*see Chapter 5.5.2.1, page 403*). It can be used, for example, at the end of a series to put Sample Processors in the desired condition.

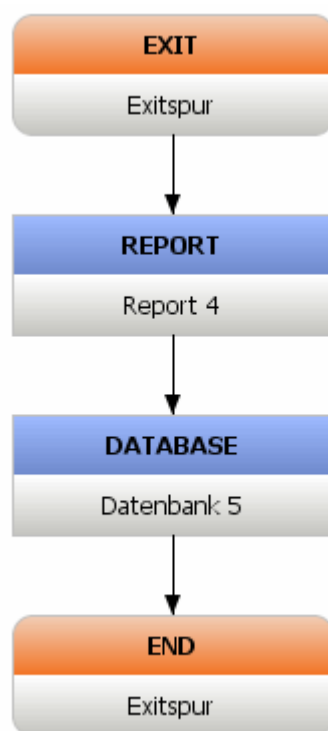


5.5.2.5 Exit track

Subwindow: **Method**

An **exit track** is a track that can be created manually with **Paste ► New track... ► Exit track** or with the icon . It starts with the start command (see Chapter 5.6.2.6, page 425) and finishes with a end command (see Chapter 5.6.2.8, page 427). Only one exit track can be inserted per method.

The exit track is executed as soon as all **normal tracks** and the **main track** have finished or if the determination has been stopped manually. If a new **exit track** is created, then a (see Chapter 5.6.8.4, page 1104) command and a (see Chapter 5.6.8.3, page 1102) and a REPORT command will be automatically inserted into this track. With these commands it can be guaranteed that a database entry and a report are created for each determination, even if the determination has been stopped either manually or due to an error.

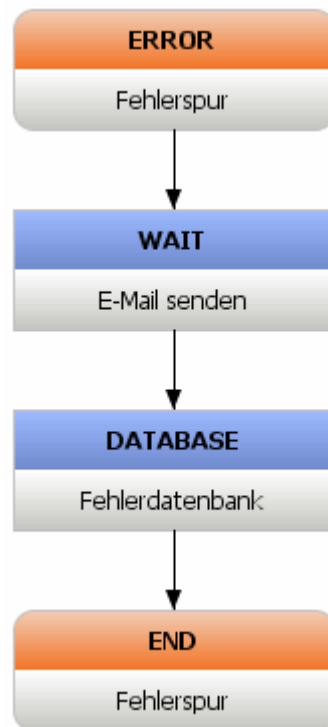


5.5.2.6 Error track

Subwindow: **Method**

An **error track** is a track that can be created manually with **Paste ► New track... ► Error track** or with the icon . It begins with a start command (see Chapter 5.5.2.6, page 407) and finishes with an end command (see Chapter 5.6.2.8, page 427). Only one error track can be inserted per method.

The error track is executed if the determination is stopped due to an error. In this case the error track takes over the function of the Main track. Normal tracks can be called from error tracks as well.



5.5.3 Edit tracks

Subwindow: **Method**

The following functions for tracks are available for a method currently opened in the main window:

- *Insert new track*
- *Select track*
- *Move track*
- *Copy track*
- *Cut track*
- *Insert track*
- *Delete track*

5.6 Commands

5.6.1 Commands - General

5.6.1.1 Definition and Presentation

Subwindow: **Method**

Definition

A **command** is a part of a **track** with the following general properties:

- **Command type**
Each Command type defines the function of the command. The identification of the command type (short description in capital letters) cannot be changed.
- **Command name**
Each command has a freely selectable command name which must be unique within the method.



Note

In the event that a command has been renamed afterwards, the cross references to this command (e.g. command variables) are adjusted automatically within the method.

- **Command parameters**
The number and type of command parameters depend on the command type and can be edited in the **Command properties** window.
- **Commands in the run**
Commands within the same track are carried out in sequence, one after the other, in the method run.

Presentation

Commands are displayed double-spaced. The first row contains the name of the command type (e.g. **DET pH, CALC**) and the second row contains a freely selectable command name that is unique within the method. The default command name is composed of the command type and a consecutive number.

DET pH
DET pH 1

The command types are structured by the following colors:

- **Orange**
Track commands



- **Green**
Titration and measurement commands
- **Yellow**
Sample Processor and dosing commands
- **Blue**
All other commands

5.6.1.2 Edit commands

Subwindow: **Method**

The following processing functions for commands are available for a method currently opened in the main window:

- *Insert new command*
- *Select command*
- *Move command*
- *Copy command*
- *Cut command*
- *Insert command*
- *Delete command*
- *Command properties*
- *Command comment*

5.6.1.3 Alphabetical command overview

Subwindow: **Method**

- *ADD*
Adding a predefined volume.
- *CAL Cond*
Determination of cell constants of conductivity sensors.
- *CAL LOOP Conc*
Calibration loop for calibrating ion-selective electrodes (ISE electrodes).
- *CAL MEAS pH*
Measuring command for calibrating pH electrodes.
- *CAL MEAS Conc*
Measuring command for calibrating ion-selective electrodes (ISE electrodes).
- *CAL Spec*
Execution of a wavelength calibration.
- *CALC*
Calculation of intermediate and end results, titer values and common variables.
- *CALL*
Calling up tracks (subprograms).
- *CTRL*
Setting remote output lines.
- *DATABASE*
Storage of the determination data in data bases.

- *DET*
Dynamic Equivalence Point Titrations.
- *DOS pH*
Controlled dosing with the measured quantity pH.
- *DOS U*
Controlled dosing with the measured quantity voltage U.
- *EMPTY*
Emptying a dosing unit.
- *END*
End command for all tracks.
- *ERROR*
Start command for error track.
- *EXIT*
Start command for exit track.
- *EXPORT*
Export of determination data.
- *FLOW*
Gas flow monitoring with 774 and 864 Sample Processor.
- *HEATER*
Controlling the oven temperature with the 774 and 864 Sample Processors.
- *KFC*
Coulometric Karl Fischer Titrations with voltametric measurement.
- *KFT*
Volumetric Karl Fischer Titrations.
- *LIFT*
Moving to a lift position.
- *LOOP*
Multiple execution of a command sequence.
- *LQH*
Extensive dosing possibilities with a Dosino.
- *MEAS*
Measuring.
- *MET*
Monotonic Equivalence Point Titrations.
- *MOVE*
Moving to a rack position or an external position.
- *PREP*
Preparing an 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*
Request sample data.
- *SCAN*
Scan remote input lines.
- *SEND*
Send 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*
STAT Titration.
- *STDADD auto*
Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.
- *STDADD dos*
Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD man*
Standard addition with manual addition of the standard addition solution.
- *STIR*
Controlling a connected stirrer.
- *SWING*
Swinging of the robotic arm (with Swing Head only).
- *TRACK*
Start command for normal track.
- *TRANSFER*
Data transfer via RS-232 to external devices or programs.
- *WAIT*
Interrupting the method run.

5.6.2 Track commands

5.6.2.1 Track commands - Overview

Menu item: **Method ▶ Paste ▶ New track...**

The following track commands exist for the different tracks:

- **START**
Start command for (see Chapter 5.5.2.1, page 403).
- **TRACK**
Start command for (see Chapter 5.5.2.2, page 404).
- **SERIES START**
Start command for (see Chapter 5.5.2.3, page 405).
- **SERIES END**
Start command for (see Chapter 5.5.2.4, page 406).
- **EXIT**
Start command for (see Chapter 5.5.2.5, page 407).
- **ERROR**
Start command for (see Chapter 5.5.2.6, page 407).
- **END**
End command for all tracks.

5.6.2.2 START

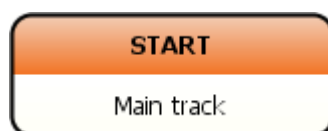
5.6.2.2.1 START - Overview

Dialog window: **Method ▶ START ▶ Properties.. ▶ START 'Command name'**

Start command for main track.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **START** are configured on the following 3 tabs:

- *General*
General settings for the method run.
- *Application note*
Writing an application note which is displayed when starting a determination.
- *Method variables*
Configuring method and sample variables which are to be available for the method.

Workplace view

Workplace view

Selection	Current view View
Default value	Current view

Current view

If this option is enabled, the current view of the workplace remains opened when starting a determination.

View

If this option is enabled, the selected workplace view is automatically opened when starting a determination.

If the option **View** is selected, then a workplace view can be selected from those available in the list box.

Selection	'Workplace view'



Note

The selected workplace view will only be opened when starting a single determination or starting the first determination of a series. It will not be opened when a new method within a determination series is being loaded.

Track display for live window

Live display 1

Selection of the track to be displayed in the subwindow **Live display 1**.

Selection	Main track Selection of available tracks
Default value	Main track

Live display 2

Selection of the track to be displayed in the subwindow **Live display 2**.

Selection	Main track Selection of available tracks
Default value	Main track

Statistics

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

If this parameter is switched on, then the statistic functions defined in the **CALC** command will be calculated.



Note

In order to make sure that the statistics will really be calculated, the feature must also be enabled in the **Workplace** program part on the **Single determination** tab.

Number of single determinations

The number of single determinations defined here is valid for all **CALC** commands in the method.

Range	1 ... 00
Default value	not defined
The number of single determinations must be specified on the tab Determination series in the Run subwindow of the program part Workplace.	

Conditioning

Automatic conditioning

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

If this option is **enabled**, the conditioning will be started automatically at the start of a determination for all commands with activated conditioning (**SET**, **KFT**, **KFC**). After the track with the conditioning command has been finished, conditioning is started again automatically and will be continued even after the end of the determination.

If this parameter is **disabled**, then conditioning will not be started until the start of the command. Conditioning is not started again after the end of the track with the conditioning command. This parameter must be switched off for **automation applications**.

5.6.2.2.3 START - Application note

Tab: **Method** ▶ **START** ▶ **Properties...** ▶ **START 'Command name'** ▶ **Application note**

Command name

Name of the command.

Input	25 characters

The application note defined in the text window is displayed in the tab **Application note** in the subwindow **Live display** of the program part **Workplace**. The tab is opened automatically when the method is loaded.

The text editor with which the application note can be entered or changed

is opened with  or by double-clicking into the text field (see *Chapter 2.5.2, page 81*).

5.6.2.2.4 START - Method variables (Table)

Tab: **Method** ▶ **START** ▶ **Properties...** ▶ **START 'Command name'** ▶ **Method variable**

Command name

Name of the command.

Input	25 characters

The variables that are to be available within the method in other commands (e.g. **CALC** command) under the designation **MV.'Variable name'** must be declared here. Either a sample data variable (entry in field **Assignment**) or a direct value (entry in field **Value**) can be assigned to a method variable.

The overview table shows all of the declared method variables and can itself not be edited directly. With a click on the column title (columns **Name**, **Type**, **Assignment** or **Value**) the table can be sorted according to the selected column in either ascending or descending sequence.

The meaning of the columns see *Method variables (Details)*, page 417.

[New]

Opens the dialog window **Method variable - New** in which a new method variable can be entered (see Chapter 5.6.2.2.5, page 417).

[Properties]

Opens the dialog window **Method variable - 'Name'** in which the method variable selected in the table can be edited (*see Chapter 5.6.2.2.5, page 417*).

[Delete]

Deletes the method variable selected in the table.

5.6.2.2.5 START - Method variables (Properties)

Dialog window: **Method ▶ START ▶ Properties... ▶ START 'Command name' ▶ Method variable ▶ [Properties] ▶ Method variable - 'Name'**

Definition of the method variable

Name

Freely selectable name of the method variable which must be unique within the method.

Input	50 characters

Type

Selection of the variable type. This field cannot be edited with variables with a unique type (**Sample size**, **Unit**, **Sample position**).



REQUEST command during the run.

Freely selectable comment on the method variable.

Input	1000 characters

Note

Time.

The limits for the variable will be monitored while the determination is running if this option is enabled.

Lower limit for the variable.

Input	10 digits

Selection	'Date'

Upper limit for the variable.

Input	10 digits

Selection	'Date'

Message



Note

Is displayed only for method variables of the types **Number** or **Date/Time**.

The message defined here can be output to different targets if the upper limit is exceeded or if the lower limit is not reached. The text editor for

entering or changing the message is opened with  or by double-clicking into the text field (see Chapter 2.5.2, page 81). The formula editor can also be called up inside the text field (see Chapter 2.4, page 26).

Input	Text (unlimited)

Display message

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

If this option is enabled, all active tracks are stopped and the message defined in the text box will be displayed if the limits are exceeded.

Record message

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

If this option is enabled, the message defined in the text box will be documented in the determination if the limits are exceeded.

Message by E-mail

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

If this option is enabled, the message defined in the text box will be sent to the address defined under **<E-Mail>** if the result limits are exceeded.

[E-mail]

Opens the window **Send E-mail** for defining the E-mail parameters (see *Chapter 5.6.2.2.6, page 421*).

Acoustic signal

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

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above when a limit is exceeded.

Is displayed only for method variables of the types **Number** or **Date/Time**.

Selection	Stop determination Stop determination and series
Default value	Stop determination

If this option is selected, then the current determination (or conditioning) will be stopped. The next determination of the series will not be started afterwards.

Input	150 characters
Default value	Message from tiamo – Method 'Method name' – Command 'Command name'

Parameter for "Use E-mail template = off"

Mail to

E-mail address of the recipient.

Input	200 characters

Subject

Subject to describe the message.

Input	150 characters
Default value	Message from tiamo – Method 'Method name' – Command 'Command name'

User

Name of the user for access to mail server. The name need not agree with the Windows user name.

Input	200 characters

Password

Password for the access to the mail server. This password does not necessarily have to be identical to the Windows password.

Input	200 characters

Mail from

E-Mail address of the sender.

Input	200 characters

SMTP server

Address of SMTP mail server.

Input	200 characters

POP3 server

Address of POP3 mail server.

Input	200 characters

5.6.2.3 TRACK

Dialog window: **Method** ▶ **TRACK** ▶ **Properties..** ▶ **TRACK 'Command name'**

Start command for normal track.

Appearance

The command has the following appearance:

**Command name**

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Return immediately

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

If this option is enabled, then the program does not wait for this track to be completed, but rather sends an acknowledgement immediately to the track with the **CALL** command. From now on, both tracks will be running simultaneously.

Delete old data

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

All data previously generated by a track will be deleted at each new start of this track when this option is activated.

Command variables

The following command variables are generated in the method run by the command **TRACK** and can be used in formulas under the designation

'Command name.Variable designation':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended



Parameters

Command name

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Command variables

The following command variables are generated in the method run by the command **SERIES END** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.2.6 EXIT

Dialog window: **Method** ► **EXIT** ► **Properties...** ► **EXIT 'Command name'**

Start command for exit track.

Appearance

The command has the following appearance:



Parameters

Command name

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Command variables

The following command variables are generated in the method run by the command **EXIT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

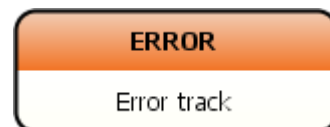
5.6.2.7 ERROR

Dialog window: **Method** ► **ERROR** ► **Properties..** ► **ERROR 'Command name'**

Start command for error track.

Appearance

The command has the following appearance:



Parameters

Command name

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Command variables

The following command variables are generated in the method run by the command **START** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended

5.6.2.8 END

Dialog window: **Method ► END ► END -'Command name'**

End command for all tracks.

Appearance

The command has the following appearance:



Parameters

The **END** command does not have any parameters. It is created automatically at the end of a track when a new track is inserted.

Command variables

No command variables are generated in the method run by the **END** command.

5.6.3 Titration commands

5.6.3.1 Titration commands - Overview

Menu item: **Method ► Paste ► New command...**

Commands for titrations.

Modes

The following titration commands can be selected:

- *DET*
Command for Dynamic Equivalence Point Titrations.



- *MET*
Command for Monotonic Equivalence Point Titrations.
- *(see Chapter 5.6.3.4.1, page 639)*
Command for Set Endpoint Titrations.
- *KFT*
Command for volumetric Karl Fischer Titrations.
- *KFC*
Command for coulometric Karl Fischer Titrations with voltametric measurement.
- *STAT*
Command for STAT Titrations.

5.6.3.2 DET

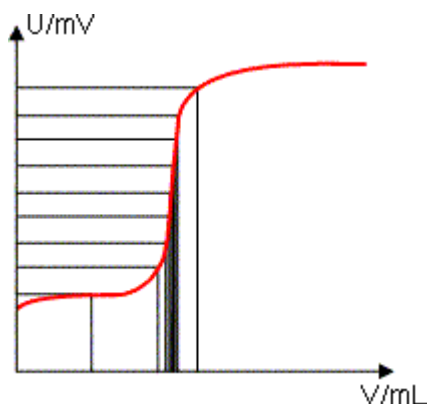
5.6.3.2.1 DET - Overview

Menu item: **Method** ▶ **Paste** ▶ **New command...**

Command for **Dynamic Equivalence Point Titrations.**

Principle

With this command titrations with dynamic incremental reagent addition are carried out. The volume increments vary as a function of the slope of the curve. An attempt is made to achieve constant measured value alterations with each dosing. The optimal volume for dosing is determined from the measured value alterations of the previous dosings. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting period.



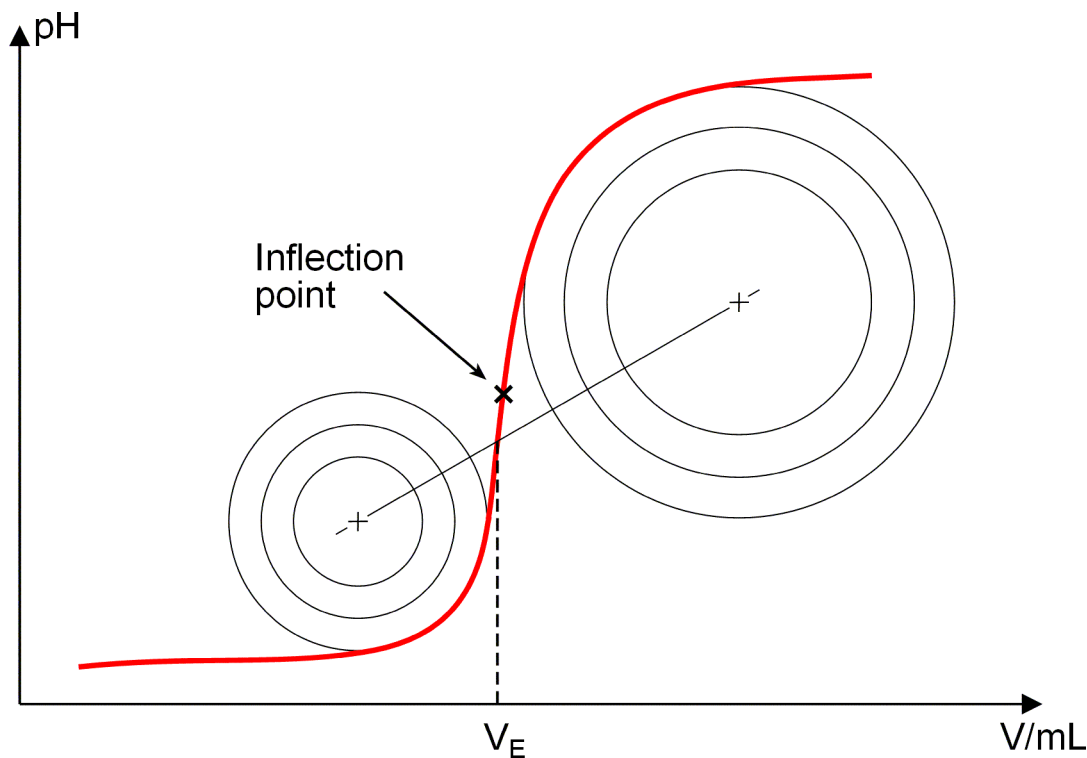
Note

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 **EP** are determined automatically in a similar manner to that described in the Tubbs method (C.F. Tubbs; Anal. Chem 26 (1954))

1670–1671, quoted in Ullman 5 (1980) 659). . The volume of the equivalence point **VE** is shifted from the inflection point towards the smaller circle of curvature for real asymmetric titration curves.



The figure shows that the evaluation also requires measuring points from the measuring point list after the equivalence point as well.

For the recognition of the EPs found the set **EP criterion** is compared with the **ERC (Equivalence point Recognition Criterion)** found. The ERC is the first derivative of the titration curve combined with a mathematical function which is more sensitive for flat jumps than for steeper ones. EPs whose ERC is smaller than the set EP criterion will not be recognized.

Commands

Depending on the measured value one of the following four **DET** commands can be selected:

- *DET pH*
Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *DET U*
Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *DET U*
Voltametric measurement with selectable polarization current (measured quantity voltage U).



- *DET Upol*
Amperometric measurement with selectable polarization voltage (measured value current I).

5.6.3.2.2 DET pH

5.6.3.2.2.1 DET pH - Overview

Dialog window: **Method ▶ DET pH ▶ Properties.. ▶ DET pH - 'Command name'**

Command for **dynamic equivalence point titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrino: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **DET pH** are configured on the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DET pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break-point $\times (1 \dots 9)$
.BP{x}.MEA	Measured value for the break-point $\times (1 \dots 9)$ in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point $\times (1 \dots 9)$ in °C
.BP{x}.TIM	Time for the break-point $\times (1 \dots 9)$ in s
.BP{x}.VOL	Volume for the break-point $\times (1 \dots 9)$ in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.ERC	ERC for the endpoint $\times (1 \dots 9)$
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in °C
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL
.ETE	End temperature (temperature following processing of the command) in °C

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.ERC	ERC for the fix endpoint x (1...9)
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.HP{x}.MEA	Measured value for the HNP x (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1...9) in °C
.HP{x}.TIM	Time in s until the HNP x (1...9) is reached
.HP{x}.VOL	Volume for the HNP x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value

Identification	Description
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL

Identification	Description
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.2.2 DET pH - General/Hardware

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrand

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrim

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor**Measuring input**

Selection of the measuring input to which the sensor is connected.

Titrand

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrim

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855

Selection **1** | **2** | **3** | **4** | **off**

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandu, 855

Range	-15 ... 15
Default value	8

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

Switch on/off automatically

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

5.6.3.2.2.3 DET pH - Start conditions

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Start conditions**

Name of the command.

Input	25 characters

Initial measured value

Note

Is displayed only for Titrando and 855.

Measured value drift

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off



Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value



Note

Is displayed only for Titrand and 855.

Start measured value pH

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-20.000 ... 20.000
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope



Note

Is displayed only for Titrand and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 9.999 pH/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.2.4 DET pH - Titration parameters

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrand, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrand, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

Titrand, 855

Range	0.1 ... 9999.9 µL
Selection	off
Default value	off

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature**Temperature**

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.2.2.5 DET pH - Stop conditions

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop measured value pH

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrandu, 855

Range	-20.000 ... 20.000
Selection	off
Default value	off

Titrimo

Range	-20.00 ... 20.00
Selection	off
Default value	off

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Range	1 ... 9
Default value	9
Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrand, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrand

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.2.2.6 DET pH - Potentiometric evaluation

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Potentiometric evaluations**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (pH) Evaluation with volume window (mL)
Default value	Evaluation without window

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (pH)**EP criterion**

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrimo

Range	0 ... 200
Default value	5

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered (*see Chapter 5.6.3.2.2.9, page 453*).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (*see Chapter 5.6.3.2.2.9, page 453*).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered.

[Properties]

Opens the dialog window in which the parameters for the selected window can be edited (*see Chapter 5.6.3.2.2.10, page 454*).

[Delete]

Deletes the window selected in the table.

5.6.3.2.2.7 DET pH - Additional evaluations

Tab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.2.2.11, page 455*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see *Chapter 5.6.3.2.2.11*, page 455).

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

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

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point (see Chapter 5.6.3.8.1, page 835).

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrand and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value

related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Volume Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Window = Measured value

Range	-20.000 ... 20.000 pH
Default value	-20.000 pH

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Window = Measured value pH

Range	-20.0 ... 20.0 pH
Default value	20.0 pH

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrando and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Procedure

Selection of the Gran procedure.

Selection	Normalized Standard
Default value	Normalized

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.0 mL

Lower limit pH

Value for the lower limit of the Gran evaluation range.

Range	-20.000 ... 20.000
Default value	-20.000

Upper limit pH

Value for the upper limit of the Gran evaluation range.

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.2.9 DET pH - Measured value window

Dialog window: **Method ▶ DET pH ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window (pH) ▶ [New]/[Properties] ▶ Measured value window**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit pH

Lower limit for the measured value window.

Range	-20.000 ... 20.000
Default value	-20.000

Upper limit pH

Upper limit for the measured value window.

Range	-20.000 ... 20.000
Default value	20.000

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrand, 855

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrand, 855

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.2.11 DET pH - Fix endpoint evaluation

Dialog window: **Method ▶ DET pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-20.000 ... 20.000 pH

- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DET U** and can be used in formulas under the designation

'Command name.Variable designation':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.ERC	ERC or first derivative for the break-point $\times (1 \dots 9)$
.BP{x}.MEA	Measured value for the break-point $\times (1 \dots 9)$ in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point $\times (1 \dots 9)$ in °C
.BP{x}.TIM	Time for the break-point $\times (1 \dots 9)$ in s
.BP{x}.VOL	Volume for the break-point $\times (1 \dots 9)$ in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.ERC	ERC for the endpoint $\times (1 \dots 9)$
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint , 2 = 2 or more endpoints , 3 = EP corrected with Autodrift , 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in °C

Identification	Description
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL
.ETE	End temperature (temperature following processing of the command) in $^{\circ}\text{C}$
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.ERC	ERC for the fix endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fix endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fix endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fix endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fix endpoint $\times (1 \dots 9)$ in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in $^{\circ}\text{C}$
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP $\times (1 \dots 9)$ in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.HP{x}.TIM	Time in s until the HNP $\times (1 \dots 9)$ is reached
.HP{x}.VOL	Volume for the HNP $\times (1 \dots 9)$ in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in $^{\circ}\text{C}$
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list

Identification	Description
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855

Selection	1	2	3	4	off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.3.3 DET U - Start conditions

Tab: **Method ▶ DET U ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrandos and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value**Note**

Is displayed only for Titrimo and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope**Note**

Is displayed only for Titrimo and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 999 mV/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.3.4 DET U - Titration parameters

Tab: **Method** ▶ **DET U** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrande, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrande, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has

elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller measured value drift and a higher EP criterion at the same time.

Range	1 ... 9
Default value	2 (slow), 4 (optimal), 6 (fast)

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Range	0.1 ... 999.9 µL
Default value	1.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or

if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrand, 855

Range	0.1 ... 9999.9 µL
Selection	off
Default value	off

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrand, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.2.3.6 DET U - Potentiometric evaluation

Tab: **Method** ▶ **DET U** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:

Potentiometric evaluation

Selection	Evaluation without window	Evaluation with measured value window (U)	Evaluation with volume window (mL)
Default value	Evaluation without window		

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (U)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrand** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	all greatest last off
Default value	all

Titrandu, 855

Selection	all greatest last ascending descending offset
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (U)**EP criterion**

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrimo

Range	0 ... 200
Default value	5

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered (see Chapter 5.6.3.2.3.9, page 479).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.2.3.9, page 479).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (see Chapter 5.6.3.2.3.10, page 480).

[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.2.3.10, page 480).

[Delete]

Deletes the window selected in the table.

5.6.3.2.3.7 DET U - Additional evaluations

Tab: **Method** ▶ **DET U** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value, Volume or Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.2.3.11, page 481*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see *Chapter 5.6.3.2.3.11, page 481*).

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

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

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point (see Chapter 5.6.3.8.1, page 835).

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrand and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value

related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Volume Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrando and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.00 mL

Lower limit

Value for the lower limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Upper limit

Value for the upper limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

5.6.3.2.3.8 DET U - Additional measured values

Tab: **Method** ▶ **DET U** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.3.9 DET U - Measured value window

Dialog window: **Method ▶ DET U ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window (U) ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	-2000 mV

Upper limit

Upper limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	2000 mV

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrandu, 855

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrandu, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.3.10

DET U - Volume window

Dialog window: **Method ▶ DET U ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (ml) ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0 ... 200
Default value	5

Filter for the recognition of equivalence points:

Selection	first greatest last ascending descending
Default value	first

Only the first endpoint to be found will be recognized.

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

Only the last endpoint to be found will be recognized.

Only endpoints with a positive slope of the titration curve will be recognized.

Only endpoints with a negative slope of the titration curve will be recognized.

Dialog window: **Method ▶ DET U ▶ Properties... ▶ Additional evaluations ▶ Fix end-point evaluation #**

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Volume
Default value	Measured value		

Value of the fix endpoint.

<i>Measured value</i>	
Range	-2000.0 ... 2000.0 mV
<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00 ... 9999.99 mL

5.6.3.2.4 DET Upol

5.6.3.2.4.1 DET Ipol - Overview

Dialog window: **Method ▶ DET Ipol ▶ Properties... ▶ DET Ipol - 'Command name'**

Command for **Dynamic Equivalence Point Titrations** with voltametric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrimo: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **DET lpol** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.

- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DET Ipol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break-point $\times (1 \dots 9)$
.BP{x}.MEA	Measured value for the break-point $\times (1 \dots 9)$ in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point $\times (1 \dots 9)$ in °C
.BP{x}.TIM	Time for the break-point $\times (1 \dots 9)$ in s
.BP{x}.VOL	Volume for the break-point $\times (1 \dots 9)$ in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint $\times (1 \dots 9)$
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in °C
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.ERC	ERC for the fix endpoint $\times$ (1...9)
.FP{x}.MEA	Measured value for the fix endpoint $\times$ (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint $\times$ (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint $\times$ (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint $\times$ (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP $\times$ (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP $\times$ (1...9) in °C
.HP{x}.TIM	Time in s until the HNP $\times$ (1...9) is reached
.HP{x}.VOL	Volume for the HNP $\times$ (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list
.LP.EXx	External value $\times$ (1...3) for the last measuring point of the measuring point list

Identification	Description
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL

Titrande

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor**Measuring input**

Selection of the measuring input to which the sensor is connected.

Titrande

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855, 888

Selection	1
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

Titrandu, 855

Range	-125.0 ... 125.0 μA (Increment: 2.5)
Default value	5.0 μA

Titrimo

Range	-127 ... 127 μA (Increment: 1)
Default value	5 μA

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrandos, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.2.4.3 DET Ipol - Start conditions

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. Acceptance of the measured value depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value



Note

Is displayed only for Titrande and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off



Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope



Note

Is displayed only for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 999 mV/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.4.4 DET Ipol - Titration parameters

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted FPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrandu, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titirino

Range	0.5 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller measured value drift and a higher EP criterion at the same time.

Range	1 ... 9
Default value	2 (slow), 4 (optimal), 6 (fast)

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Range	0.1 ... 999.9 µL
Default value	1.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrande, 855

Range	0.1 ... 9999.9 µL
Selection	off
Default value	off

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.2.4.5 DET Ipol - Stop conditions

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrand, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000 mV
Selection	off
Default value	off

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Range	1 ... 9
Default value	9
Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrand, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrandu, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrino

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.2.4.6 DET Ipol - Potentiometric evaluation

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (Upol) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrande** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrimo

Selection	all greatest last off
Default value	all

Titrande, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrimo

Range	0 ... 200
Default value	5

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered.

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.2.4.9, page 506).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (see Chapter 5.6.3.2.4.10, page 507).

[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.2.4.10, page 507).

[Delete]

Deletes the window selected in the table.

5.6.3.2.4.7 DET Ipol - Additional evaluations

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (*see Chapter 5.6.3.2.4.11, page 508*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (*see Chapter 5.6.3.2.4.11, page 508*).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Volume Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrando and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure(see *Chapter 5.6.3.8.4, page 837*).

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.00 mL

Lower limit

Value for the lower limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Upper limit

Value for the upper limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

5.6.3.2.4.8 DET Ipol - Additional measured values

Tab: **Method ▶ DET Ipol ▶ Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered.

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.4.10**DET Ipol - Volume window**

Dialog window: **Method ▶ DET Ipol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (ml) ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrandu, 855

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrandu, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.4.11 DET Ipol - Fix endpoint evaluation

Dialog window: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Additional evaluations** ▶ **Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Volume
Default value	Measured value		

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

5.6.3.2.5 DET Upol**5.6.3.2.5.1 DET Upol - Overview**

Dialog window: **Method ▶ DET Upol ▶ Properties... ▶ DET Upol - 'Command name'**

Command for **Dynamic Equivalence Point Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices.

Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titrimo: 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:

**Parameters**

The parameters for the command **DET Upol** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DET Upol** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BP{x}.ERC	ERC or first derivative for the break-point x (1...9)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BP{x}.VOL	Volume for the break-point x (1...9) in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint x (1...9)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL

.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.ERC	ERC for the fix endpoint x (1...9)
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1...9) in °C
.HP{x}.TIM	Time in s until the HNP x (1...9) is reached
.HP{x}.VOL	Volume for the HNP x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.ERC	ERC for the last measuring point in the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value of the measuring point list

5.6.3.2.5.2 DET Upol - General/Hardware

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titirino

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855, 888

Selection	1
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

Titrand, 855

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

Titrim

Range	-1270 ... 1270 mV (Increment: 10)
Default value	400 mV

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrand, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrand, 855

Selection	1 2 3 4 off

Titrande, 855

Range	0.01 ... 99.90 $\mu\text{A}/\text{min}$
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) $\mu\text{A}/\text{min}$
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.05 ... 99.90 $\mu\text{A}/\text{min}$
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) $\mu\text{A}/\text{min}$
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume**Start volume**

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value



Note

Is displayed only for Titrando and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-200.0 ... 200.0 μA
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope



Note

Is displayed only for Titrand and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 99 µA/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.5.4 DET Upol - Titration parameters

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrandu, 855

Range	0.01 ... 99.90 µA/min
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.05 ... 99.90 µA/min
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) µA/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrando, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrando, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments**Note**

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.



Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller measured value drift and a higher EP criterion at the same time.

Range	1 ... 9
Default value	2 (slow), 4 (optimal), 6 (fast)

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Range	0.1 ... 999.9 µL
Default value	1.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

Titrando, 855

Range	0.1 ... 9999.9 µL
Selection	off
Default value	off

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titirino

Range	0.01 ... 150.00 mL/min

Selection	maximum
Default value	maximum

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.2.5.5 DET Upol - Stop conditions

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Selection	maximum
Default value	maximum

5.6.3.2.5.6 DET Upol - Potentiometric evaluation

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (Upol) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrande** and **855..** With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrimo

Selection	all greatest last off
Default value	all

Titrandu, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrimo

Range	0 ... 200
Default value	5

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered (see Chapter 5.6.3.2.5.9, page 532).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (*see Chapter 5.6.3.2.5.9, page 532*).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (*see Chapter 5.6.3.2.5.10, page 533*).

[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (*see Chapter 5.6.3.2.5.10, page 533*).

[Delete]

Deletes the window selected in the table.

5.6.3.2.5.7 DET Upol - Additional evaluations

Tab: **Method ▶ DET Upol ▶ Properties... ▶ Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation**Fix endpoint evaluation**

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (*see Chapter 5.6.3.2.5.11, page 534*).



[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see *Chapter 5.6.3.2.5.11*, page 534).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 µA/mL
Default value	5.0 µA/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 µA/mL
Default value	5.0 µA/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrando and 855.

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

Range	-200.0 ... 200.0 μA
Default value	200.0 μA

can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.2.5.9 DET Upol - Measured value window

Dialog window: **Method ▶ DET Upol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window (Upol) ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Range	-200.0 ... 200.0 μA
Default value	-200.0 μA

Upper limit

Upper limit for the measured value window.

Range	-200.0 ... 200.0 μ A
Default value	200.0 μ A

EP criterion

Criterion for the recognition of equivalence points. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.5.10**DET Upol - Volume window**

Dialog window: **Method ▶ DET Upol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (ml) ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrandu, 855

Range	0 ... 200
Default value	5

EP recognition

Filter for the recognition of equivalence points:

Titrandu, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.2.5.11 DET Upol - Fix endpoint evaluation

Dialog window: **Method ▶ DET Upol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation # ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Volume
Default value	Measured value		

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 μA

Time

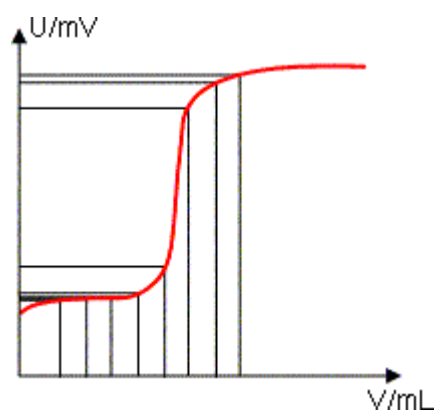
Range 0.0 ... 999999.9 s

Volume

Range 0.00 ... 9999.99 mL

5.6.3.3 MET**5.6.3.3.1 MET - Overview**Menu item: **Method ▶ Paste ▶ New command...**Command for **Monotonic Equivalence Point Titrations**.**Principle**

With this command titrations with reagent addition at constant volume increments are carried out. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting period.

**Note**

This command is suited for titrations with relatively high signal fluctuations or suddenly occurring potential jumps and for slow titrations or slowly responding electrodes.

Evaluation

The equivalence points (EPs) are localized by a procedure based on the Fortuin method which has been adapted by Metrohm for numerical methods. A search is made for the largest measured value alteration (Δ_n). The exact EP is determined by using an interpolation factor p which depends on the Δ values before and after Δ_n .

$$V_{EP} = V_0 + p \Delta V$$

$\mathbf{V}_{EP}$ = EP volume, $\mathbf{V}_0$ = total volume added before Δ_n , $\Delta \mathbf{V}$ = 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 one summand is taken into account.) EPs whose ERC is smaller than the set EP criterion will not be recognized.

Commands

Depending on the measured value one of the following four **MET** commands can be selected:

- *MET pH*
Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *MET U*
Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *MET I_{pol}*
Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *MET U_{pol}*
Amperometric measurement with selectable polarization voltage (measured value current I).

5.6.3.3.2 MET pH

5.6.3.3.2.1 MET pH - Overview

Dialog window: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **MET pH - 'Command name'**

Command for **Monotonic Equivalence Point Titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titirino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrator: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MET pH** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.DME	Measured value differential for the break-point x (1...9)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BP{x}.VOL	Volume for the break-point x (1...9) in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s

Identification	Description
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.DME	Measured value differential for the endpoint x (1...9)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.DME	Measured value differential for the fix endpoint x (1...9)
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached

Identification	Description
.HP{x}.MEA	Measured value for the HNP $\times$ (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP $\times$ (1...9) in °C
.HP{x}.TIM	Time in s until the HNP $\times$ (1...9) is reached
.HP{x}.VOL	Volume for the HNP $\times$ (1...9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C

Identification	Description
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.2.2 MET pH - General/Hardware

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device**Dosing device**

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made

of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrande, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrande, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.2.3 MET pH - Start conditions

Tab: **Method ▶ MET pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value**Note**

Is displayed only for Titrande and 855.

Start measured value pH

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-20.000 ... 20.000
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min

Selection **maximum**

Start slope



Note

Is displayed only for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 9.999 pH/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.3.2.4 MET pH - Titration parameters

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrand, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrand, 855

Range	0.0001 ... 9.9999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Titrimo

Range	0.001 ... 9.999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.3.2.5 MET pH - Stop conditions

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrino

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop measured value pH

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrandu, 855

Range	-20.000 ... 20.000
Selection	off
Default value	off

Titrimo

Range	-20.00 ... 20.00
Selection	off
Default value	off

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Range	1 ... 9
Default value	9
Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrande, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrande, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.3.2.6 MET pH - Potentiometric evaluation

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (pH) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (pH)

With this option set up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrand** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion pH

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0.10 ... 9.99
Default value	0.50

EP recognition

Filter for the recognition of equivalence points:

Titrimo

Selection	all greatest last off
Default value	all

Titrand, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (pH)

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered (see Chapter 5.6.3.3.2.9, page 559).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.3.2.9, page 559).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)

[New]

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (see Chapter 5.6.3.3.2.10, page 560).



[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.3.2.10, page 560).

[Delete]

Deletes the window selected in the table.

5.6.3.3.2.7 MET pH - Additional evaluations

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.3.2.11*, page 561).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.3.2.11, page 561).

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

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

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point (see Chapter 5.6.3.8.1, page 835).

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrand and 855.

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Window = Measured value pH

Range	-20.0 ... 20.0 pH
Default value	20.0 pH

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrand and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Procedure

Selection of the Gran procedure.

Selection	Normalized Standard
Default value	Normalized

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.0 mL

Lower limit pH

Value for the lower limit of the Gran evaluation range.

Range	-20.000 ... 20.000
Default value	-20.000

Upper limit pH

Value for the upper limit of the Gran evaluation range.

Range	-20.000 ... 20.000
Default value	20.000

5.6.3.3.2.8 MET pH - Additional measured values

Tab: **Method** ▶ **MET pH** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.2.9 MET pH - Measured value window

Dialog window: **Method ▶ MET pH ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window (pH) ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit pH

Lower limit for the measured value window.

Range	-20.000 ... 20.000
Default value	-20.000

Upper limit pH

Upper limit for the measured value window.

Range	-20.000 ... 20.000
Default value	20.000

EP criterion pH

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrandu, 855

Range	0.1 ... 9.99
Default value	0.50

EP recognition

Filter for the recognition of equivalence points:

Titrandu, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.2.10

MET pH - Volume window

Dialog window: **Method ▶ MET pH ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (mL) ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

EP criterion pH

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrand, 855

Range	0.1 ... 9.99
Default value	0.50

EP recognition

Filter for the recognition of equivalence points:

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.2.11 MET pH - Fix endpoint evaluation

Dialog window: **Method ▶ MET pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range **-20.000 ... 20.000 pH**

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.000000 ... 9999.99 mL

5.6.3.3.3 MET U

5.6.3.3.3.1 MET U - Overview

Dialog window: **Dialog window ▶ MET U ▶ Properties... ▶ MET U - 'Command name'**

Command for **Monotonic Equivalence Point Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

Titino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MET U** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.

- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.DME	Measured value differential for the break-point x (1...9)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BP{x}.VOL	Volume for the break-point x (1...9) in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.DME	Measured value differential for the endpoint x (1...9)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value

.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL
.ETE	End temperature (temperature following processing of the command) in $^{\circ}\text{C}$
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.DME	Measured value differential for the fix endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fix endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fix endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fix endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fix endpoint $\times (1 \dots 9)$ in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in $^{\circ}\text{C}$
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP $\times (1 \dots 9)$ in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.HP{x}.TIM	Time in s until the HNP $\times (1 \dots 9)$ is reached
.HP{x}.VOL	Volume for the HNP $\times (1 \dots 9)$ in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C

.STY	Type of stop with which the command was stopped: 1 = normal;0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.3.2 MET U - General/Hardware

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **General/Hardware**

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrande

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrande

Selection	1 2
Default value	1

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.3 MET U - Start conditions

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrandos and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value**Note**

Is displayed only for Titrimo and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope**Note**

Is displayed only for Titrimo and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 999 mV/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.3.3.4 MET U - Titration parameters

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrande, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrande, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has

elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrandu, 855

Range	0.0001 ... 9.9999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Titrino

Range	0.001 ... 9.999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature**Temperature**

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.3.5 MET U - Stop conditions

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Titrandu, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000 mV
Selection	off
Default value	off

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Range	1 ... 9
Default value	9
Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrandu, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Range	0 ... 999999 s
Selection	off
Default value	off

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **Potentiometric evaluation**

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Selection	Evaluation without window	Evaluation with measured value window (U)	Evaluation with volume window (mL)
Default value	Evaluation without window		

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (U)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrand** and **855**. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	1 ... 999 mV
Default value	30 mV

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	all greatest last off
Default value	all

Titrandu, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

Equivalence point recognition is switched off.

Deletes the window selected in the table.

Deletes the window selected in the table.

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **volume**) for the fix endpoint from the measuring point list.

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

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value, Volume or Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.3.3.11, page 587*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.3.3.11, page 587).

[Delete]

Deletes the selected line.

pK/HNP evaluation

pK/HNP evaluation

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

If this option is enabled, then the pK value is determined from the titration curve which corresponds to the pH value at the half neutralization point (see Chapter 5.6.3.8.1, page 835).

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrand and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value

related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis, on the volume axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Volume Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Window = Volume

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrando and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.00 mL

Lower limit

Value for the lower limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Upper limit

Value for the upper limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

5.6.3.3.3.8 MET U - Additional measured values

Tab: **Method** ▶ **MET U** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.3.9 MET U - Measured value window

Dialog window: **Method ▶ MET U ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	-2000 mV

Upper limit

Upper limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	2000 mV

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Range	1 ... 999 mV
Default value	30 mV

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrand, 855

Range	1 ... 999 mV
Default value	30 mV

EP recognition

Filter for the recognition of equivalence points:

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.11 MET U - Fix endpoint evaluation

Dialog window: **Method ▶ MET U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET Ipol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.DME	Measured value differential for the break-point x (1...9)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BP{x}.VOL	Volume for the break-point x (1...9) in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint x (1...9)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.DME	Measured value differential for the fix endpoint x (1...9)
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1...9) in °C
.HP{x}.TIM	Time in s until the HNP x (1...9) is reached
.HP{x}.VOL	Volume for the HNP x (1...9) in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list

Identification	Description
.LP.EXx	External value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL

Identification	Description
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.3.4.2 MET Ipol - General/Hardware

Tab: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrande

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrande

Selection	1 2
Default value	1

855, 888

Selection	1
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

Titrandu, 855

Range	-125.0 ... 125.0 μA (Increment: 2.5)
Default value	5.0 μA

Titirino

Range	-127 ... 127 μA (Increment: 1)
Default value	5 μA

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrande, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrande, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.4.3 MET Ipol - Start conditions

Tab: **Method ▶ MET Ipol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.



Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value**Note**

Is displayed only for Titrande and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min

Selection **maximum**

Start slope



Note

Is displayed only for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 999 mV/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.3.4.4 MET Ipol - Titration parameters

Tab: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal
slow For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs. optimal Parameter set for all standard titrations; optimized for the most frequent applications. fast For less critical rapid titrations. User Editing the individual titration parameters which affect the titration rate.	

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrande, 855

Range	0.1 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	20.0 (slow), 50.0 (optimal), 80.0 (fast) mV/min
Selection	off



off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrandu, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is 1/20 of the expected EP volume. For steep jumps the volume increment should tend toward 1/100 and for flat jumps toward 1/10 of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments

as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrand, 855

Range	0.0001 ... 9.9999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Titrimo

Range	0.001 ... 9.999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrand, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrand

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.3.4.6 MET Ipol - Potentiometric evaluation

Tab: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (Upol) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrando** and **855..** With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	1 ... 999 mV
Default value	30 mV

EP recognition

Filter for the recognition of equivalence points:

Titrimo

Selection	all greatest last off
Default value	all

Titrandu, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)**[New]**

Opens the dialog window in which the parameters for a new window can be entered (*see Chapter 5.6.3.3.4.9, page 611*).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (*see Chapter 5.6.3.3.4.9, page 611*).

[Delete]

Deletes the window selected in the table.

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	1 ... 999
Default value	30

Evaluation with volume window (mL)**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (*see Chapter 5.6.3.3.4.10, page 612*).

[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (*see Chapter 5.6.3.3.4.10, page 612*).

[Delete]

Deletes the window selected in the table.

5.6.3.3.4.7 MET Ipol - Additional evaluations

Tab: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.3.4.11*, page 613).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.3.4.11, page 613).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Break-point evaluation



Note

This evaluation method is possible only with Titrand and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Window = Time

Range	0 ... 999999 s
Default value	999999 s

Gran evaluation



Note

This evaluation method is possible only with Titrand and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Initial volume

Volume which must be present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.00 mL

Lower limit

Value for the lower limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Upper limit

Value for the upper limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

5.6.3.3.4.8 MET Ipol - Additional measured values

Tab: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

5.6.3.3.4.9 MET Ipol - Measured value window

Dialog window: **Method ▶ MET Ipol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window (Ipol) ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	-2000 mV

Upper limit

Upper limit for the measured value window.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	2000 mV

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Range	1 ... 999 mV
Default value	30 mV

EP recognition

Filter for the recognition of equivalence points:

Titrande, 855

Selection	first greatest last ascending descending
Default value	first



first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.4.10

MET Ipol - Volume window

Dialog window: **Method ▶ MET Ipol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window (mL) ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

EP criterion mV

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Range	1 ... 999
Default value	30

EP recognition

Filter for the recognition of equivalence points:

Titrand, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.4.11 MET Ipol - Fix endpoint evaluation

Dialog window: **Method ▶ MET Ipol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

Identification	Description
.BP{x}.DME	Measured value differential for the break-point x (1...9)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BP{x}.VOL	Volume for the break-point x (1...9) in mL
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint x (1...9)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

Identification	Description
.FP{x}.DME	Measured value differential for the fix endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fix endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fix endpoint $\times (1 \dots 9)$ in °C
.FP{x}.TIM	Time in s until the fix endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fix endpoint $\times (1 \dots 9)$ in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP $\times (1 \dots 9)$ in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP $\times (1 \dots 9)$ in °C
.HP{x}.TIM	Time in s until the HNP $\times (1 \dots 9)$ is reached
.HP{x}.VOL	Volume for the HNP $\times (1 \dots 9)$ in mL
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C

Identification	Description
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrande

Selection	1 2
Default value	1

855, 888

Selection	1
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode



U(pol)

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

Titrando, 855

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

Titrimo

Range	-1270 ... 1270 mV (Increment: 10)
Default value	400 mV

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855

Selection	1	2	3	4	off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 798 and 799.

5.6.3.3.5.3 MET Upol - Start conditions

Tab: **Method ▶ MET Upol ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value**Note**

Is displayed only for Titrandos and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:



Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Start measured value**Note**

Is displayed only for Titrand and 855.

Start measured value

Once the start measured value is reached, the dosing of the start volume is stopped and the next start condition is processed or the titration is started. If the start measured value is achieved by the addition of a start volume, then titration will start directly.

Range	-200.0 ... 200.0 µA
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope**Note**

Is displayed only for Titrand and 855.

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Titrand, 855

Range	0.01 ... 99.90 $\mu\text{A}/\text{min}$
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) $\mu\text{A}/\text{min}$
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Titrimo

Range	0.05 ... 99.90 $\mu\text{A}/\text{min}$
Default value	20.00 (slow), 50.00 (optimal), 80.00 (fast) $\mu\text{A}/\text{min}$
Selection	off

off

Measured value acceptance will take place after the maximum waiting time has elapsed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time

has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrandu, 855

Range	0 (slow, optimal, fast) ... 999999 s
Default value	0 (slow, optimal, fast) s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855

Range	0.1 ... 999999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Titrimo

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is $1/20$ of the expected EP volume. For steep jumps the volume increment should tend toward $1/100$ and for flat jumps toward $1/10$ of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

Titrandu, 855

Range	0.0001 ... 9.9999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Titrimo

Range	0.001 ... 9.999 mL
Default value	0.05 (slow), 0.10 (optimal), 0.20 (fast) mL

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Temperature**Temperature**

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

5.6.3.3.5.5 MET Upol - Stop conditions

Tab: **Method** ► **MET Upol** ► **Properties...** ► **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Range	-200.0 ... 200.0 μ A
Selection	off

Stop EP

The titration is stopped when the specified number of equivalence points has been found.

Range	1 ... 9
Default value	9
Selection	off

Volume after EP

When the number of equivalence points defined under **Stop EP** has been found, this volume will be added. In this way you can see the curve shape after the equivalence point is reached.

Titrandu, 855

Range	0.01000 ... 9999.99 mL
Selection	off
Default value	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titration

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.3.5.6 MET Upol - Potentiometric evaluation

Tab: **Method** ▶ **MET Upol** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition are defined on this tab. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (Upol) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.



Evaluation with measured value window (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0.1 ... 99.9 μA
Default value	2.0 μA

EP recognition

Filter for the recognition of equivalence points:

Titrimo

Selection	all greatest last off
Default value	all

Titrandu, 855

Selection	all greatest last ascending descending off
Default value	all

all

All equivalence points will be recognized.

greatest

Only the equivalence point with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last equivalence point to be found will be recognized.

ascending

Only equivalence points with a positive slope of the titration curve will be recognized.

descending

Only equivalence points with a negative slope of the titration curve will be recognized.

off

Equivalence point recognition is switched off.

Evaluation with measured value window (Upol)**EP criterion**

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Titrimo

Range	0.1 ... 99.9 μA
Default value	2.0 μA

[New]

Opens the dialog window **Measured value #** in which the parameters for a new window can be entered (see Chapter 5.6.3.3.5.9, page 637).

[Properties]

Opens the dialog window **Measured value #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.3.5.9, page 637).

[Delete]

Deletes the window selected in the table.

Evaluation with volume window (mL)**[New]**

Opens the dialog window **Volume window #** in which the parameters for a new window can be entered (see Chapter 5.6.3.3.5.10, page 638).

[Properties]

Opens the dialog window **Volume window #** in which the parameters for the selected window can be edited (see Chapter 5.6.3.3.5.10, page 638).

[Delete]

Deletes the window selected in the table.

5.6.3.3.5.7 MET Upol - Additional evaluations

Tab: **Method** ► **MET Upol** ► **Properties...** ► **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.3.5.11*, page 639).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see *Chapter 5.6.3.3.5.11*, page 639).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 µA/mL
Default value	5.0 µA/mL

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 $\mu\text{A/mL}$
Default value	5.0 $\mu\text{A/mL}$

Break-point evaluation



Note

This evaluation method is possible only with Titrando and 855.

Break-point evaluation

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

A break-point evaluation is used to determine sharp changes of direction in the titration curve.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Gran evaluation



Note

This evaluation method is possible only with Titrando and 855.

Gran evaluation

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

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure (see Chapter 5.6.3.8.4, page 837).

Initial volume

Volume which is present in the measuring vessel before the command is started.

Range	0.01 ... 9999.99 mL
Default value	50.00 mL

Lower limit

Value for the lower limit of the Gran evaluation range.

Range	-200.0 ... 200.0 µA
Default value	-200.0 µA

Upper limit

Value for the upper limit of the Gran evaluation range.

Range	-200.0 ... 200.0 µA
Default value	200.0 µA

5.6.3.3.5.8 MET Upol - Additional measured values

Tab: **Method** ► **MET Upol** ► **Properties...** ► **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.3.5.9 MET Upol - Measured value window

Dialog window: **Method ▶ MET Upol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window ▶ [New]/[Properties] ▶ Measured value window#**

Measured value windows are regions on the measured value axis for which different parameters for potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the measured value window.

Range	-200.0 ... 200.0 μA
Default value	-200.0 μA

Upper limit

Upper limit for the measured value window.

Range	-200.0 ... 200.0 μA
Default value	200.0 μA

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Range	0.1 ... 99.9 μA
Default value	2.0 μA

EP recognition

Filter for the recognition of equivalence points:

Titrande, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.5.10 MET Upol - Volume window

Dialog window: **Method ▶ MET Upol ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with volume window ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit

Upper limit for the volume window.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	9999.99 mL

EP criterion

Criterion for the recognition of endpoints. Endpoints whose discovered ERC value is smaller than the value entered here will not be recognized.

Titrandu, 855

Range	0.1 ... 99.9 μA
Default value	2.0 μA

EP recognition

Filter for the recognition of equivalence points:

Titrandu, 855

Selection	first greatest last ascending descending
Default value	first

first

Only the first endpoint to be found will be recognized.

greatest

Only the endpoint with the greatest ERC value, i.e. the steepest jump, will be recognized.

last

Only the last endpoint to be found will be recognized.

ascending

Only endpoints with a positive slope of the titration curve will be recognized.

descending

Only endpoints with a negative slope of the titration curve will be recognized.

5.6.3.3.5.11 MET Upol - Fix endpoint evaluation

Dialog window: **Method ▶ MET Upol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time or volume**) for the fix endpoint from the measuring point list.

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 µA

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

5.6.3.4 SET**5.6.3.4.1 SET - Overview**

Menu item: **Method ▶ Paste ▶ New command...**

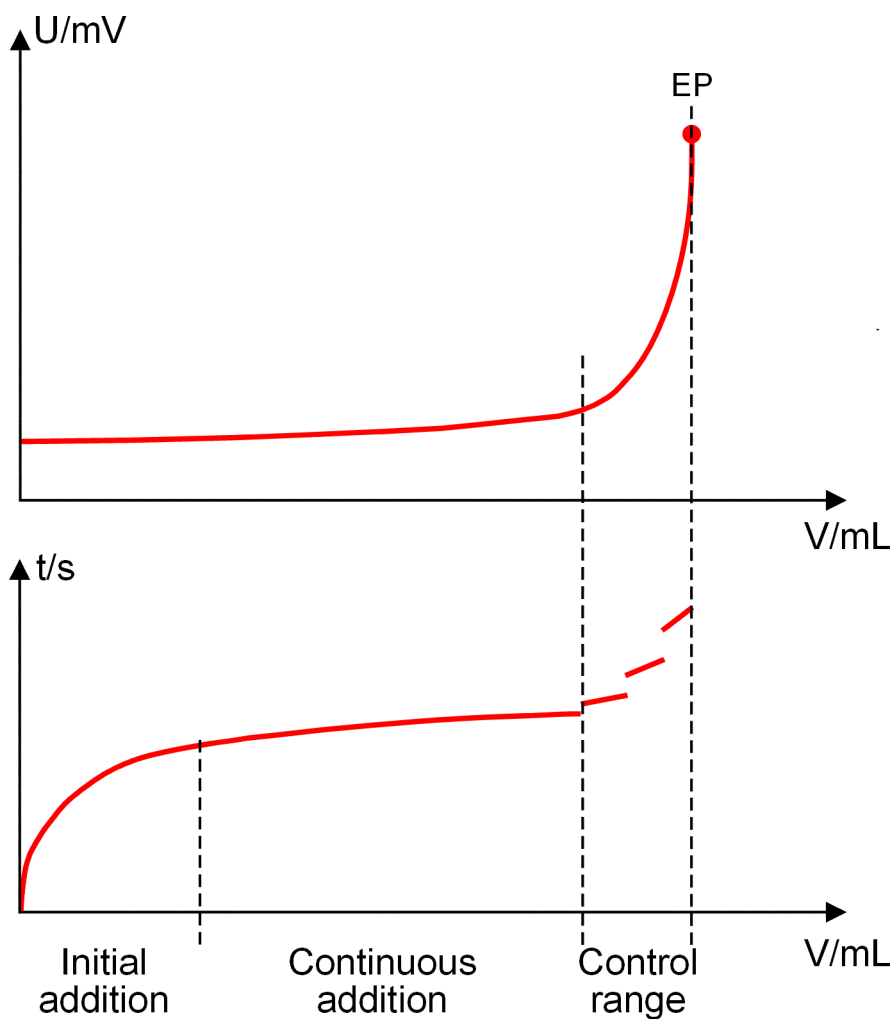
Command for **Set endpoint titrations** with measured value | pol.

Principle

With this command titrations to one or two preset endpoints are carried out. The termination of the titration at the endpoint is either drift-controlled or after a waiting period. The volume that has been added when the endpoint is reached gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**
During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
In this phase addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Control range (Dynamics)**
In this range addition is finely controlled. Shortly before the endpoint is reached addition is only carried out at the **Min. rate** (*Control range*).



Note

This command is used for rapid routine determinations when the endpoint does not change throughout a series or when an excess of reagent must be avoided.

Commands

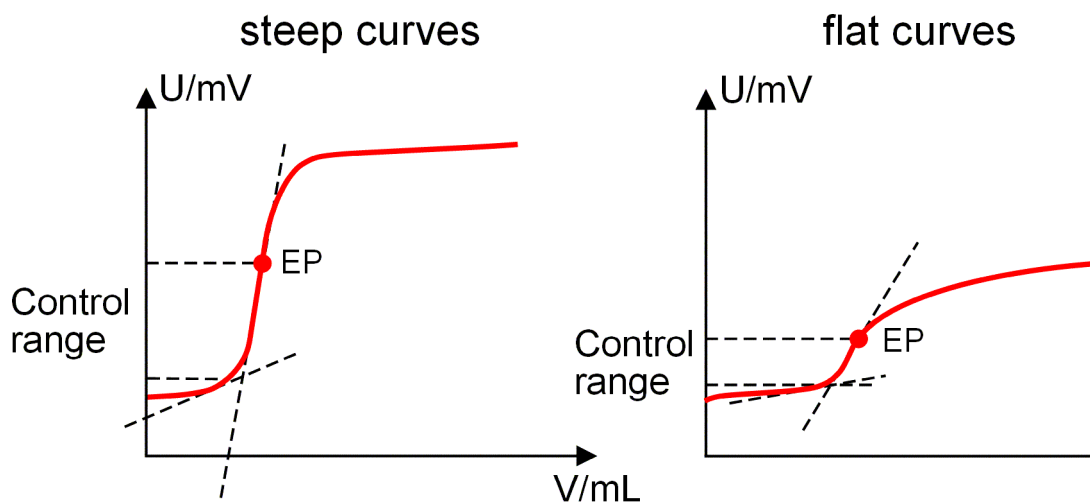
Depending on the measured value one of the following four **SET** commands can be selected:

- *SET pH*
Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *SET U*
Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *SET Upol*
Amperometric measurement with selectable polarization voltage (measured value current I).
- *SET Ipol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).

5.6.3.4.2 SET - Control range

Menu item: **Method** ▶ **SET** ▶ **Properties...** ▶ **Control parameters**

Set a large control range for steep curves and a small control range for flat ones. A good approximation for the start of the control range is given by the point where the tangents intersect.



5.6.3.4.3 SET pH

5.6.3.4.3.1 SET pH - Overview

Dialog window: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **SET pH - 'Command name'**

Command for **Set Endpoint Titrations** with potentiometric pH measurement.

Devices

This command can be executed with the following devices:

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL
.ETE	End temperature (temperature following processing of the command) in $^{\circ}\text{C}$
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

Identification	Description
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point on the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL

Identification	Description
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.3.2 SET pH - General/Hardware

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrandu

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor**Measuring input**

Selection of the measuring input to which the sensor is connected.

Titrand

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrim

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrim, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855

Selection **1 | 2 | 3 | 4 | off**

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandu, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrando 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.3.3 SET pH - Start conditions

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured values will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Range	0 ... 999999 s
Default value	0 s

5.6.3.4.3.4 SET pH - Control parameters

Tab: Method ▶ SET pH ▶ Properties... ▶ Control parameters

Command name

Name of the command.

Input	25 characters

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 at pH

Measured value for the first endpoint.

Titrande, 855

Range	-20.000 ... 20.000
Selection	off
Default value	off

Titrimo

Range	-20.00 ... 20.00
Selection	off
Default value	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.



Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Dynamics pH

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 641).

Titrandu, 855

Range	0.001 ... 20.000
Default value	5.000 (slow), 2.000 (optimal), 0.500 (fast)
Selection	off

Titrimo

Range	0.01 ... 20.00
Default value	5.00 (slow), 2.00 (optimal), 0.50 (fast)
Selection	off

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Range	0.01 ... 9999.00 µL/min
Default value	5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min

Stop criterion

Stop criterion

The titration is stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.



Note

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	drift time off
Default value	drift

drift

The switch-off point will always have the same curve slope dV/dt .

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off

The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Titrande, 855

Range	0 ... 999 s
Default value	10 s

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.3.5 SET pH - Titration parameters

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

-

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrande, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.4.3.6 SET pH - Stop conditions

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrino

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrim

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.4.3.7 SET pH - Conditioning

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

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

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrand, 855

Range	1 ... 999 µL/min
Default value	20 µL/min

Range	0 ... 999999 s
Selection	off
Default value	off

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

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

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Additional evaluations**

Name of the command.

Input	25 characters

The following additional methods for the evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.4.3.10*, page 662).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see *Chapter 5.6.3.4.3.10*, page 662).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Maximum evaluation

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Additional measured values**

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).



[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

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

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.3.10 SET pH - Fix endpoint evaluation

Dialog window: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Additional evaluations** ▶ **Fix endpoint evaluation** ▶ **[New]/[Properties]** ▶ **Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-20.000 ... 20.000 pH

Time	
Range	0.0 ... 9999999.9 s

Volume	
Range	0.000000 ... 9999.99 mL

5.6.3.4.4 SET U

5.6.3.4.4.1 SET U - Overview

Dialog window: **Dialog window** ► **SET U** ► **Properties...** ► **SET U** - 'Command name'

Command for **Set Endpoint Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

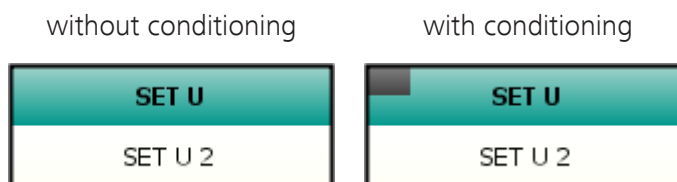
Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrim: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SET U** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Conditioning*
Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$

Identification	Description
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C

Identification	Description
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.4.2 SET U - General/Hardware

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

Temperature measurement

Type of temperature measurement.

Titrand, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrand, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrand, 855

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrands and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of

the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.4.3 SET U - Start conditions

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Start conditions**

The start conditions are processed in the listed sequence before the titration is started.

Command name

Name of the command.

Input	25 characters

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1**Pause 1**

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrande, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s
Default value	0 s

Start volume**Start volume**

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.4.4.4 SET U - Control parameters

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

The Control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Titrandu, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000
Selection	off
Default value	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 641).

Titrande, 855

Range	0.1 ... 2000.0 mV
Default value	300.0 (slow), 100.0 (optimal), 30.0 (fast) mV

Titrimo

Range	1.00 ... 2000 mV
Default value	300.0 (slow), 100.0 (optimal), 30.00 (fast) mV

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Range	0.01 ... 9999.00 µL/min
Default value	5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min

Stop criterion

Stop criterion

The titration is stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.



Note

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	drift time off
Default value	drift

drift

The switch-off point will always have the same curve slope dV/dt .

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off

The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Titrande, 855

Range	0 ... 999 s
Default value	10 s

Titrimo

Range	0 ... 999 s
Default value	10 s
Selection	inf.

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion = time** and **Relative stop time = inf.**

Titrimo

Range	0 ... 999999 s

Endpoint 2



Note

Is activated only for **EP1 with ≠ off**.

on | off (Default value: **off**)

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

EP2 at pH

Measured value for the second endpoint.

Titrande, 855

Range	-20.0 ... 20.0
Selection	off
Default value	off

Titrimo

Range	-20.00 ... 20.00
Selection	off
Default value	off

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.4.5 SET U - Titration parameters

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

—

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrandos, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrand, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.4.4.6 SET U - Stop conditions

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrandu, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrando, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.4.4.7 SET U - Conditioning

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrandu, 855

Range	1 ... 999 µL/min
Default value	20 µL/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0 ... 99.9 µL/min
Default value	0 µL/min

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrand, 855

Range	0.000000 ... 9999.99 mL
Default value	20.00 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off



Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.4.8 SET U - Additional evaluations

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.3.4.4.10, page 683).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.4.4.10, page 683).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values**Additional external measured values**

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.4.10 SET U - Fix endpoint evaluation

Dialog window: **Method ▶ SET U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET Ipol** and can be used in formulas under the designation

'Command name.Variable designation':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL
.ETE	End temperature (temperature following processing of the command) in °C

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL

Identification	Description
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.5.2 SET Ipol - General/Hardware

Tab: Method ► SET Ipol ► Properties... ► General/Hardware

Command name

Name of the command.

Input **25 characters**

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection **'Device name' | not defined**
 Default value **not defined**

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Sensor**Measuring input**

Selection of the measuring input to which the sensor is connected.

Titrand

Selection	1 2
Default value	1

855, 888

Selection	1
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

Titrand, 855

Range	-125.0 ... 125.0 μA (Increment: 2.5)
Default value	5.0 μA

Titrimo

Range	-127 ... 127 μA (Increment: 1)
Default value	5 μA

Electrode test

on | off (Default value: **off**)

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.5.3 SET Ipol - Start conditions

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured values will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Range	0.01 ... 150.00 mL/min

Selection	maximum
Default value	maximum

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.4.5.4 SET Ipol - Control parameters

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

The Control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000
Selection	off
Default value	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal



slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 641).

Titrandu, 855

Range	0.1 ... 2000.0 mV
Default value	300.0 (slow), 100.0 (optimal), 30.0 (fast) mV

Titrimo

Range	1.00 ... 2000 mV
Default value	300.0 (slow), 100.0 (optimal), 30.00 (fast) mV

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Range	0.01 ... 9999.00 µL/min
Default value	5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min

Stop criterion**Stop criterion**

The titration is stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

**Note**

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	drift time off
Default value	drift

drift

The switch-off point will always have the same curve slope dV/dt .

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off

The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Titrando, 855

Range	0 ... 999 s
Default value	10 s

Titrimo

Range	0 ... 999 s
Default value	10 s
Selection	inf.

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion = time** and **Relative stop time = inf**.

Titrimo

Range	0 ... 999999 s

Endpoint 2



Note

Is activated only for **EP1** with $\neq$ **off**.

on | off (Default value: **off**)

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

EP2 with

Measured value for the second endpoint.

Titrandu, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrino

Range	-2000 ... 2000
Selection	off
Default value	off

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.5.5 SET Ipol - Titration parameters

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

-

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrande, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrando, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titirino

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.4.5.6 SET Ipol - Stop conditions

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrim

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.4.5.7 SET Ipol - Conditioning

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrand, 855

Range	1 ... 999 µL/min
Default value	20 µL/min



Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0 ... 99.9 µL/min
Default value	0 µL/min

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrandu, 855

Range	0.000000 ... 9999.99 mL
Default value	20.00 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrandu, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.

**Note**

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.5.8 SET Ipol - Additional evaluations

Tab: **Method** ► **SET Ipol** ► **Properties...** ► **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.4.5.10*, page 704).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.4.5.10, page 704).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Additional measured values**

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

Opens the dialog window **Calc. measured value #**(see Chapter 5.6.3.9.1, page 838) in which the parameters for the additional measured value can be entered.

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).



[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.5.10 SET Ipol - Fix endpoint evaluation

Dialog window: **Method ▶ SET Ipol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-2000.0 ... 2000.0 mV

Time	
Range	0.0 ... 9999999.9 s

Volume	
Range	0.00 ... 9999.99 mL

5.6.3.4.6 SET Upol

5.6.3.4.6.1 SET Upol - Overview

Dialog window: **Method** ► **SET Upol** ► **Properties...** ► **SET Upol - 'Command name'**

Command for **Set Endpoint Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

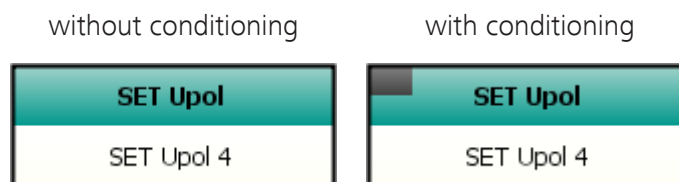
Titrandos: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrinos: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

Robotic Titrator: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SET Upol** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Control parameters for endpoint 1 and endpoint 2 (measured value for the endpoints, titration rate, user defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Conditioning*
Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET Upol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ in the unit of the measured value
.EP{x}.MEP	Quantity of endpoints in the window $\times (1 \dots 9)$; 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP{x}.TEM	Temperature for the endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.EP{x}.TIM	Time in s until the endpoint $\times (1 \dots 9)$ is reached
.EP{x}.VOL	Volume for the endpoint $\times (1 \dots 9)$ in mL
.ETE	End temperature (temperature following processing of the command) in $^{\circ}\text{C}$

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device**Dosing device**

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Temperature measurement

Type of temperature measurement.

Titrandos, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandos, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.6.3 SET Upol - Start conditions

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the following three parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.01 ... 99.90 µA/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1**Pause 1**

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrande, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s
Default value	0 s

Start volume**Start volume**

Volume to be added before the start of the titration at the dosing rate indicated.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min

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**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 641).

Titrand, 855

Range	0.01 ... 200.00 μA
Default value	40.0 (slow), 10.0 (optimal), 5.0 (fast) μA

Titrimo

Range	0.1 ... 200.0 μA
Default value	40.0 (slow), 10.0 (optimal), 5.0 (fast) μA

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 166.00 (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min



Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Range	0.01 ... 9999.00 µL/min
Default value	5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min

Stop criterion

Stop criterion

The titration is stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.



Note

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Selection	drift time off
Default value	drift

drift

The switch-off point will always have the same curve slope dV/dt .

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

off

The titration will not be stopped. In older instructions the **Delay time** was usually defined as the Stop criterion.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Titrande, 855

Range	0 ... 999 s
Default value	10 s

Titrimo

Range	0 ... 999 s
Default value	10 s
Selection	inf.

Stop time

The titration is stopped if the stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion = time** and **Relative stop time = inf.**

Titrimo

Range	0 ... 999999 s

Endpoint 2**Note**

Is activated only for **EP1 with ≠ off**.

on | off (Default value: **off**)

Check box for switching endpoint 2 on/off. If this is deactivated, then the associated parameters will not be displayed.

EP2 with

Measured value for the second endpoint.

Range	-200.0 ... 200.0 µA
Selection	off
Default value	off

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.6.5 SET Upol - Titration parameters

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

—

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

Titrandos, 719, 720, 736, 751, 758, 785, 794, 798, 799

Range	0 ... 999999 s

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titirino

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.4.6.6 SET Upol - Stop conditionsTab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Stop conditions****Command name**

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrimo, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Titrimo, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.4.6.7 SET Upol - Conditioning

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrandu, 855

Range	1 ... 999 µL/min
Default value	20 µL/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0 ... 99.9 µL/min
Default value	0 µL/min

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrand, 855

Range	0.000000 ... 9999.99 mL
Default value	20.00 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrand, 855

Range	0 ... 999999 s
Selection	off
Default value	off

Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s



Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.4.6.8 SET Upol - Additional evaluations

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.3.4.6.10, page 725).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.4.6.10, page 725).

[Delete]

Deletes the selected line.

Minimum evaluation**Minimum evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 $\mu\text{A/mL}$
Default value	5.0 $\mu\text{A/mL}$

Maximum evaluation**Maximum evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 $\mu\text{A/mL}$
Default value	5.0 $\mu\text{A/mL}$

5.6.3.4.6.9 SET Upol - Additional measured values

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.6.10 SET Upol - Fix endpoint evaluation

Dialog window: **Method ▶ SET Upol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 µA

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

5.6.3.5 KFT**5.6.3.5.1 KFT - Overview**

Menu item: **Method ▶ Paste ▶ New command...**

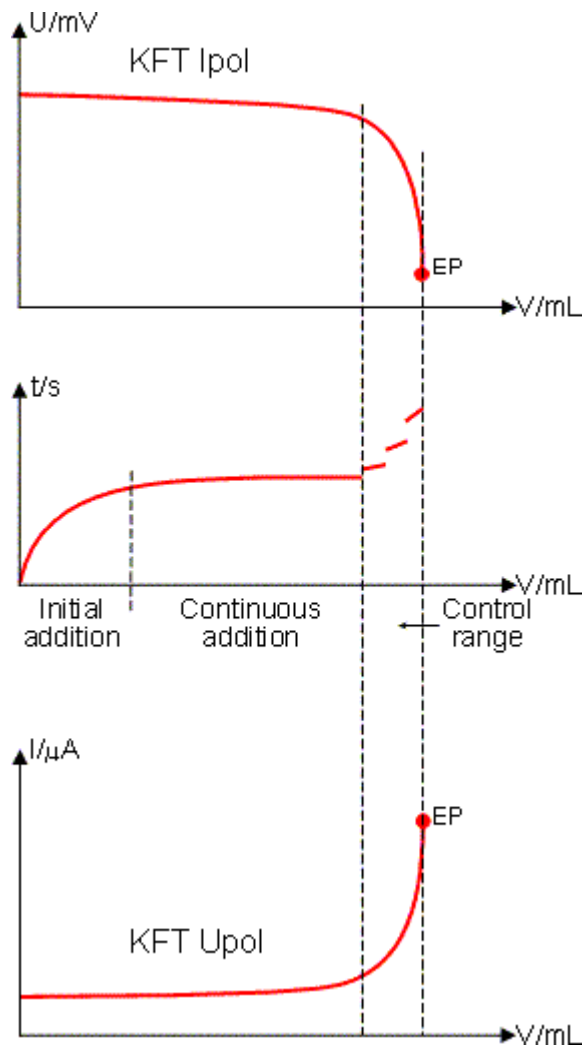
Command for volumetric **Karl Fischer Titrations**.

Principle

With this command, volumetric titrations for determining the water content by the Karl Fischer method with automatic conditioning are carried out. A typical feature of the Karl Fischer titration is the controlled reagent addition, which depends on the control difference (current measured value – endpoint), with the aim of reaching the measured value given as being the predefined target endpoint as quickly and accurately as possible. Overtitrating is avoided to a great extent. The titration termination at the endpoint takes place either drift-controlled or after a waiting period. The volume added up to the endpoint gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**
During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
In this phase, addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Control range (Dynamics)**
Addition is finely controlled in this range. Shortly before the endpoint is reached. addition is carried out only at the **Min. rate**.



Commands

Depending on the measured value, one of the following two **KFT** commands can be chosen:

- *KFT Ipol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).

- *KFT Upol*

Amperometric measurement with selectable polarization voltage (measured value current I).

5.6.3.5.2 KFT Ipol

5.6.3.5.2.1 KFT Ipol - Overview

Dialog window: **Method** ► **KFT Ipol** ► **Properties...** ► **KFT Ipol - 'Command name'**

Command for **Karl Fischer Titrations** with voltametric measurement (selectable polarization current).

Devices

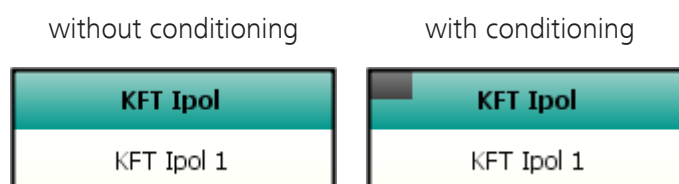
This command can be executed with the following devices.

Titrand: 835, 836, 841, 857, 890, 901, 906, 907

Titrim: 720, 736, 751, 758, 784, 795, 799

Appearance

The command has the following appearance:



Parameters

The parameters for the command **KFT Ipol** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Conditioning*
Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **KFT Ipol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Quantity of endpoints 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP.TEM	Temperature for the endpoint in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.VOL	Volume for the endpoint in mL
.ETE	End temperature (temperature following processing of the command) in °C

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrande

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrande

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrando.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 784, 795 and 799.

Range	0 ... 999999 s
Default value	1 s

Pause 1**Pause 1**

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

Start volume**Start volume**

Volume to be added before the start of the titration with the speed entered below.

Titrand

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrim

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrim

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Pause 2**Pause 2**

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Max. rate**.

Titrande

Range	0.1 ... 2000.0 mV
Default value	300.0 (slow), 100.0 (optimal), 30.0 (fast) mV

Titrimo

Range	1 ... 2000 mV
Default value	300 (slow), 100 (optimal), 30 (fast) mV

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrande

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), maximal (optimal), maximal (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), maximal (optimal), maximal (fast) mL/min

Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Relative stop drift

Titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = Rel. Drift**.

Titrando

Range	1 ... 999 µL/min
Default value	10 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Titrando, 855

Range	0 ... 999 s
Default value	10 s

Titrimo

Range	0 ... 999 s
Default value	10 s
Selection	inf.

Stop time

The titration is stopped if the absolute stop time defined here has elapsed since the start of the titration. This parameter is only shown for **Stop criterion = time** and **Delay time = inf.**

Titrimo

Range	1 ... 999999 s

5.6.3.5.2.5 KFT Ipol - Titration parameters

Tab: **Method ▶ KFT Ipol ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

KFT Ipol - Stop conditions

Tab: **Method** ▶ **KFT Ipol** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

<i>Titrand</i>	
Range	0.0000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

<i>Titrimo</i>	
Range	0.00 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

<i>Titrande</i>	
Range	0 ... 999999 s
Selection	off
Default value	off

Filling rate

Rate at which the dosing cylinder is to be filled after titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

<i>Titrand</i>	
Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.5.2.7 KFT Ipol - Conditioning

Tab: **Method** ▶ **KFT Ipol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the **Start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Titrandu

Range	1 ... 999 µg/min
Default value	20 µg/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0 ... 99.9 µL/min
Default value	0 µL/min

Stop volume

Determination stops when the specified volume has been dosed since the start of the conditioning. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrande

Range	0.000000 ... 9999.99 mL
Default value	20.00 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrande

Range	0 ... 999999 s
Selection	off
Default value	off

Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s



Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.5.2.8 KFT Ipol - Additional evaluations

Tab: **Method** ▶ **KFT Ipol** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for the evaluation of the titration curves can be activated and defined on these tabs:

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this check box is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value**, **Volume** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.3.5.2.10, page 747).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.5.2.10, page 747).

[Delete]

Deletes the selected line.

Minimum evaluation**Minimum evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation**Maximum evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

5.6.3.5.2.9 KFT Ipol - Additional measured values

Tab: **Method** ▶ **KFT Ipol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.5.2.10 KFT Ipol - Fix endpoint evaluation

Dialog window: **Method ▶ KFT Ipol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00 ... 9999.99 mL

5.6.3.5.3 KFT Upol**5.6.3.5.3.1 KFT Upol - Overview**

Dialog window: **Method ▶ KFT Upol ▶ Properties... ▶ KFT Upol - 'Command name'**

Command for **Karl Fischer Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices.

Titrande: 835, 836, 841, 857, 890, 901, 906, 907

Titrimo: 720, 736, 751, 758, 784, 795, 799

Appearance

The command has the following appearance:



without conditioning

with conditioning



Parameters

The parameters for the command **KFT Upol** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Conditioning*
Switching conditioning on/off. Definition of start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **KFT Upol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled

Identification	Description
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Quantity of endpoints 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP.TEM	Temperature for the endpoint in $^{\circ}\text{C}$
.EP.TIM	Time in s until the endpoint is reached
.EP.VOL	Volume for the endpoint in mL
.ETE	End temperature (temperature following processing of the command) in $^{\circ}\text{C}$
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fix endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fix endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fix endpoint $\times (1 \dots 9)$ in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in $^{\circ}\text{C}$

Identification	Description
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

Identification	Description
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.5.3.2 KFT Upol - General/Hardware

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrande
Default value	Titrande

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

U(pol)

The polarization voltage is the voltage applied to the polarized electrode during an amperometric measurement.

Titrand

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

Titrim

Range	-1270 ... 1270 mV (Increment: 10)
Default value	400 mV

Electrode test

on | off (Default value: **off**)

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrand

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu

Selection **1** | **2** | **3** | **4** | **off**

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandu

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 785, 784, 795 and 799.

5.6.3.5.3.3 KFT Upol - Start conditions

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrand.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.01 ... 99.90 $\mu\text{A}/\text{min}$
Selection	off
Default value	off

off

The measured values will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

Endpoint

Ep with

Measured value for the endpoint.

Range	-2000.0 ... 2000.0 mV
Default value	250.0 mV
Selection	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been

reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Max. rate**.

Titrandu

Range	0.01 ... 200.0 μ A
Default value	40.0 (slow), 10.0 (optimal), 5.0 (fast) μ A

Titrimo

Range	0.1 ... 200.0 μA
Default value	40.0 (slow), 10.0 (optimal), 5.0 (fast) μA

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu

Range	0.01 ... 166.00 mL/min
Default value	1.00 (slow), maximal (optimal), maximal (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), maximal (optimal), maximal (fast) mL/min

Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Range	0.1 ... 9.9 µL
Default value	minimal (slow), minimal (optimal), 5.0 (fast) µL

Stop criterion

Stop criterion

The titration was stopped after the last dosing once the endpoint has been reached and the stop criterion has been fulfilled. The titration can be stopped when a particular **drift** has been achieved or after a preset **time**.

Titrimo

Selection	drift time
Default value	drift

Titrand

Selection	drift rel. drift off time
Default value	drift

drift

The titration is stopped when the **stop drift** has been reached.

rel. drift

The titration is stopped when the relative stop drift (drift value at time of start + **relative stop drift**) has been reached.

off

The titration will not be stopped.

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different, very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

**Note**

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been turned off.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Relative stop drift

Titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = Rel. Drift**.

Titrand

Range	1 ... 999 µL/min
Default value	10 µL/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time**. The selection **inf.** stands for infinite.

Range	0 ... 999999 s

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrande

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.5.3.6 KFT Upol - Stop conditions

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0.00 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Titrandu

Range	0 ... 999999 s
Selection	off
Default value	off

off

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

Filling rate

Rate at which the dosing cylinder is to be filled after titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrandu

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.5.3.7 KFT Upol - Conditioning

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Titrand

Range	1 ... 999 µg/min
Default value	20 µg/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0 ... 99.9 µL/min
Default value	0 µL/min

Stop volume

Determination stops when the specified volume has been dosed since the start of the conditioning. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

Titrandu

Range	0.000000 ... 9999.99 mL
Default value	20.00 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrandu

Range	0 ... 999999 s
Selection	off
Default value	off

Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

on | off (Default value: **off**)

5.6.3.5.3.8 KFT Upol - Additional evaluations

Command name

Input	25 characters

Fix endpoint evaluation

on | off (Default value: **off**)



[New]

[Properties]

[Delete]

tiamo 2.0

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 µA/mL
Default value	5.0 µA/mL

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 µA/mL
Default value	5.0 µA/mL

5.6.3.5.3.9 KFT Upol - Additional measured values

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'.

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered.

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.



Parameters

The parameters for the command **KFC** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, indicator and generator electrode and stirrers.
- *Start conditions*
Entry of a waiting period before the start of the titration.
- *Control parameters*
Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Entry of the stop time which causes the titration to stop.
- *Conditioning*
Switching conditioning on/off. Definition of start drift, drift correction and drift value.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **KFC** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$

Identification	Description
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.EP.CHA	Load for endpoint in mA·s
.EP.DVT	Drift for the endpoint in µg/min
.EP.MEA	Measured value for the endpoint in mV
.EP.QTY	Measured value (water) for the endpoint in µg
.EP.TIM	Time in s until the endpoint is reached
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.DVT	Drift for the fix endpoint × (1...9) in µg/min
.FP{x}.MEA	Measured value for the fix endpoint × (1...9) in the unit of the measured value
.FP{x}.QTY	Measured value (water) for the fix endpoint × (1...9) in µg
.FP{x}.TIM	Time in s until the fix endpoint × (1...9) is reached
.LP.CAx	Calculated value × (1...3) for the last measuring point of the measuring point list
.LP.CHA	Load for the last measuring point of the measuring point list in mA s
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, STAT, DOS) or drift for the last measuring point in in the measuring point list in µg/min (KFC)
.LP.EXx	External value × (1...3) for the last measuring point of the measuring point list
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg

Identification	Description
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list; 0 = not defined, 1 = <14 V, 2 = 14...28 V, 3 = >28 V
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C

5.6.3.6.2 KFC - General/Hardware

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	756 KF Coulometer 831 KF Coulometer
Default value	831 KF Coulometer

Indicator electrode

I(pol)

Polarization current at the indicator electrode.

Selection	2 μA 5 μA 10 μA 20 μA 30 μA
Default value	10 μA



Note

When changing this parameter, make sure that the polarization current of the indicator electrode, the endpoint and the control range are linked closely with one another (*see Chapter 5.6.3.6.4, page 773*).

Electrode test

on | off (Default value: **off**)

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Generator electrode

Generator type

Selection of the generator type.

Selection	without diaphragm with diaphragm
Default value	without diaphragm

Generator current

Polarization current at the generator electrode.

Selection	100 mA 200 mA 400 mA auto
Default value	400 mA

auto

Means that the current is automatically adapted to the conductivity of the reagent and that in the region of the endpoint the current will be controlled at smaller values



For generator electrodes **without diaphragm** it is recommended to set the **Generator current** to **400 mA**.

Switch on/off automatically

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.

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Start conditions**

Name of the command.

Input	25 characters

Pause

Waiting time before the start of the titration.

Range	0 ... 999999 s

Default value	0 s

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Control parameters**

Name of the command.

Input	25 characters

Ep with

Measured value for the endpoint.



Range	-2000 ... 2000 mV
Default value	50 mV

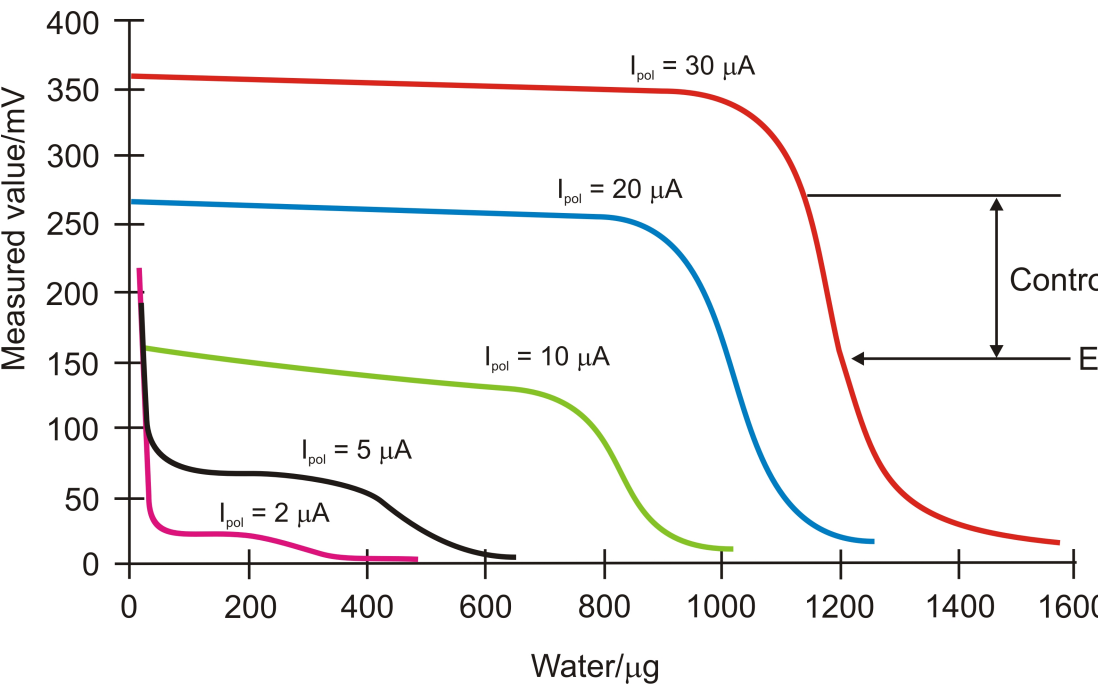
Control

Control range

The control range is entered as distance to the endpoint. Within the control range, iodine will be produced in steps which are controlled by the **Minimal rate**. The larger the control range, the slower the titration. Outside the control range, 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 modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

Range	1.0 ... 2000 mV
Default value	70 mV



The diagram shows KF titration curves at different polarization currents. It is clear to see that the position of the endpoint varies with the polarization current. The curves have different slopes, i.e. dynamics must also be adapted. Polarization currents smaller than 10 μA are not suitable for this application. The following table gives an idea of the optimal control parameters for various polarization currents.

Ipol	10 μ A	20 μ A	30 μ A
EP	50 mV	100 mV	150 mV
Control range	70 mV	100 mV	120 mV

Max. rate

Max. rate with which iodine is produced outside the **control range**.

Range	1.5 ... 2240 μg/min
Selection	maximum
Default value	maximum

Min. rate

This parameter defines the minimum rate with which iodine is produced inside the **control range**. The smaller the rate the slower the titration and the higher the accuracy.

Range	0.3 ... 999.9 μg/min
Default value	15.0 μg/min
Selection	minimal

Stop criterion**Stop criterion**

Switches off titration when the endpoint has been reached and the stop criterion has been met.

Selection	drift rel. drift
Default value	rel. drift

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 μg/min
Default value	5 μg/min

Relative stop drift

Titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = rel. drift**.

Range	0 ... 999 μg/min
Default value	5 μg/min

5.6.3.6.5 KFC - Titration parameters

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, the entry of an extraction time is a good idea for the titration of sparingly soluble samples.

Range	0 ... 999999 s
Default value	0 s

Temperature

Manually entered titration temperature.

Range	-170.0 ... 500.0°C
Default value	25.0

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Range	1 ... 999999 s
Default value	1 s

5.6.3.6.6 KFC - Stop conditions

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab.

Stop time

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

Range	0 ... 999999 s
Selection	off
Default value	off

5.6.3.6.7 KFC - Conditioning

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

on | off (Default value: **off**)

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Range	1 ... 999 µg/min
Default value	20 µg/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × Titration time) caused by total 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.

Selection	automatic manual off
Default value	off

automatic

The drift value at the start of the titration applies here.

manual

The value defined under **Drift value** applies.

off

The drift correction (= **Drift value** × Titration time) caused by empty consumption during titration is deducted from the total consumption.

Delay after 'Cond ok'

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s



Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

on | off (Default value: **off**)

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

on | off (Default value: **off**)

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.6.8 KFC - Additional evaluations

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (*see Chapter 5.6.3.6.10, page 780*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (*see Chapter 5.6.3.6.10, page 780*).

[Delete]

Deletes the selected line.

5.6.3.6.9 KFC - Additional measured values

Tab: **Method ▶ KFC ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).



[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.6.10 KFC - Fix endpoint evaluation

Dialog window: **Method ▶ KFC ▶ Properties... ▶ Additional evaluations ▶ Fix end-point evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-200.0 ... 200.0 μA

Time	
Range	0.0 ... 9999999.9 s

<i>Volume</i>	
Range	0.00 ... 9999.99 mL

5.6.3.7 STAT

5.6.3.7.1 STAT - Overview

Menu item: **Method ▶ Paste ▶ New command...**

Command for **STAT Titrations (STAT)**.

Principle

In **STAT** titrations, reagent is added until a preset measured value (control point) has been reached, which is then maintained at a constant level. The substance released by the reaction is immediately titrated off with the reagent in order to maintain the control point. The STAT titration keeps the control point constant until the preset stop criterion has been reached.

STAT titrations are used, for example, in enzyme analysis where the enzyme activity can be determined from the resulting dosing rate (in mL/min).

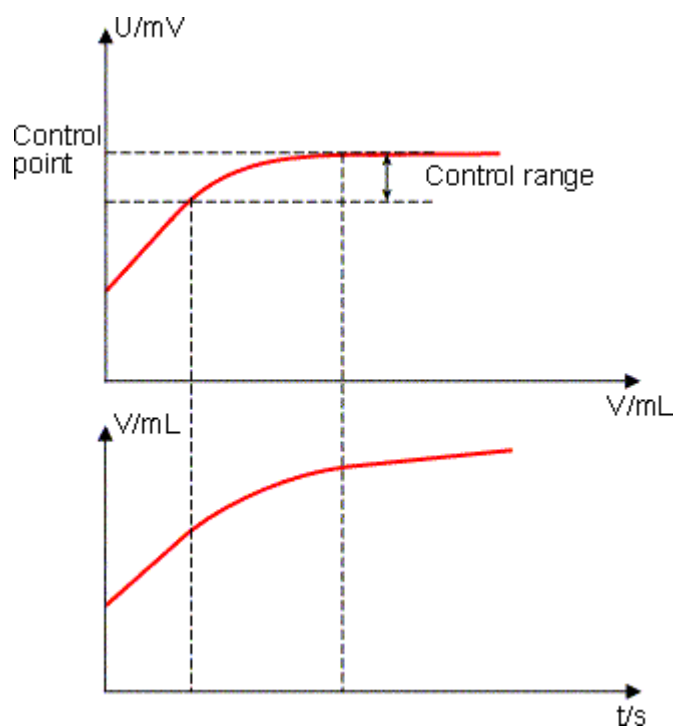
Reagent addition takes place in two phases during the titration:

- **Dosing outside the control range**

The dosing is carried out at the **Max. rate** until the **Control range** is reached.

- **Dosing inside the control range**

Dosing is finely controlled in this range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached.



5.6.3.7.4 STAT - Track call

Dialog window: **Method** ▶ **STAT/STAT pH/STAT U** ▶ **Properties...** ▶ **Monitoring** ▶ **[New]/[Properties]** ▶ **Track call #**

Monitoring

Selects the quantity at which a track is to be started when its limit value is exceeded.

Selection	Measured value Dosing rate Temperature Any
Default value	Measured value

Any

Means one or another of the three sizes.

Limit exceeding

Selects the exceeded limit for which a track is to be started.

Selection	Lower limit Upper limit Any OK
Default value	Any

Any

The track will be started if either the upper or the lower limit is exceeded.

OK

The track is started when the monitored quantities are once again within the limit values (including hysteresis).

Track name

Selects the track that is to be started automatically.

Selection	'Track name'



Note

If a track is called for that is already running then it will be allowed to finish and then restarted when it is free again.

5.6.3.7.5 Tandem dosing

Menu item: **Method** ▶ **STAT/ADD/DOS** ▶ **General/Hardware**

If the check box **Tandem dosing** is activated for the commands **STAT**, **ADD** or **DOS**, then a second dosing device can be defined in order to enable continuous dosing. Dosing is carried out with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa.

However, in order to ensure continuous dosing, the following points must be taken into account:



- **Keeping filling times short**

Use the highest possible filling rate in order to keep the filling times as short as possible. Please note the viscosity and density of the liquid.

- **Filling rate with different cylinders**

When you use two dosing devices with different cylinder volumes (dosing cylinder 2 > dosing cylinder 1), then the minimum filling rate of the larger cylinder 2 must be:

$$\text{Filling rate 2} \geq \text{Filling rate 1} \cdot (V_{\text{Dosing cylinder 2}}/V_{\text{Dosing cylinder 1}})$$

- Rule for dosing rate

The dosing rate must not exceed 75% of the filling rate of the smaller cylinder. This corresponds to the following values (at the maximum filling rate):

Cylinder volume	Max. dosing rate		Max. flow rate	
	Exchange unit	Dosing unit	Exchange unit	Dosing unit
1 mL	2.25 mL/min	---	approx. 130 mL/h	---
2 mL	---	5.00 mL/min	---	approx. 300 mL/h
5 mL	11.25 mL/min	12.50 mL/min	approx. 670 mL/h	approx. 750 mL/h
10 mL	22.50 mL/min	25.00 mL/min	approx. 1.3 L/h	approx. 1.5 L/h
20 mL	45.00 mL/min	50.00 mL/min	approx. 2.7 L/h	approx. 3.0 L/h
50 mL	112.50 mL/min	124.50 mL/min	approx. 6.7 L/h	approx. 7.5 L/h

5.6.3.7.6 STAT pH

5.6.3.7.6.1 STAT pH - Overview

Dialog window: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **STAT pH - 'Command name'**

Command for **STAT titrations** with measured value pH.

Devices

This command can be executed with the following devices:

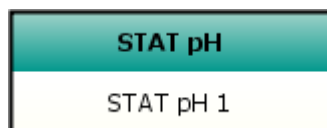
Titrand: 835, 836, 842, 857, 902, 906, 907

Titrimo: 718, 736, 751, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **STAT** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Parameters for the control point.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Monitoring*
Definition of measured value, dosing rate, and temperature monitoring.
- *Evaluations*
Definition of methods for evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **STAT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s

Identification	Description
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in in the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached

Identification	Description
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window x (1...9)
.RE{x}.DRS	Standard deviation for mean dosing rate in window x (1...9) in mL/min
.RE{x}.DRT	Mean dosing rate in window x (1...9) in mL/min
.RE{x}.RWL	Lower limit of the evaluation window x (1...9) in s
.RE{x}.RWH	Upper limit of the evaluation window x (1...9) in s
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C

Identification	Description
.STY	Type of stop with which the command was stopped: 1 = normal;0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.7.6.2 STAT pH - General/Hardware

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, the dosing is carried out without interruption with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa (*see Chapter 5.6.3.7.5, page 783*). This parameter is displayed only for Titrandos and 855.



Dosing device

Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrand

Selection	1 2 3 4
Default value	2

855

Selection	1 2 3
Default value	2

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

Titrandu, 855

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Filling rate

Speed with which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value(see Chapter 5.6.3.7.5, page 783).

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrand

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrim

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrand, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrand, 855

Selection	1 2 3 4 off

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured values will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrand, 855

Range	0 ... 999999 s
Default value	0 s

Start volume

Start volume

Volume to be added before the start of the titration at the dosing rate indicated.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Pause 2

Pause 2

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.7.6.4 STAT pH - Control parameters

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

Control point

Control point at pH

Definition of the pH value to be controlled.

Titrandu, 855

Range	-20.000 ... 20.000
Selection	off
Default value	off

Titrimo

Range	-20.00 ... 20.00
Selection	off
Default value	off

Titration rate**Titration rate**

Three predefined rates, for which the parameters for **Control** are not displayed, can be selected for the titration rate. The **User** setting must be selected in order to be able to edit these parameters.

Selection	50 µL/min 100 µL/min 500 µL/min User
Default value	100 µL/min

Control**Note**

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Dynamics pH

The control range defines the measured value range before the given control point. It has a decisive influence on the titration rate and thus also on the accuracy. The dosing is also monitored by the **Min. rate** within the control range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing proceeds continuously at the **Max. rate**.

Titrando, 855

Range	0.001 ... 20.000
Default value	1.000
Selection	off

Titrimo

Range	0.01 ... 20.00
Default value	1.00
Selection	off

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. The following rule of thumb should be used as a starting

point for parameterization: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in $\mu\text{L}/\text{min}$.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Default value	0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **Control range** at the end of the titration. The smaller the selected minimum rate, the longer it takes until the control point is reached for the first time. The following rule of thumb should be observed for maintaining the **Min. rate** in order to achieve as constant (regular) a dosing at the control point as possible: **Min. rate** in $\mu\text{L}/\text{min}$ = expected reaction rate in $\mu\text{L}/\text{min}$ / 10.

Range	0.01 ... 9999.00 µL/min
Default value	0.25 (50 µL/min), 0.75 (100 µL/min), 2.00 (500 µL/min) µL/min



Note

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. The parameters **Max. rate** and **Dynamics pH** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The control range should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. pH = 3). The nominal value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started with a small deviation from the control point. Within the control range, the dosing rate is determined primarily by the **Min. rate**.

5.6.3.7.6.5 STAT pH - Titration parameters

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

-

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Measuring point recording

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	1 ... 999999 s
Default value	2 s

Start time

The measured values are not entered in the measuring point list until this time has elapsed since the start of the titration.

Range	0 ... 999999 s
Default value	0 s

Start measured value pH

The measured values are not entered in the measuring point list until this value has been reached.

Titrandu, 855

Range	-20.000 ... 20.000
Selection	off
Default value	off

Titrino

Range	-20.00 ... 20.00
Selection	off
Default value	off

Start rate

The measured values are not entered in the measuring point list until the dosing rate has fallen below this value. This parameter is checked 10 s after the start at the earliest.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	off
Default value	off

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	off
Default value	off

STAT pH - Stop conditions

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

<i>Titrand, 855</i>	
Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

<i>Titrimo</i>	
Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time has elapsed after the start conditions have been fulfilled.

Range	0 ... 999999 s
Selection	off
Default value	off

since

Specifies when the stop time begins to be counted down (will not be displayed if the **Stop time** is disabled):

Selection	Start Control point first reached Last dosing
Default value	Start

Start

The stop time starts after the start volume has been dosed and after the pause time that follows.

Control point first reached

The stop time starts as soon as the control point has been reached for the first time.



Last dosing

The stop time starts after the last increment has been dosed, i. e. the stop time is reset to zero again after each dosing step.

Stop rate

Stops when the current dosing rate is less than the defined stop rate. This criterion is checked 10 s after the start at the earliest. The maximum stop rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrando, 855

Range	0.01 ... 166.00 mL/min
Selection	off
Default value	off

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrino

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.7.6.7 STAT pH - Monitoring

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Monitoring**

Command name

Name of the command.

Input	25 characters

The following monitoring processes can be switched on and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit pH

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

Titrand, 855

Range	-20.000 ... 20.000
Default value	-20.000

Titrimo

Range	-20.00 ... 20.00
Default value	-20.00

Lower hysteresis pH

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value, then the event **Measured value lower limit ok** is triggered.

Titrand, 855

Range	0 ... 20.000
Default value	20

Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

Titrand, 855

Range	-20.000 ... 20.000
Default value	20.000

Titrimo

Range	-20.00 ... 20.00
Default value	20.00

Upper hysteresis pH

The upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit ok** will be triggered.

Titrandu, 855

Range	0 ... 20.000
Default value	20

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrande) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Dosing rate

Monitoring Dosing rate

on | off (Default value: **off**)

If this option is activated, then the dosing rate will be monitored and any exceeded limits will be entered in the list of measuring points. This monitoring is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

Titrandu, 855

Range	0.00 ... 166.00 mL/min
Default value	0.00 mL/min

Titrimo

Range	0.00 ... 150.00 mL/min
Default value	0.00 mL/min

Lower hysteresis

The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit by this hysteresis value, the action **Dosing rate lower limit ok** is triggered.

Titrande, 855

Range	0.00 ... 166.00 mL/min
Default value	0.20 mL/min

Upper limit

Upper limit of the dosing rate. If the dosing rate exceeds this limit, then the event **Dosing rate upper limit exceeded** will be triggered.

Titrande, 855

Range	0.00 ... 166.00 mL/min
Default value	166.00 mL/min

Titrimo

Range	0.00 ... 150.00 mL/min
Default value	150.00 mL/min

Upper hysteresis

Upper hysteresis of the dosing rate. When the dosing rate again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit ok** is triggered.

Titrande, 855

Range	0.00 ... 166.00 mL/min
Default value	0.20 mL/min

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrande) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.



Stop command (only Titrando)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.



Note

If, when monitoring the dosing rate, the **Lower limit** is exceeded then the actions **Wait for [Continue]** and **Wait for limit ok** are irrelevant as the mean dosing rate becomes ever smaller during this time. The valid range can never be reached again.

Monitoring Temperature

Monitoring Temperature

on | off (Default value: **off**)

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	-170.0 °C

Lower hysteresis

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

Titrande, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	150.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	500.0 °C

Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

Titrande, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrande) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrande)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, max. 20 entries can be defined for the track that is to be started automatically when a particular limit is exceeded.

[New]

Opens the dialog window **Track call #** in which the parameters for the track call can be entered.

[Properties]

Opens the dialog window **Track call #** in which the parameters for the track call can be edited (see *Chapter 5.6.3.7.4, page 783*).

[Delete]

Deletes the track call selected in the table.

5.6.3.7.6.8 STAT pH - Evaluations

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following methods for the evaluation of titration curves can be activated and defined on this tab:

Rate evaluation

Rate evaluation

on | off (Default value: **off**)

If this check box is activated, than a maximum of 9 time 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:

[New]

Opens the dialog window **Evaluation window #** in which the parameters for a new time slot can be entered (*see Chapter 5.6.3.7.3, page 782*).

[Properties]

Opens the dialog window **Evaluation window #** in which the parameters for the new time slot can be edited (*see Chapter 5.6.3.7.3, page 782*).

[Delete]

Deletes the time slot selected in the table.

Fix endpoint evaluation**Fix endpoint evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value**, **time** or **volume**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint.

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (*see Chapter 5.6.3.4.3.10, page 662*).

[Delete]

Deletes the selected line.

Minimum evaluation**Minimum evaluation**

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/mL
Default value	1.0 pH/mL

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values**Additional external measured values**

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.7.6.10 STAT pH - Fix endpoint evaluation

Dialog window: **Method ▶ STAT pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-20.000 ... 20.000 pH

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.000000 ... 9999.99 mL

Command variables

The following command variables are generated in the method run by the command **STAT U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fix endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C

Identification	Description
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window $\times$ (1...9)
.RE{x}.DRS	Standard deviation for mean dosing rate in window $\times$ (1...9) in mL/min
.RE{x}.DRT	Mean dosing rate in window $\times$ (1...9) in mL/min
.RE{x}.RWL	Lower limit of the evaluation window $\times$ (1...9) in s
.RE{x}.RWH	Upper limit of the evaluation window $\times$ (1...9) in s
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.7.7.2 STAT U - General/Hardware

Tab: Method ▶ STAT U ▶ Properties... ▶ General/Hardware

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, the dosing is carried out without interruption with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa (see Chapter 5.6.3.7.5, page 783). This parameter is displayed only for Titrando and 855.

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	2

855

Selection	1 2 3
Default value	2

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

Titrando, 855

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Filling rate

Speed with which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device then during dosing it will automatically be reduced to the largest possible value (see Chapter 5.6.3.7.5, page 783).

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrande, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrande, 855

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this check box is activated, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751 and 799.

5.6.3.7.7.3 STAT U - Start conditions

Tab: **Method ▶ STAT U ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1

Pause 1

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Titrand, 855

Range	0 ... 999999 s
Default value	0 s

Start volume**Start volume**

Volume to be added before the start of the titration at the dosing rate indicated.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titrimo

Range	0.00 ... 999.99 mL
Default value	0.00 mL

Dosing rate

Speed at which the start volume is to be added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Pause 2**Pause 2**

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.7.7.4 STAT U - Control parameters

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

Control point

Control point at

Definition of the current value to be controlled.

Titrandu, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000 mV
Selection	off
Default value	off

Titration rate

Titration rate

Three predefined rates, for which the parameters for **Control** are not displayed, can be selected for the titration rate. The **User** setting must be selected in order to be able to edit these parameters.

Selection	50 µL/min 100 µL/min 500 µL/min User
Default value	100 µL/min

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

The control range defines the measured value range before the given control point. It has a decisive influence on the titration rate and thus also on the accuracy. The dosing is also monitored by the **Min. rate** within the control range. The nearer the control point, the slower the dosing takes place until

the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing proceeds continuously at the **Max. rate**.

Titrande, 855

Range	0.1 ... 2000.0 mV
Default value	60.0 mV
Selection	off

Titrimo

Range	1 ... 2000 mV
Default value	60 mV
Selection	off

Max. rate

Rate at which dosing is carried out outside of the **control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. The following rule of thumb should be used as a starting point for parameterization: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in $\mu\text{L/min}$.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Default value	0.25 (50 $\mu\text{L/min}$), 0.75 (100 $\mu\text{L/min}$), 2.00 (500 $\mu\text{L/min}$) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	0.25 (50 $\mu\text{L/min}$), 0.75 (100 $\mu\text{L/min}$), 2.00 (500 $\mu\text{L/min}$) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the longer it takes until the control point is reached for the first time. The following rule of thumb should be observed for maintaining the **Min. rate** in order to achieve as constant (regular) a dosing at the control point as possible: **Min. rate** in $\mu\text{L/min}$ = expected reaction rate in $\mu\text{L/min}$ / 10.

Range	0.01 ... 9999.00 $\mu\text{L/min}$
Default value	0.25 (50 $\mu\text{L/min}$), 0.75 (100 $\mu\text{L/min}$), 2.00 (500 $\mu\text{L/min}$) $\mu\text{L/min}$



Note

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. The parameters **Max. rate** and **Control range** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The **Control range** should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. $U = 180 \text{ mV}$). The nominal value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started with a small deviation from the control point. Within the control range, the dosing rate is determined primarily by the **Min. rate**.

5.6.3.7.7.5 STAT U - Titration parameters

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

—

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

Titrande, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Measuring point recording**Time interval measuring point**

Time interval for entering a measuring point in the measuring point list.

Titrande, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	1 ... 999999 s
Default value	2 s

Start time

The measured values are not entered in the measuring point list until this time has elapsed since the start of the titration.

Range	0 ... 999999 s
Default value	0 s

Start measured value

The measured values are not entered in the measuring point list until this value has been reached.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

Titrimo

Range	-2000 ... 2000 mV
Selection	off
Default value	off

Start rate

The measured values are not entered in the measuring point list until the dosing rate has fallen below this value. This parameter is checked 10 s after the start at the earliest.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Selection	off
Default value	off

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	off
Default value	off

5.6.3.7.7.6 STAT U - Stop conditions

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input **25 characters**

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Stop time

Stops when the preset time has elapsed after the start conditions have been fulfilled.

Range	0 ... 999999 s
Selection	off
Default value	off

since

Specifies when the stop time begins to be counted down (will not be displayed if the **Stop time** is disabled):

Selection	Start Control point first reached Last dosing
Default value	Start

Start

The stop time starts after the start volume has been dosed and after the following pause time.

Control point first reached

The stop time starts as soon as the control point has been reached for the first time.

Last dosing

The stop time starts after the last increment has been dosed, i. e. the stop time is reset to zero again after each dosing step.

Stop rate

Rate at which the dosing cylinder is to be filled after titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	off
Default value	off

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	off
Default value	off

Filling rate

Speed with which the dosing cylinder is to be refilled after the titration. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Titrimo

Range	-2000 ... 2000
Default value	2000

Upper hysteresis

The upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit ok** will be triggered.

Titrand, 855

Range	0.0 ... 2000.0 mV
Default value	0.2 mV

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (Titrand, 855) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (Titrand, 855)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Dosing rate**Monitoring Dosing rate**

on | off (Default value: **off**)

If this check box is activated, then the averaged dosing rate will be monitored and any exceeded limits will be entered in the measuring point list. This monitoring is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

Titrandu, 855

Range	0.00 ... 166.00 mL/min
Default value	0.00 mL/min

Titrimo

Range	0.00 ... 150.00 mL/min
Default value	0.00 mL/min

Lower hysteresis

The lower hysteresis represents a tolerance range for the lower limit of the dosing rate. When the dosing rate exceeds the lower limit by this hysteresis value, the action **Dosing rate lower limit ok** is triggered.

Titrando, 855

Range	0.00 ... 166.00 mL/min
Default value	0.20 mL/min

Upper limit

Upper limit of the dosing rate. If the dosing rate exceeds this limit, then the event **Dosing rate upper limit exceeded** will be triggered.

Titrandu, 855

Range	0.00 ... 166.00 mL/min
Default value	166.00 mL/min

Titrimo

Range	0.00 ... 150.00 mL/min
Default value	150.00 mL/min

Upper hysteresis

Upper hysteresis of the dosing rate. When the dosing rate again falls below the upper limit by this hysteresis value, then the event **Dosing rate upper limit ok** is triggered.

Titrandu, 855

Range	0.00 ... 166.00 mL/min
Default value	0.20 mL/min

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (Titrando, 855) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (Titrando, 855)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Temperature**Monitoring Temperature**

on | off (Default value: **off**)

If this check box is activated, then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

Titrando, 855

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Titrino

Range	-170.0 ... 500.0 °C
Default value	-170.0 °C

Lower hysteresis

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

Titrandu, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	150.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	500.0 °C

Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

Titrandu, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (Titrand, 855) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (Titrando, 855)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing is resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, max. 20 entries can be defined for the track that is to be started automatically when a particular limit is exceeded.

[New]

Opens the dialog window **Track call #** in which the parameters for the track call can be entered (*see Chapter 5.6.3.7.4, page 783*).

[Properties]

Opens the dialog window **Track call #** in which the parameters for the track call can be edited (*see Chapter 5.6.3.7.4, page 783*).

[Delete]

Deletes the track call selected in the table.

5.6.3.7.7.8 STAT U - Evaluations

Tab: **Method** ► **STAT U** ► **Properties...** ► **Evaluations**

Command name

Name of the command.

Input	25 characters

The following methods for the evaluation of titration curves can be activated and defined on this tab:

Rate evaluation**Rate evaluation**

on | off (Default value: **off**)

If this check box is activated, then 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:

[New]

Opens the dialog window **Evaluation window #** in which the parameters for a new time slot can be entered (*see Chapter 5.6.3.7.3, page 782*).



[Properties]

Opens the dialog window **Evaluation window #** in which the parameters for the new time slot can be edited (see Chapter 5.6.3.7.3, page 782).

[Delete]

Deletes the time slot selected in the table.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **volume**) for the fix endpoint from the measuring point list.

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see *Chapter 5.6.3.7.7.10*, page 834).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.3.7.7.10, page 834).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Maximum evaluation

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Additional measured values**

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).



[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered.

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.7.7.10 STAT U - Fix endpoint evaluation

Dialog window: **Method ▶ STAT U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	-2000.0 ... 2000.0 mV
<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00 ... 9999.99 mL

5.6.3.8 Evaluation

5.6.3.8.1 pK value and Half neutralization potential

Parameters: **Method** ▶ **DET/MET** ▶ **Properties...** ▶ **Additional evaluations** ▶ **pK/HNP evaluation**

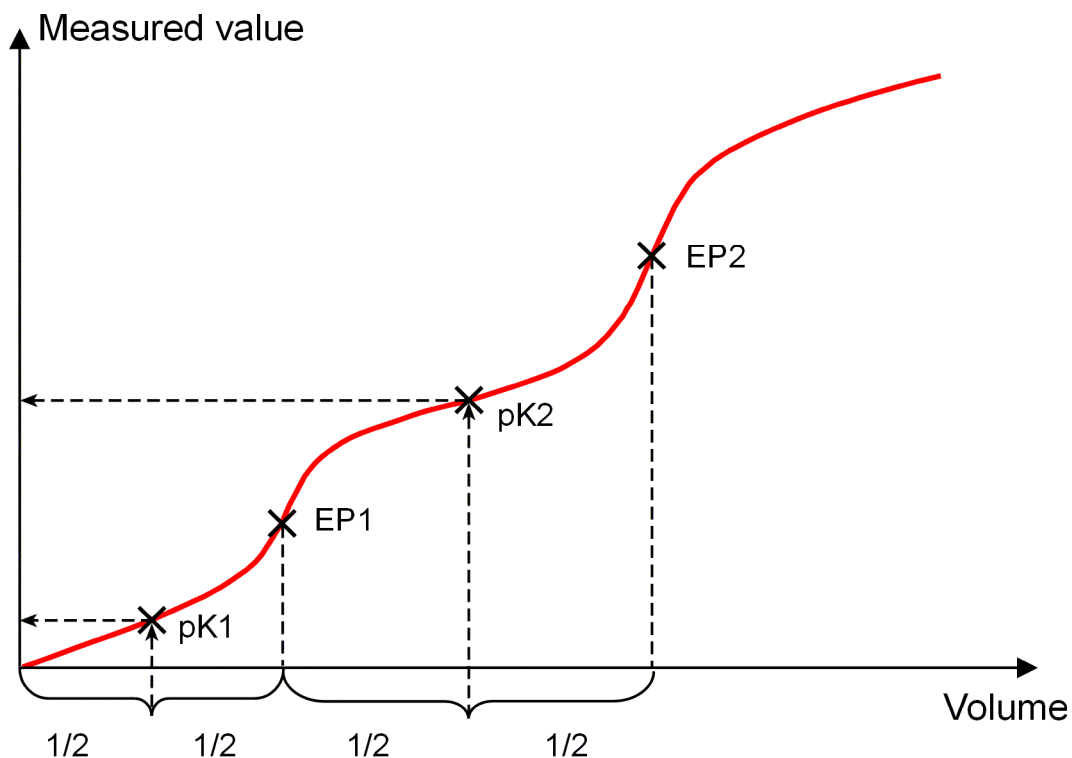
The **pK value** can be determined for pH titrations (DET and MET) and the **half neutralization potential** can be determined for U titrations.

The activities of conjugated acid-base pairs are linked by the following equation (Henderson-Hasselbalch equation):

$$\text{pH} = \text{pK}_a + \log (a_B/a_A)$$

If the activities of the acid and the conjugated base are equal ($a_A = a_B$), then $\text{pH} = \text{pK}_a$. This is the value at the half neutralization point and can be extrapolated from the titration curve. A careful pH calibration is necessary for pK evaluations. Nonetheless, the determined pK value is only an approximation, as the ionic strengths are not taken into account. In order to obtain more accurate values, titrations must be carried out with decreasing ionic strengths and the results extrapolated to the ionic strength zero. pK evaluation in aqueous solution is limited to the range $3.5 < \text{pK} < 10.5$ because of the leveling effect of strong acids and the lack of jumps with very weak acids. pK values of mixtures of acids and polyvalent acids can also be determined.

In non-aqueous solutions the **half neutralization potential (HNP)** is frequently used instead of the pK value. The HNP is evaluated in the same way as the pK value.





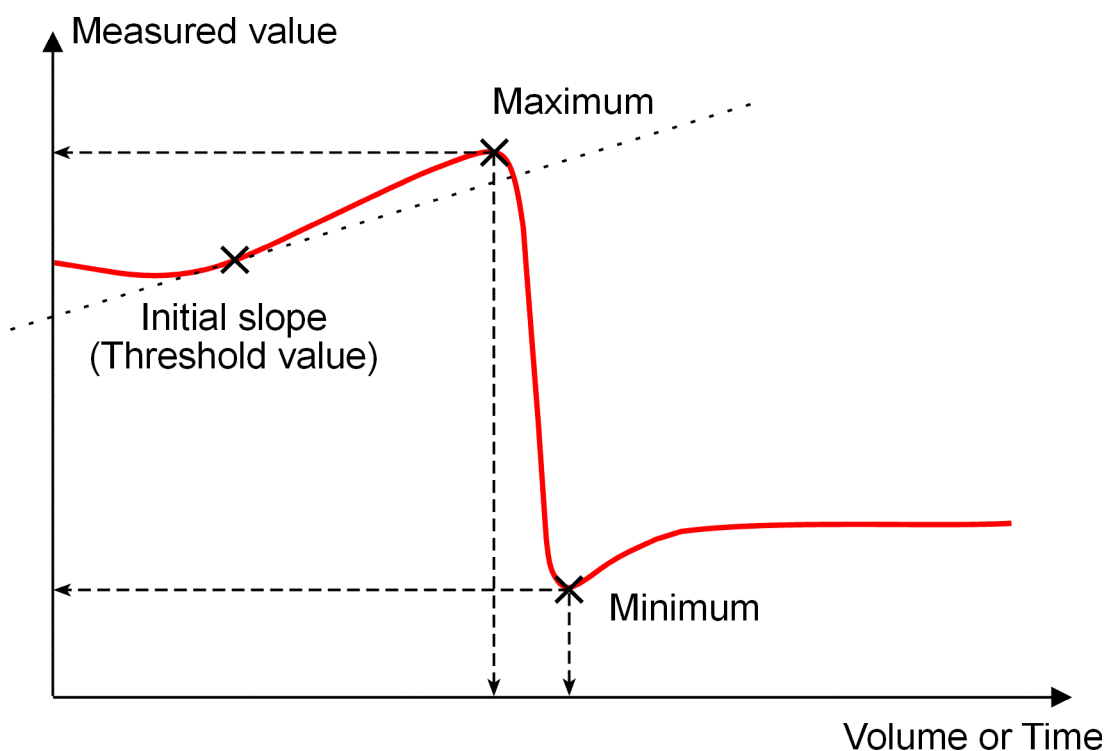
Note

If a start volume is to be added then it must be smaller than $1/2 V(EP1)$.

5.6.3.8.2 Minimum/Maximum evaluation

Parameters: **Method** ▶ DET/MET/SET/KFT/KFC/MEAS ▶ **Properties...** ▶ **Additional evaluations** ▶ **Minimum/Maximum evaluation**

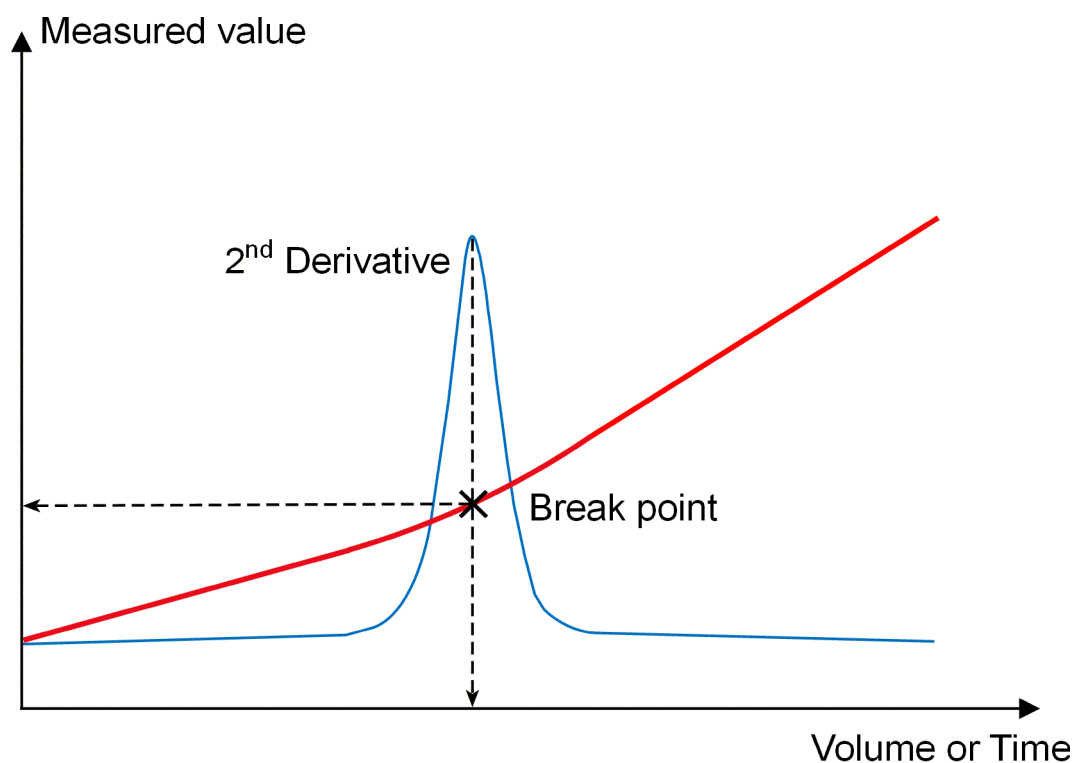
For the minimum or maximum measured value the associated **volume**, **time** and **temperature** are interpolated from the measuring point list. The evaluation begins as soon as the slope of the curve exceeds a particular threshold value.



5.6.3.8.3 Break-point evaluation

Parameters: **Method** ▶ DET/MET/MEAS ▶ **Properties...** ▶ **Additional evaluations** ▶ **Break-point evaluation**

A break-point evaluation is used to determine sharp change of direction in the titration curve. This evaluation is primarily used for photometric and conductivity titrations. The method is based on the search for extremes in the second derivative of the curve.



5.6.3.8.4 Gran evaluation

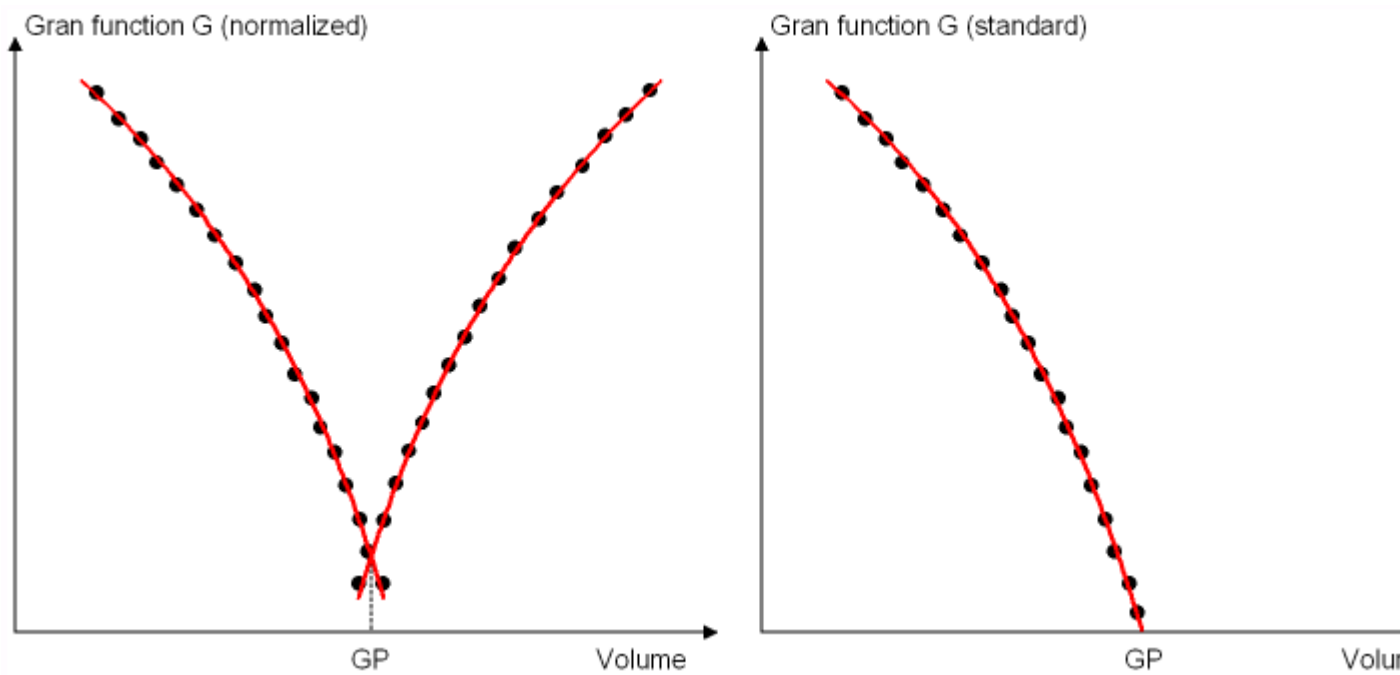
Parameters: **Method** ▶ **DET/MET** ▶ **Properties...** ▶ **Additional evaluations** ▶ **Gran evaluation**

The Gran evaluation can be used to determine S-shaped DET and MET titration curves. Two different procedures can be selected for this which are referred to as **Normalized** and **Standard**.

In the **normalized** procedure, the titration curves are linearized in 2 parts: the first part is before, the second after the equivalence point. The Gran function G is then plotted vs. the reagent consumption to get the Gran endpoint GP.

In the **standard** procedure, which is only available for 5.6.3.2.7DET pH - Additional evaluations and 5.6.3.3.2MET pH, only the part before the equivalence point will be linearized, and afterwards the intersection point with the y axis is determined as the endpoint GP.

The Gran evaluation is only suitable for curves with a single jump. All of the jumps are evaluated together as a group when a curve has several jumps. This may be desirable, as for example if 2 EPs are very close to one another in a steep jump and one wishes to have only one GP evaluated, e.g. with titrations of NaOH that contain carbonate.



5.6.3.9 Additional measured values

5.6.3.9.1 Calculated measured value

Dialog window: **Method** ▶ **DET/MET/SET/KFT/KFC/STAT/MEAS** ▶ **Properties...** ▶ **Additional measured values** ▶ **[New]/[Properties]** ▶ **Calculated measured value**

With the option **Additional calculated measured values**, a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables ***.CA1...3**.

Name

Designation for the calculated measured value. This name is used as axis legend.

Input	25 characters
Default value	Calculated measured value #

Formula

Formula to calculate the measured value. It can either be entered directly or can be created with the formula editor which opens by pressing

Input	1000 characters
Default value	'empty'

Device

Unit of calculated measured value.

Selection	empty ppm % g/L mg/L mg/mL mg/100g mol/L mmol/L mL g mg µg °C µL s mS/cm
Default value	empty

Decimal places

Number of decimal places with which the calculated measured value will be displayed.

Range	0 ... 5
Default value	2

Comment

Comment on the calculated measured value.

Input	250 characters
Default value	'empty'

5.6.3.9.2 External measured value

Dialog window: **Method** ► **DET/MET/SET/KFT/KFC/STAT/MEAS** ► **Properties...** ► **Additional measured values** ► **[New]/[Properties]** ► **External measured value**

With the option **Additional external measured values**, a maximum of 3 new measured values can be applied and saved from other existing measuring commands (e.g. **MEAS**) which are running at the same time in other tracks. These new measured values can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables ***.EX1...3**.

Command

Selection of the command from which the additional measured value will be taken over.

Selection	Selection from existing measuring commands

Measured quantity

Selection of the quantity from the command which will be adopted as quantity of the additional external measured value.

Selection	Selection from existing measuring quantities

Device

Display of the unit of the external measured value.

Comment

Comment on the external measured value.

Input	250 characters
Default value	'empty'

5.6.4 Measuring commands

5.6.4.1 Measuring commands - Overview

Menu item: **Method ▶ Paste ▶ New command... ▶ Measure**

Commands for **measurements** with different measured quantities.

The following measuring commands can be selected:

- *MEAS pH*
Potentiometric pH measurement with pH electrodes.
- *MEAS U*
Potentiometric voltage measurement with metal electrodes.
- *MEAS Ipol*
Amperometric measurement with selectable polarization voltage (measured value current I).
- *MEAS Upol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *MEAS T*
Temperature measurement.
- *MEAS T/Flow*
Temperature and gas flow measurement.
- *MEAS Conc*
Concentration measurement (direct measurement).
- *MEAS Cond*
Conductivity measurement.
- *MEAS TC Cond*
Measurement of the temperature coefficients of the conductivity.
- *MEAS Ref*
Measurement of a reference spectrum.
- *MEAS Spec*
Measurement of the sample spectrum
- *MEAS Opt*
Absorption measurement
- *STDADD man*
Standard addition with manual addition of the standard addition solution.
- *STDADD dos*
Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD auto*
Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

5.6.4.2 MEAS pH

5.6.4.2.1 MEAS pH - Overview

Dialog window: **Method** ► **MEAS pH** ► **Properties..** ► **MEAS pH - 'Command name'**

Command for potentiometric **pH measurements** with pH electrodes.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrim: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS pH** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C

Identification	Description
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value in the unit of the measured value

Identification	Description
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.2.2 MEAS pH - General/Hardware

Tab: **Method** ▶ **MEAS pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Titrandos, 855, 867

Selection	1 2 3 4 off
Default value	1

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.2.3 MEAS pH - Measuring parameters

Tab: **Method ▶ MEAS pH ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control



Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the **Signal drift** or the **Stop measured value pH** is reached or a defined **Waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions

Measuring time or **Stop measured value pH** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrandu, 855, 867

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrandu, 855, 867

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrande, 855, 867

Range	0 ... 999999 s
Default value	52 s

Titrimo

Range	0 ... 9999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrande, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

Stop measured value pH

Stops when the preset measured value has been reached since the start of the measurement.

Titrande, 855, 867

Range	-20.000 ... 20.000
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

5.6.4.2.4 MEAS pH - Evaluations

Tab: **Method** ▶ **MEAS pH** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (*see Chapter 5.6.4.2.6, page 853*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (*see Chapter 5.6.4.2.6, page 853*).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-20.000 ... -20.000 pH
Default value	20.000 pH

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-20.000 ... 20.000 pH
Default value	20.000 pH

Window = Time

Range	0 ... 999999 s
Default value	999999 s

5.6.4.2.5 MEAS pH - Additional measured values

Tab: **Method** ▶ **MEAS pH** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined here which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

5.6.4.2.6 MEAS pH - Fix endpoint evaluation

Dialog window: **Method** ▶ **MEAS pH** ▶ **Properties...** ▶ **Additional evaluations** ▶ **Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-20.000 ... 20.000 pH

Time

Range	0.0 ... 999999.9 s

5.6.4.3 MEAS U

5.6.4.3.1 MEAS U - Overview

Dialog window: **Method** ▶ **MEAS U** ▶ **Properties...** ▶ **MEAS U - 'Command name'**

Command for potentiometric **voltage measurements**.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrim: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS U** are configured on the following 4 tabs:



- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached

Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value
.LP.TEM	Temperature for the last measuring point in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.3.2 MEAS U - General/Hardware

Tab: **Method** ▶ **MEAS U** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input **25 characters**

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrino

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

Temperature measurement

Type of temperature measurement.

Titrandos, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Titrandos, 855, 867

Selection	1 2 3 4 off

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

Titrande, 855, 867

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrande, 855, 867

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrande, 855, 867

Range	0 ... 999999 s
Default value	52 s

Titrimo

Range	0 ... 9999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrande, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

<i>Titrande, 855, 867</i>	
Range	-20.0 ... 150 °C
Default value	25.0 °C
<i>Titrimo</i>	
Range	-170.0 ... 500 °C
Default value	25.0 °C

5.6.4.3.4 MEAS U - Evaluations

Tab: **Method ▶ MEAS U ▶ Properties... ▶ Evaluations**

Command name

Name of the command.	
Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)
If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.3.6, page 865).



[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.4.3.6, page 865).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Break-point evaluation

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the

measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Window = Time

Range	1 ... 999999 s
Default value	999999 s

5.6.4.3.5 MEAS U - Additional measured values

Tab: **Method** ▶ **MEAS U** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.3.6 MEAS U - Fix endpoint evaluation #

Dialog window: **Method ▶ MEAS U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fix measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value (Titrande, 867, 855)

Range	-2000.0 ... 2000.0 mV

Measured value (Titrino)

Range	-2000 ... 2000 mV

Time

Range	0.0 ... 999999.9 s

5.6.4.4 MEAS Ipol**5.6.4.4.1 MEAS Ipol - Overview**

Dialog window: **Method ▶ MEAS Ipol ▶ Properties... ▶ MEAS Ipol - 'Command name'**

Command for **voltametric measurements** with selectable polarization current.

Devices

This command can be executed with the following devices:

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list

Identification	Description
.STY	Type of stop with which the command was stopped: 1 = normal;0 = manual or after error

5.6.4.4.2 MEAS Ipol - General/Hardware

Tab: **Method** ▶ **MEAS Ipol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during a amperometric measurement.

Titrando, 855, 867

Range	-125.0 ... 125.0 μA (Increment: 2.5)
Default value	5.0 μA

Titrimo

Range	-127 ... 125.0 μA (Increment: 1)
Default value	5 μA

Electrode test

on | off (Default value: **off**)

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement

Titrando, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Titrandu, 855, 867

Selection	1	2	3	4	off

off

Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandu, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrando, 855 and 867.

5.6.4.4.3 MEAS Ipol - Measuring parameters

Tab: **Method** ▶ **MEAS Ipol** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrande, 855, 867

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Titrimo

Range	0.5 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrandu, 855, 867

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855, 867

Range	0 ... 999999 s
Default value	52 s

Titrimo

Range	0 ... 9999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrandu, 855, 867

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Titrande, 855, 867

Range	0 ... 999999 s
Default value	120 s

Titrimo

Range	0 ... 9999 s
Default value	120 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrande, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrande, 855, 867

Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

off

No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Titrande, 855, 867

Range	-20.0 ... 150 °C
Default value	25.0 °C



<i>Titrimo</i>	
Range	-170.0 ... 500 °C
Default value	25.0 °C

5.6.4.4.4 MEAS Ipol - Evaluations

Tab: **Method** ▶ **MEAS Ipol** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.	
Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.4.6, page 878).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.4.4.6, page 878).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Break-point evaluation

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

5.6.4.4.5 MEAS Ipol - Additional measured values

Tab: **Method** ▶ **MEAS Ipol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.4.6 MEAS Ipol - Fix endpoint evaluation

Dialog window: **Method** ▶ **MEAS Ipol** ▶ **Properties...** ▶ **Additional evaluations** ▶ **Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time
Default value	Measured value	

Fix value

Value of the fix endpoint.

Measured value (Titrando, 867, 855)

Range	-2000.0 ... 2000.0 mV

Measured value (Titrino)

Range	-2000 ... 2000 mV

Time

Range	0.0 ... 9999999.9 s

5.6.4.5 MEAS Upol

5.6.4.5.1 MEAS Upol - Overview

Dialog window: **Method** ▶ **MEAS Upol** ▶ **Properties...** ▶ **MEAS Upol - 'Command name'**

Command for **amperometric measurements** with selectable polarization voltage.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 857, 888, 890, 901, 904, 905, 906, 907

Titrim: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS Upol** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Upol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break-point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list

Identification	Description
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.5.2 MEAS Upol - General/Hardware

Tab: **Method** ▶ **MEAS Upol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

<i>Titrando, 867</i>	
Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

U(pol)

The polarization voltage is the potential applied to the polarized electrode during a amperometric measurement.

Titrandu, 855, 867

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

Titirino

Range	-1270 ... 1270 mV (Increment: 10)
Default value	400 mV

Electrode test

on | off (Default value: **off**)

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Titrandu, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer**Stirrer**

Titrandos, 855, 867

Selection	1 2 3 4 off

off

Selection of the stirrer. **off** means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.4.5.3 MEAS Upol - Measuring parameters

Tab: **Method ▶ MEAS Upol ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Titrande, 855, 867

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrande, 855, 867

Range	0 ... 999999 s
Default value	52 s

Titrimo

Range	0 ... 9999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrande, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Titrande, 855, 867

Range	-200.0 ... 200.0 µA
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Titrimo

Range	-170.0 ... 500 °C
Default value	25.0 °C

5.6.4.5.4 MEAS Upol - Evaluations

Tab: Method ▶ MEAS Upol ▶ Properties... ▶ Evaluations

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: off)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.5.6, page 891).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.4.5.6, page 891).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: off)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.



Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 $\mu\text{A/s}$
Default value	5.0 $\mu\text{A/s}$

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.5 ... 10.0 $\mu\text{A/s}$
Default value	5.0 $\mu\text{A/s}$

Break-point evaluation



Note

This evaluation method is possible only with Titrando, 855 and 867.

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-200.0 ... 200.0 μA
Default value	-200.0 μA

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-200.0 ... 200.0 μA
Default value	200.0 μA

Window = Time

Range	1 ... 999999 s
Default value	999999 s

5.6.4.5.5 MEAS Upol - Additional measured values

Tab: **Method** ▶ **MEAS Upol** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.5.6 MEAS Upol - Fix endpoint evaluation #

Dialog window: **Method ▶ MEAS Upol ▶ Properties... ▶ Additional evaluations ▶ Fix - Endpoint - Evaluation # ▶ [New]/[Property] ▶ Fix - Endpoint - Evaluation #**

Measured quantity

Selection of the fix measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 µA

Time

Range	0.0 ... 999999.9 s

5.6.4.6 MEAS T**5.6.4.6.1 MEAS T - Overview**

Dialog window: **Method ▶ MEAS T ▶ Properties... ▶ MEAS T - 'Command name'**

Command for **temperature measurements**.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrimo: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/Ion - Meter: 867

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value (temperature) for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value (temperature) for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (temperature) in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (temperature) in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)

Identification	Description
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.6.2 MEAS T - General/Hardware

Tab: **Method** ▶ **MEAS T** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **Temperature sensor** or **pH Electrode** from the sensors configured in the sensor table.

Selection	Sensor name Temperature sensor pH Electrode
Default value	Temperature sensor

Stirrer**Stirrer**

Selection of the stirrer.

Titrandos, 855, 856, 867

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855, 856, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855, 856 and 867.

5.6.4.6.3 MEAS T - Measuring parameters

Tab: **Method** ▶ **MEAS T** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrande, 855, 867

Range	0.1 ... 999.0 °C
Default value	0.5 °C

Titrimo

Range	0.5 ... 999.0 °C
Default value	0.5 °C

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrande, 855, 867

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrande, 855, 867

Range	0 ... 999999 s
Default value	52 s

Titrimo

Range	0 ... 9999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrande, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

off
No stop.

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

<i>Titrande, 855, 867</i>	
Range	-20.0 ... 150 °C
Default value	25.0 °C
<i>Titrimo</i>	
Range	-170.0 ... 500 °C
Default value	25.0 °C

5.6.4.6.4 MEAS T - Evaluations

Tab: **Method ▶ MEAS T ▶ Properties... ▶ Evaluations**

Command name

Name of the command.	
Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)
If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.6.6, page 903).



[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.4.6.6, page 903).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

Maximum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

Break-point evaluation



Note

This evaluation method is possible only with Titrando, 855, 856 and 867.

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see Chapter 5.6.3.9.2, page 839).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.9.2, page 839).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.6.6 MEAS T - Fix endpoint evaluation

Dialog window: **Method ▶ MEAS pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	-20.0 ... 150.0 °C
<i>Time</i>	
Range	0.0 ... 999999.9 s

Identification	Description
.EGF	Last measured gas flow rate (measured value following processing of the command) in mL/min
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.GMA	Maximum gas flow rate in mL/min
.GMI	Minimum gas flow rate in mL/min
.GMN	Average gas flow rate in mL/min
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.GFL	Gas flow value for the last measuring point of the measuring point list in mL/min
.LP.MEA	Measured value (temperature) for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (temperature) in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (temperature) in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C

5.6.4.7.3 MEAS T/Flow - Measuring parameters

Tab: **Method** ▶ **MEAS T/Flow** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measuring time

Maximum period of time for measurement.

Range	0 ... 999999 s
Default value	600 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	1 ... 999999.0 s
Default value	10 s

Stop measured value Temp.

Stops when the preset measured value has been reached since the start of the measurement. **off** means no stop.

Range	50.0 ... 250.0 °C
Selection	off
Default value	off

5.6.4.7.4 MEAS T/Flow - Evaluations

Tab: **Method** ▶ **MEAS T/Flow** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

5.6.4.7.5 MEAS T/Flow - Additional measured values

Tab: **Method** ▶ **MEAS T/Flow** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values**Additional external measured values**

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.8 MEAS Conc**5.6.4.8.1 MEAS Conc - Overview**

Dialog window: **Method ▶ MEAS Conc ▶ Properties... ▶ MEAS Conc - 'Command name'**

Command for **Concentration measurements** (direct measurement).

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS Conc** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *General/Hardware*
Parameters for setting the measurement procedure.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Conc** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C

Identification	Description
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.8.2 MEAS Conc - General/Hardware

Tab: Method ► MEAS Conc ► Properties... ► General/Hardware

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

<i>Titrando</i> , 867	
Selection	1 2
Default value	1

855	
Selection	1
Default value	1

Sensor

Selection of an ISE sensor from the ISE sensors available in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement.

<i>Titrande, 855</i>	
Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **off**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.4.8.3 MEAS Conc - Measuring parameters

Tab: **Method ▶ MEAS Conc ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control



Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Range	0 ... 1E+99
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Range	0 ... 999999 s
Default value	120 s

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

Range	0.1 ... 999999.0 s
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

Range	0 ... 1E+99
Selection	off
Default value	off

off

No stop.

Temperature

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Range	-20.0 ... 150°C
Default value	25.0

5.6.4.8.4 MEAS Conc - Additional measured values

Tab: **Method** ▶ **Commands** ▶ **MEAS Conc** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.



- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Cond** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break-point (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CLC	Cell constant of the sensor used in the command for conductivity measurement cells
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used in the command
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fix endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

Identification	Description
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.RTE	Reference temperature in °C
.SLO	Slope of the sensor used in the command
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TC.TC	Temperature coefficient in %/°C
.TC.CO	Coefficient c_0 of the Chebyshev polynomial of the solution used
.TC.C1	Coefficient c_1 of the Chebyshev polynomial of the solution used
.TC.C2	Coefficient c_2 of the Chebyshev polynomial of the solution used

Identification	Description
.TC.C3	Coefficient c3 of the Chebyshev polynomial of the solution used
.TC.C4	Coefficient c4 of the Chebyshev polynomial of the solution used
.TC.TSTART	Start temperature in °C
.TC.TSTOP	Stop temperature in °C

5.6.4.9.2 MEAS Cond - General/Hardware

Tab: **Method** ▶ **MEAS Cond** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device and the sensor are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type.

Selection	712 Conductometer 856 Conductivity Module
Default value	856 Conductivity Module

Sensor

Sensor

Selection of a sensor of the **Conductivity sensor** type from the sensors configured in the sensor table.

Selection	Sensor name Conductivity sensor
Default value	Conductivity sensor

Temperature measurement

Type of temperature measurement

856

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer



Note

Is displayed only if the 856 Conductivity Module has been selected as device type.

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.4.9.3 MEAS Cond - Measuring parameters

Tab: **Method** ▶ **MEAS Cond** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

Measurement frequency

712	
Selection	auto 300 Hz 2.4 kHz
Default value	auto

auto

The more suitable of the two frequencies is selected.

Type of measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled. This option is not available for the 712 Conductometer.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.

**Note**

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

856

Range	0.001 ... 999.0 (mS/cm)/min
Default value	10.0 (mS/cm)/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

856

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

856

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

856

Range	0.1 ... 999999.0 s
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

856

Range	0.0000 ... 2000.00 mS/cm
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Range	0 ... 999999 s
Default value	120 s

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

712

Range	0.4 ... 999999 s
Default value	2.0 s

856

Range	0.1 ... 999999.0 s
Default value	2.0 s

Stop measured value

Stops when the preset measured value has been reached since the start of the measurement.

856

Range	0.0000 ... 2000.00 mS/cm
Selection	off
Default value	off

off

No stop.

Temperature**Measurement temperature**

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

712

Range	-170.0 ... 500.0°C
Default value	20.0

856

Range	-20.0 ... 150.0°C
Default value	20.0

Reference temperature

The electrical conductivity depends greatly on the temperature. The conductivity measured at a particular temperature is thus automatically converted to this reference temperature (usually 20 °C or 25 °C).

712

Range	-170.0 ... 500.0°C
Default value	20.0

856

Range	-20.0 ... 150.0°C
Default value	20.0

Selection	off

off

The conductivity is displayed for the measurement temperature.

Temperature compensation

Selection	Temperature coefficient Sample solution
Default value	Temperature coefficient

Temperature coefficient

Manual input of a constant temperature coefficient.

Sample solution

Selection of a function for the temperature coefficients from the table

Sample solutions (TC conductivity).**Temperature coefficient**

Range	0.00 ... 9.99 %/°C
Default value	2.00 %/°C

Sample solution

Selection of the sample solution from the table **Sample solutions (TC conductivity)**.

Selection	DIN Table entries
Default value	DIN

5.6.4.9.4 MEAS Cond - Evaluations

Tab: **Method** ▶ **MEAS Cond** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Fix endpoint evaluation

Fix endpoint evaluation

on | off (Default value: **off**)

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fix measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.9.6, page 930).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix end-point selected in the table (see Chapter 5.6.4.9.6, page 930).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.001 ... 10.0 (mS/cm)/s
Default value	5.0 (mS/cm)/s

Maximum evaluation

Maximum evaluation

on | off (Default value: **off**)

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.001 ... 10.0 (mS/cm)/s
Default value	5.0 (mS/cm)/s

Break-point evaluation

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

5.6.4.9.5 MEAS Cond - Additional measured values

Tab: **Method** ▶ **Commands** ▶ **MEAS Cond** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (see *Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.9.6 MEAS Cond - Fix endpoint evaluation

Dialog window: **Method ▶ MEAS Cond ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation #**

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	0.0000 ... 2000.00 mS/cm
<i>Time</i>	
Range	0.0 ... 999999.9 s

5.6.4.10 MEAS TC Cond

5.6.4.10.1 MEAS TC Cond - Overview

Dialog window: **Method ▶ MEAS TC Cond ▶ Properties... ▶ MEAS TC Cond - 'Command name'**

Command for the **Measurement of the temperature coefficients of the conductivity.**

Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS TC Cond** are configured on the following two tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Cond** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break-point (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break-point x (1...9) in °C
.BP{x}.TIM	Time for the break-point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used in the command
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{x}.MEA	Measured value for the fix endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fix endpoint x (1...9) in °C

Identification	Description
.FP{x}.TIM	Time in s until the fix endpoint $\times$ (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.EXx	External value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point of the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point of the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.NMP	Number of measuring points in the measuring point list
.SLO	Slope of the sensor used in the command
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TC.CO	Coefficient c0 of the Chebyshev polynomial of the solution used
.TC.C1	Coefficient c1 of the Chebyshev polynomial of the solution used
.TC.C2	Coefficient c2 of the Chebyshev polynomial of the solution used

Identification	Description
.TC.C3	Coefficient c3 of the Chebyshev polynomial of the solution used
.TC.C4	Coefficient c4 of the Chebyshev polynomial of the solution used
.TC.MAX	Maximum temperature coefficient in %/°C (
.TC.MIN	Minimum temperature coefficient in %/°C (
.TC.TSTART	Start temperature in °C
.TC.TSTOP	Stop temperature in °C

5.6.4.10.2 MEAS TC Cond - General/Hardware

Tab: **Method** ▶ **MEAS TC Cond** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type.

Selection	712 Conductometer 856 Conductivity Module
Default value	856 Conductivity Module

Sensor

Sensor

Selection of a sensor of the **Conductivity sensor** type from the sensors configured in the sensor table.

Selection	Sensor name Conductivity sensor
Default value	Conductivity sensor

Stirrer

This section is visible only if the 856 Conductivity Module was selected as device type.

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.4.10.3 MEAS TC Cond - Measuring parameters

Tab: **Method** ▶ **MEAS TC Cond** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement frequency

712

Selection	auto 300 Hz 2.4 kHz
Default value	auto

auto

The more suitable of the two frequencies is selected.

Stop time

Maximum period of time for measurement.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values

Additional external measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.11 MEAS Ref

5.6.4.11.1 MEAS Ref - Overview

Dialog window: **Method** ► **MEAS Ref** ► **Properties...** ► **MEAS Ref - 'Command name'**

Command for the **Measurement of a reference spectrum**.

Devices

This command can be executed with the following device:

Spectrometer: Avantes

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS Ref** are configured on the following 2 tabs:

- *General/Hardware*
Parameters for device.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Command variables

The following command variables are generated in the method run by the command **MEAS Ref** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.11.2 MEAS Ref - General/Hardware

Tab: **Method** ▶ **MEAS Ref** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Avantes Spectrometer
Default value	Avantes Spectrometer

5.6.4.11.3 MEAS Ref - Measuring parameters

Tab: **Method** ▶ **MEAS Ref** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Start wavelength

Lower limit of the spectrum.

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

Upper limit of the spectrum.

Integration time

Integration time for spectrum recording.

Averaged spectra

The number of spectra that are recorded and averaged.

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

5.6.4.12 MEAS Spec

5.6.4.12.1 MEAS Spec - Overview

Dialog window: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **MEAS Spec - 'Command name'**

Command for the **Measurement of the sample spectrum.**

Devices

This command can be executed with the following device:

Spectrometer: Avantes

Appearance

The command has the following appearance:

Parameters

The parameters for the command **MEAS Spec** are configured on the following 3 tabs:



- *General/Hardware*
Parameters for device.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Definition of evaluation results for the sample spectrum.

Command variables

The following command variables are generated in the method run by the command **MEAS Spec** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.PK{#}.ABS	Absorbance of the peak with the greatest absorbance (maximum absorbance) for evaluation # (1...9)
.PK{#}.TRN	Transmission of the peak with the greatest absorbance (minimum transmission) for evaluation # (1...9) in %
.PK{#}.CNT	Intensity of the peak with the greatest absorbance (maximum intensity) for evaluation # (1...9)
.PK{#}.CNR	Intensity in reference spectrum 'Command name'.PK{#}.WVL for evaluation # (1...9)
.PK{#}.CND	Intensity in dark spectrum 'Command name'.PK{#}.WVL for evaluation # (1...9)
.PK{#}.WVL	Wavelength of the peak with the greatest absorbance for evaluation # (1...9) of the discovered maximum
.PK{#}.SAT	Specification as to whether the detector was saturated with 'Command name'.PK{#}.WVL for evaluation # (1...9)

5.6.4.12.2 MEAS Spec - General/Hardware

Tab: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Avantes Spectrometer
Default value	Avantes Spectrometer

5.6.4.12.3 MEAS Spec - Measuring parameters

Tab: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Start wavelength

Lower limit of the spectrum.

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

End wavelength

Upper limit of the spectrum.

Range	200.0 ... 1100.0 nm
Default value	1000.0 nm

Integration time

Integration time for spectrum recording.

Range	0.01 ... 600000 ms
Default value	6 ms

Averaged spectra

The number of spectra that are recorded and averaged.

Range	1 ... 10000
Default value	10

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Range	0 ... 100 Pixels
Default value	0 Pixels

5.6.4.12.4 MEAS Spec - Evaluations

Tab: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

[New]

Opens the dialog window **Evaluation window #** for entering the start and end wavelengths (see *Chapter 5.6.4.12.5, page 943*).

[Properties]

Opens the dialog window **Evaluation window #** for editing the start and end wavelengths selected in the table (see Chapter 5.6.4.12.5, page 943).

[Delete]

Deletes the selected line.

MEAS Spec - Evaluation window

Dialog window: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **Evaluations** ▶ **[New]/[Properties]** ▶ **Evaluation window #**

Start wavelength

Lower limit of the evaluation range.

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

End wavelength

Upper limit of the evaluation range.

Range	200.0 ... 1100.0 nm
Default value	1000.0 nm

5.6.4.13 MEAS Opt

5.6.4.13.1 MEAS Opt - Overview

Dialog window: **Method ▶ MEAS Opt ▶ Properties.. ▶ MEAS Opt - 'Command name'**

Command for **absorbance** measurements.

Devices

This command can be executed with the following device:

Spectrometer: Avantes

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS Opt** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for device.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Definition of evaluation results for absorbance measurements.

Command variables

The following command variables are generated in the method run by the command **MEAS Opt** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{#}.[MEA]	Measured value for the break-point (1...9) in the unit of the measured value
.BP{#}.CNT	Intensity for the break-point x (1...9) in counts
.BP{#}.TEM	Temperature for the break-point # (1...9) in °C
.BP{#}.TIM	Time for the break-point # (1...9) in s
.BP{#}.TRN	Transmission for the break-point x (1...9) in %
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.FP{#}.[MEA]	Measured value for the fix endpoint # (1...9) in the unit of the measured value
.FP{#}.CNT	Intensity for the fix endpoint x (1...9) in counts
.FP{#}.TEM	Temperature for the fix endpoint # (1...9) in °C
.FP{#}.TIM	Time for fix endpoint # (1...9) in s
.FP{#}.TRN	Transmission for the fix endpoint x (1...9) in %
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.LP.CAx	Calculated value x (1...3) for the last measuring point of the measuring point list
.LP.CNT	Transmission of the last measuring point of the measuring point list in %
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list

Identification	Description
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.TRN	Transmission of the last measuring point of the measuring point list in %
.MA{#}.[MEA]	Maximum measured value in the unit of the measured value
.MA{#}.CNT	Intensity for maximum measured value in counts
.MA{#}.TEM	Temperature for minimum measured value in °C
.MA{#}.TIM	Time for the minimum measured value in s
.MA{#}.TRN	Transmission for maximum measured value in %
.MI{#}.[MEA]	Minimum measured value in the unit of the measured value
.MI{#}.CNT	Intensity for minimum measured value in counts
.MI{#}.TEM	Temperature for minimum measured value in °C
.MI{#}.TIM	Time for the minimum measured value in s
.MI{#}.TRN	Transmission for minimum measured value in %
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.13.2 MEAS Opt - General/Hardware

Tab: Method ► MEAS Opt ► Properties... ► General/Hardware

Command name

Name of the command.

Input **25 characters**

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Avantes Spectrometer
Default value	Avantes Spectrometer

5.6.4.13.3 MEAS Opt - Measuring parameters

Tab: **Method** ▶ **MEAS Opt** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Wavelength

Wavelength at which the measured quantity (absorbance) is recorded

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

Integration time

Integration time for absorption measurement.

Range	0.01 ... 600000 ms
Default value	6 ms

Averaged spectra

The number of spectra that are recorded and averaged.

Smoothing

Measurement

Duration of the absorption measurement.

Time interval for entering a measuring point in the measuring point list.

Stops when the preset measured value has been reached since the start of the measurement.

5.6.4.13.4 MEAS Opt - Evaluations

Command name

Name of the command.

The following additional methods for evaluation of measurement curves can be activated and defined on this tab.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 1000.0 mAU/s
Default value	20.0 mAU/s

Break-point evaluation

Break-point evaluation

on | off (Default value: **off**)

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0.0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point. The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	0 ... 4000 mAU
Default value	0 mAU

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Time for the upper limit of the window.

Window = Measured value

Range	0 ... 4000 mAU
Default value	4000 mAU

Window = Time

Range	0 ... 999999 s
Default value	999999 s

5.6.4.13.5 MEAS Opt - Fix endpoint evaluation

Dialog window: **Method ▶ MEAS Opt ▶ Properties... ▶ Evaluations ▶ Fix - Endpoint**
- Evaluation #

Measured quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range 0 ... 4000 mAU

Time

Range	0.0 ... 999999.9 s

5.6.4.14 STDADD man

5.6.4.14.1 STDADD man - Overview

Dialog window: **Method** ► **STDADD man** ► **Properties...** ► **STDADD man - 'Command name'**

Command for **Standard addition** with manual addition of the standard addition solution.

Devices

This command can be executed with the following devices:

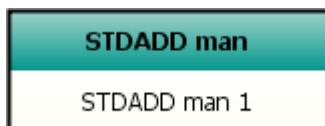
Titrand: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **STDADD man** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Standard addition*
Parameters for standard addition.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve with its evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations** ► **Show calibration curve...** or the symbol

Command variables

The following command variables are generated in the method run by the command **STDADD man** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point calculated from the calibration
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.14.2 STDADD man - General/Hardware

Tab: **Method** ▶ **STDADD man** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the sensor and the stirrer are defined here.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Sensor

Selection of a sensor of type **ISE electrode** from the sensors configured in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement.

Number of additions

Number of times the standard solution is to be added.

Range	1 ... 19
Default value	3

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) which was added to the sample before the first standard addition.

Range	0 ... 9999.999 mL
Default value	0 mL

Addition mode

Selection	Fixed volume increments Variable volume increments
Default value	Fixed volume increments

Fixed volume increments

If this option is enabled a fixed volume increment must be added for each standard addition.

Variable volume increments

If this option is enabled the defined volume increment must be added for each standard addition.

Addition volume

Size of the fixed addition volume (only when **Addition mode = fixed volume increments**).

Range	0.00000 ... 99999.9 mL
Default value	100 mL

Addition volume 1...19

Size of the individual addition volumes (only when **Addition mode = variable volume increments**).

Range	0.00000 ... 99999.9 mL
Default value	100 mL

Addition solution**Concentration**

Concentration of addition solution.

Range	0.001 ... 999999.999
Default value	1.000

Device

Concentration unit of addition solution.

Selection	mol/L mmol/L μmol/L ppm g/L mg/L μg/L mg/mL μg/mL % mEq/L
Default value	ppm

5.6.4.14.4 STDADD man - Measuring parameters

Tab: **Method** ▶ **STDADD man** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement with drift control

The measurement is stopped as soon as the **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Range	-20.0 ... 150°C
Default value	25.0

Switch off stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the measurement. In this case the following two parameters can be edited:

Stir before measurement

Stirring time between end of dosing and measurement.

Range	0 ... 999999 s
Default value	0 s

Pause before measurement

Waiting time before the measurement during which no stirring takes place.

Range	0 ... 999999 s
Default value	0 s

5.6.4.15 STDADD dos

5.6.4.15.1 STDADD dos - Overview

Dialog window: **Method ▶ STDADD dos ▶ Properties... ▶ STDADD dos - 'Command name'**

Command for **Standard addition** with addition of the standard addition solution from a dosing device.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 904, 905, 906, 907

Identification	Description
.ENP	Electrode zero point calculated from the calibration
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TITER	Titer value of the solution used for the command
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.15.2 STDADD dos - General/Hardware

Tab: Method ▶ STDADD ▶ Properties... ▶ General/Hardware

Command name

Name of the command.

Input **25 characters**

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection **'Device name' | not defined**
 Default value **not defined**

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Dosing device

Dosing device

Selection of the dosing device (exchange or dosing unit) to be used for dosing the addition solution.

Titrandu, 867

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

**Note**

If an existing solution is selected as the solution to be added then the **Concentration** and **Unit** of this solution will be adopted for calculating the standard addition. If **not defined** is selected, then **Concentration** and **Unit** must be entered on the **Standard addition** tab.

Sensor**Measuring input**

Selection of the measuring input to which the sensor is connected.

Titrand, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Sensor

Selection of a sensor of type **ISE electrode** from the sensors configured in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement.

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.



Stirrer

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.4.15.3 STDADD dos - Standard addition

Tab: **Method** ▶ **STDADD dos** ▶ **Properties...** ▶ **Standard addition**

Command name

Name of the command.

Input	25 characters

The parameters for the standard addition can be defined on this tab

Number of additions

Number of times the standard solution is added.

Range	1 ... 19
Default value	3

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) to be added to the sample before the first standard addition.

Range	0 ... 9999.999 mL
Default value	0 mL

Addition mode

Selection	Fixed volume increments Variable volume increments
Default value	Fixed volume increments

Fixed volume increments

If this option is enabled a fixed volume increment must be added for each standard addition.

Variable volume increments

If this option is enabled the defined volume increment must be added for each standard addition.

Addition volume

Size of the fixed addition volume (only when **Addition mode = fixed volume increments**).

Range	0.00000 ... 99999.9 mL
Default value	100 mL

Addition volume 1...19

Size of the individual addition volumes (only when **Addition mode = variable volume increments**).

Range	0.00000 ... 99999.9 mL
Default value	100 mL

Addition solution**Note**

Displayed only for **Solution = not defined**.

Concentration

Concentration of addition solution.

Range	0.001 ... 999999.999
Default value	1.000

Device

Concentration unit of addition solution.

Selection	mol/L mmol/L μmol/L ppm g/L mg/L μg/L mg/mL μg/mL % mEq/L
Default value	ppm

Dosing rate

Speed at which the volume increments are added. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

5.6.4.15.4 STDADD dos - Measuring parameters

Tab: **Method** ▶ **STDADD** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

Measurement with drift control

The measurement is stopped as soon as the **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Range	-20.0 ... 150°C
Default value	25.0

Switch off stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the measurement. In this case the following two parameters can be edited:

Stir before measurement

Stirring time between end of dosing and measurement.

Range	0 ... 999999 s
Default value	0 s

Pause before measurement

Waiting time before the measurement during which no stirring takes place.

Range	0 ... 999999 s
Default value	0 s

5.6.4.16 STDADD auto

5.6.4.16.1 STDADD auto - Overview

Dialog window: **Method ▶ STDADD auto ▶ Properties... ▶ STDADD auto - 'Command name'**

Command for **Standard addition** with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

Devices

This command can be executed with the following devices:

Identification	Description
.ENP	Electrode zero point calculated from the calibration
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.RES	Calculated result of the standard addition in the selected unit
.SLO	Electrode slope calculated from the calibration
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TITER	Titer value of the solution used for the command
.VAR	Variance of the calculated result of the standard addition in the selected unit
.VOL	Dosed volume

5.6.4.16.2 STDADD auto - General/Hardware

Tab: **Method** ▶ **STDADD auto** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input **25 characters**

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection **'Device name' | not defined**
 Default value **not defined**



not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Dosing device

Dosing device

Selection of the dosing device (exchange or dosing unit) to be used for dosing the addition solution.

Titrandu, 867

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.



Sensor

Selection of the measuring input to which the sensor is connected.

Selection	1 2
Default value	1

Selection	1
Default value	1

Selection of a sensor of type **ISE electrode** from the sensors configured in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Type of temperature measurement.

Selection	continuous automatic off
Default value	automatic

A temperature sensor must be connected. The temperature will then be measured continuously.

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stop volume

Volume of auxiliary solution (e.g. buffer) that is to be added to the sample before the first standard addition.

Range	0.0 ... 9999.9 mL
Default value	100.0 mL

Addition solution**Note**

Displayed only for **Solution = not defined**.

Concentration

Concentration of addition solution.

Range	0.001 ... 999999.999
Default value	1.000

Device

Concentration unit of addition solution.

Selection	mol/L mmol/L μmol/L ppm g/L mg/L μg/L mg/mL μg/mL % mEq/L
Default value	ppm

Control parameters**Dosing rate**

Speed at which the volume increments are added.

Selection	slow medium fast
Default value	fast

Delta U

Potential difference that is to be achieved by a standard addition.

Range	1 ... 999 mV
Default value	10 mV

5.6.4.16.4 STDADD auto - Measuring parameters

Tab: **Method ▶ STDADD ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement with drift control

The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a defined **Waiting time** has elapsed.

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Range	0.1 ... 999.0 mV/min
Default value	10.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

Temperature

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously.

Range	-20.0 ... 150°C
Default value	25.0

Switch off stirrer during measurement

Switch off stirrer during measurement

on | off (Default value: **off**)

If this option is activated, then the stirrer is switched off during the measurement. In this case the following two parameters can be edited:

Stir before measurement

Stirring time between end of dosing and measurement.

Range	0 ... 999999 s
Default value	0 s

Pause before measurement

Waiting time before the measurement during which no stirring takes place.

Range	0 ... 999999 s
Default value	0 s

5.6.5 Calibration commands

5.6.5.1 Calibration commands - Overview

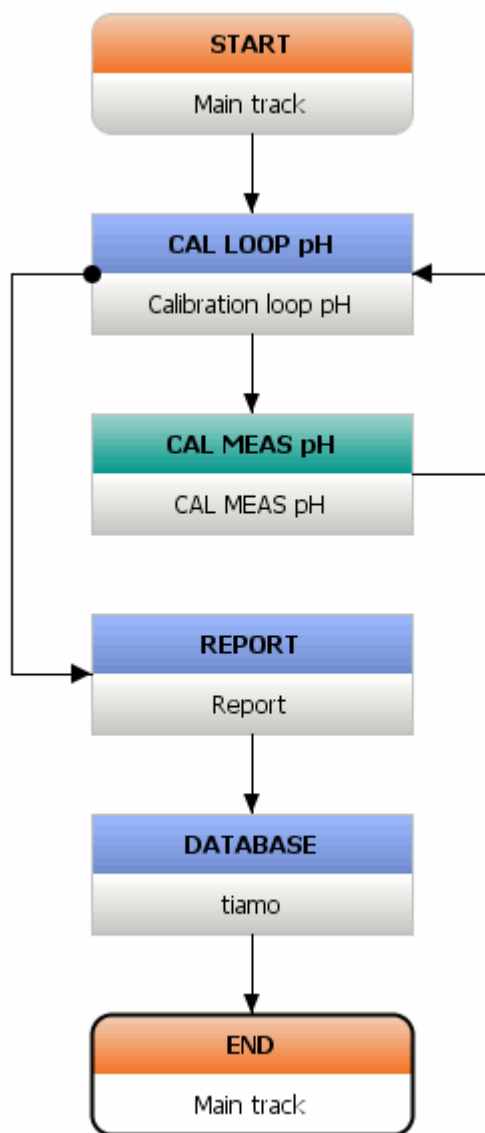
Menu item: **Method ▶ Paste ▶ New command... ▶ Calibrate**

Commands for **calibration** of pH- and ion-selective sensors.

General

The commands **CAL LOOP** and **CAL MEAS** are available for calibrating electrodes. The number and type of buffers or standards, respectively, is defined in the loop command **CAL LOOP**, which is to be measured subsequently with the command **CAL MEAS**. After each looping pass, the validity of the measurement is checked, and at the end the calibration data for the electrode is calculated.

The basic structure of a calibration method looks as follows:



The calibration can be carried out with both manual and automatic solution changes with the aid of a Sample Processor.

Commands

The following commands can be selected for calibration:

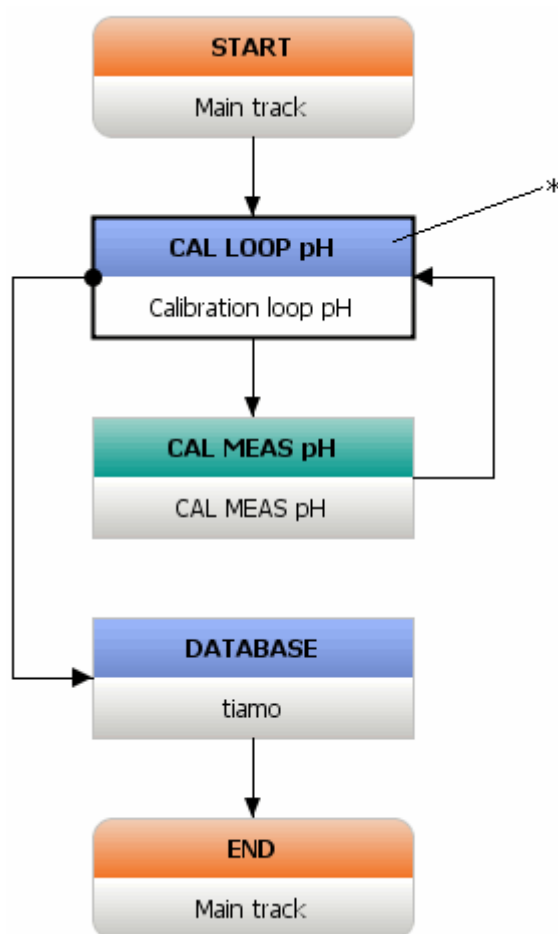
- *CALL LOOP pH*
Calibration loop for the calibration of pH electrodes.
- *5.6.5.5CAL MEAS pH*
Measurement of buffers for the calibration of pH electrodes.
- *CAL LOOP Conc*
Calibration loop for the calibration of ion-selective electrodes (ISE electrodes).

- *CAL MEAS Conc*
Measurement of standards for the calibration of ion-selective electrodes (ISE electrodes).
- *CAL Cond*
Measurement of conductivity standards for the determination of the cell constant of conductivity measurement cells.
- *CAL Spec*
Measuring command for wavelength calibration.

5.6.5.2 Calibrating with manual solution changing

Program part: **Method ▶ Calibration commands**

The basic structure of a calibration method with manual solution exchange looks as follows:



* Definition of the number of calibration solutions and the type of solution exchange.

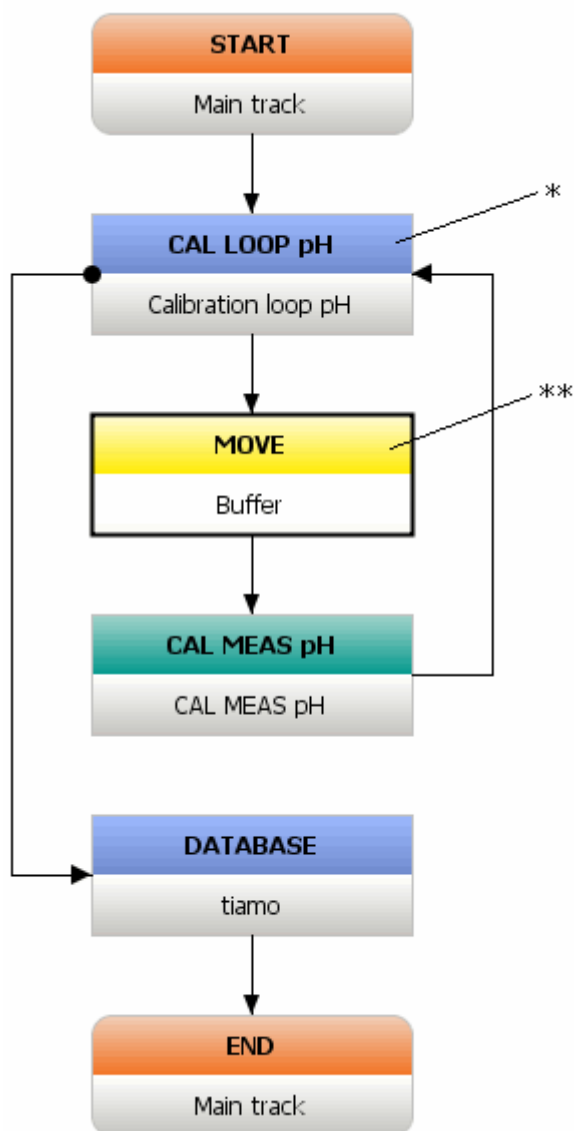
The request for changing the buffer or the standard must be **activated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. During the

method run, a request for specifying the next the buffer or standard is displayed after each measurement.

5.6.5.3 Calibrating with manual solution changing

Program part: **Method ▶ Calibration commands**

The basic structure of a calibration method with automatic solution exchange on a Sample Processor looks as follows:



* Definition of the number of calibration solutions and the type of solution exchange.

** Move to the next calibration solution.

The request for changing the buffer or standard must be **deactivated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. No request for changing the buffer or standard is then displayed during the run.

For the automatic move to the next calibration solution on the Sample Processor, a **MOVE** command must be inserted between the loop command **CAL LOOP** and the measuring command **CAL MEAS**. The positions of the calibration solutions on the rack are defined in this command. The following three possibilities are available to do so:

- **Defining rack positions for calibration solutions in the method**
Starting from a rack position **###** defined for the first calibration solution in the **MOVE** command, the other calibration solutions will be used in sequential order at the subsequent positions. The following settings have to be made in the command **MOVE** under the **Target** parameter:

Move: Rack position

Number: = **### - 1 + 'Command name.LCO'** (entry with formula editor, e.g. = **19 + 'Calibration loop pH.LCO'** for the above sample method with the first calibration solution at position **20**).

- **Defining special beakers for calibration solutions in the method**
Starting from a first special beaker **###** for the first calibration solution defined in the command **MOVE**, other calibration solutions will be used in sequential order at the subsequent special beaker positions. The same number of special beakers must be defined for the rack that is set up as the number of calibration buffers used. The following settings must be implemented in the command **MOVE** under the parameter **Target**:

Move: Special beaker

Number: = **### + 'Command name.LCO'** (input via formula editor, e.g. = **5 + 'calibration loop pH.LCO'** for the sample method above with the first calibration solution at special beaker position **6**).

- **Defining rack positions for calibration solutions in the sample data**

Starting from the **Sample position** defined in the sample data (variable **'MV.Sample position'**) for the first calibration solution, the other calibration solutions will be used in sequential order at the subsequent rack positions. The following settings must be implemented for this purpose in the command **MOVE** under the **Target** parameter:

Move: Rack position

Number: = **'MV.Sample position' - 1 + 'Command name.LCO'** (entry with formula editor, e.g. = **'MV.Sample position' - 1 + 'Calibration loop pH.LCO'** the above sample method).

The variable **'Command name.LCO'** (index number of the calibration loop) is increased by **+1** after each pass of the loop.



Note

The formula editor is opened with a right click in the input field.

5.6.5.4 CAL LOOP pH

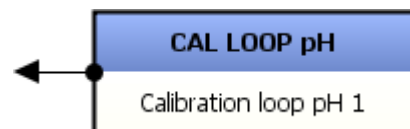
5.6.5.4.1 CAL LOOP pH - Overview

Dialog window: **Method ▶ CAL LOOP pH ▶ Properties... ▶ CAL LOOP pH - 'Command name'**

Loop command for the **calibration of pH electrodes** which is used together with the command **CAL MEAS pH**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL LOOP pH** are configured in the following dialog window:

- *CAL LOOP pH - Properties*

Command variables

The following command variables are generated in the method run by the command **CAL LOOP pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.ENP	Electrode zero point calculated from the calibration
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.LCO	Loop counter = current quantity of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (Date/Time)

Identification	Description
.SLO	Electrode slope calculated from the calibration

5.6.5.4.2 CAL LOOP pH - Properties

Dialog window: **Method ▶ CAL LOOP pH ▶ Properties... ▶ CAL LOOP pH - 'Command name'**

The number of buffers and the buffer type are defined in the dialog window **CAL LOOP pH - 'Command name'**.

Command name

Name of the command.

Input	25 characters

Buffers

Number of buffers

Selecting the number of buffers for the pH calibration.

Selection	1 2 3 4 5
Default value	2

Buffer type

Selecting a predefined buffer series for the pH calibration.

If these buffers are used, *tiamo* will recognize the particular buffer automatically.

Selection	Metrohm NIST DIN Fisher Fluka Basel Mettler Merck Merck CertiPUR 25°C Beckman Custom Special Radiometer Baker Hamilton DURACAL Precisa
Default value	Metrohm

Custom

Uses the custom buffer series defined in the configuration under

Tools ▶ Templates ▶ Custom calibration buffers.

Special

Up to five calibration buffers can be defined directly in the Properties window of the command **CAL LOOP pH**.



Note

The automatic buffer recognition is deactivated for the buffer type **Special** and the buffers must therefore be measured at the time of calibration in the same order as they were defined in the command **CAL LOOP pH**.

Buffer # pH

pH value of the special buffers (this parameter is only displayed for **Buffer type = Special**).

Range	-20.000 ... 20.000



Note

Enter the pH values for the measuring temperature used. A message will be displayed correspondingly often during the run to indicate the next buffer to be measured.

Request for buffer exchange

on | off (Default value: **on**)

If this check box is activated, a request for manual buffer exchange is displayed after each time the calibration loop is run through. This parameter must be disabled for automatic buffer exchange when calibrating with a Sample Processor.

5.6.5.4.3 Buffer data

Dialog window: **Method ▶ CAL LOOP pH ▶ Properties... ▶ CAL LOOP pH - 'Command name'**

The temperature-dependent pH values of several common pH buffers are stored in the system for automatic buffer recognition during pH calibration. In addition to the Metrohm buffer solutions 6.2307.1X0, other reference and technical buffers are also included in the tables.

The following tables provide an overview of the stored pH(T) series:

Metrohm

Temp. (°C)	Met4	Met7	Met9
	pH 4.00	pH 7.00	pH 9.00
0	3.99	7.11	9.27
5	3.99	7.08	9.18

Temp. (°C)	Met4	Met7	Met9
	pH 4.00	pH 7.00	pH 9.00
10	3.99	7.06	9.13
15	3.99	7.04	9.08
20	3.99	7.02	9.04
25	4.00	7.00	9.00
30	4.00	6.99	8.96
35	4.01	6.98	8.93
40	4.02	6.98	8.90
45	4.03	6.97	8.87
50	4.04	6.97	8.84
55	4.06	6.97	8.81
60	4.07	6.97	8.79
65	4.09	6.98	8.76
70	4.11	6.98	8.74
75	4.13	6.99	8.73
80	4.15	7.00	8.71
85	4.18	7.00	8.70
90	4.20	7.01	8.68
95	4.23	7.02	8.67

NIST

Temp. (°C)	NIST1	NIST4	NIST7	NIST9	NIST13
	pH 1	pH 4	pH 7	pH 9	pH 13
0	-	4.010	6.984	9.464	13.423
5	1.668	4.004	6.950	9.392	13.207
10	1.670	4.001	6.922	9.331	13.003
15	1.672	4.001	6.900	9.277	12.810
20	1.676	4.003	6.880	9.228	12.627
25	1.680	4.008	6.865	9.184	12.454
30	1.685	4.015	6.853	9.144	12.289

Temp. (°C)	NIST1	NIST4	NIST7	NIST9	NIST13
	pH 1	pH 4	pH 7	pH 9	pH 13
35	1.691	4.025	6.843	9.107	12.133
40	1.697	4.036	6.837	9.076	11.984
45	1.704	4.049	6.834	9.046	11.841
50	1.712	4.064	6.833	9.018	11.705
55	1.715	4.075	6.834	8.985	11.574
60	1.723	4.091	6.836	8.962	11.449
65	1.732	4.108	6.840	8.941	-
70	1.743	4.126	6.845	8.921	-
75	1.754	4.145	6.852	8.902	-
80	1.766	4.164	6.859	8.885	-
85	1.778	4.185	6.867	8.867	-
90	1.792	4.205	6.877	8.850	-
95	1.806	4.227	6.886	8.833	-

DIN

Temp. (°C)	DIN1	DIN3	DIN4	DIN7	DIN9	DIN12
	pH 1	pH 3	pH 4	pH 7	pH 9	pH 12
0	1.08	-	4.67	6.89	9.48	-
5	1.08	-	4.66	6.86	9.43	-
10	1.09	3.10	4.66	6.84	9.37	13.37
15	1.09	3.08	4.65	6.82	9.32	13.15
20	1.09	3.07	4.65	6.80	9.27	12.96
25	1.09	3.06	4.65	6.79	9.23	12.75
30	1.10	3.05	4.65	6.78	9.18	12.61
35	1.10	3.05	4.66	6.77	9.13	12.44
40	1.10	3.04	4.66	6.76	9.09	12.29
45	1.10	3.04	4.67	6.76	9.04	12.13
50	1.11	3.04	4.68	6.76	9.00	11.98
55	1.11	3.04	4.69	6.76	8.97	11.84

Temp. (°C)	DIN1	DIN3	DIN4	DIN7	DIN9	DIN12
	pH 1	pH 3	pH 4	pH 7	pH 9	pH 12
60	1.11	3.04	4.70	6.76	8.92	11.69
65	1.11	3.04	4.71	6.76	8.90	11.56
70	1.11	3.04	4.72	6.76	8.88	11.43
75	1.12	3.04	4.74	6.77	8.86	11.30
80	1.12	3.05	4.75	6.78	8.85	11.19
85	1.12	3.06	4.77	6.79	8.83	11.08
90	1.13	3.07	4.79	6.80	8.82	10.99
95	-	-	-	-	-	-

Fisher

Temp. (°C)	Fis2	Fis4	Fis7	Fis10
	pH 2	pH 4	pH 7	pH 10
0	-	4.01	7.13	10.34
5	1.98	3.99	7.10	10.26
10	1.98	4.00	7.07	10.19
15	2.02	3.99	7.05	10.12
20	2.00	4.00	7.02	10.06
25	2.00	4.00	7.00	10.00
30	2.00	4.01	6.99	9.94
35	2.02	4.02	6.98	9.90
40	2.01	4.03	6.97	9.85
45	2.01	4.04	6.97	9.81
50	2.01	4.06	6.97	9.78
55	-	4.07	6.97	9.74
60	-	4.09	6.98	9.70
65	-	4.11	6.99	9.68
70	-	4.13	7.00	9.65
75	-	4.14	7.02	9.63
80	-	4.16	7.03	9.62

Temp. (°C)	Fis2	Fis4	Fis7	Fis10
	pH 2	pH 4	pH 7	pH 10
85	-	4.18	7.06	9.61
90	-	4.21	7.08	9.60
95	-	4.23	7.11	9.60

Fluka Basel

Temp. (°C)	FBS4	FBS7	FBS9
	pH 4	pH 7	pH 9
0	4.01	7.11	9.20
5	4.00	7.08	9.15
10	4.00	7.05	9.10
15	4.00	7.02	9.05
20	4.00	7.00	9.00
25	4.01	6.98	8.96
30	4.01	6.97	8.91
35	4.02	6.96	8.88
40	4.03	6.95	8.84
45	4.04	6.94	8.80
50	4.06	6.94	8.77
55	4.07	6.93	8.74
60	4.09	6.93	8.71
65	4.11	6.93	8.69
70	4.13	6.94	8.67
75	4.14	6.94	8.65
80	4.16	6.95	8.63
85	4.18	6.96	8.61
90	4.21	6.97	8.60
95	4.23	6.98	8.59

Mettler-Toledo

Temp. (°C)	MT2	MT4	MT7	MT9	MT11
	pH 2	pH 4	pH 7	pH 9	pH 11
0	2.03	4.01	7.12	9.52	11.90
5	2.02	4.01	7.09	9.45	11.72
10	2.01	4.00	7.06	9.38	11.54
15	2.00	4.00	7.04	9.32	11.36
20	2.00	4.00	7.02	9.26	11.18
25	2.00	4.01	7.00	9.21	11.00
30	1.99	4.01	6.99	9.16	10.82
35	1.99	4.02	6.98	9.11	10.64
40	1.98	4.03	6.97	9.06	10.46
45	1.98	4.04	6.97	9.03	10.28
50	1.98	4.06	6.97	8.99	10.10
55	1.98	4.08	6.98	8.96	-
60	1.98	4.10	6.98	8.93	-
65	1.98	4.13	6.99	8.90	-
70	1.99	4.16	7.00	8.88	-
75	1.99	4.19	7.02	8.85	-
80	2.00	4.22	7.04	8.83	-
85	2.00	4.26	7.06	8.81	-
90	2.00	4.30	7.09	8.79	-
95	-	4.35	7.12	8.77	-

Merck Titrisol

Temp. (°C)	Mer2	Mer4	Mer7	Mer9	Mer12
	pH 2	pH 4	pH 7	pH 9	pH 12
0	2.01	4.05	7.13	9.24	12.58
5	2.01	4.04	7.07	9.16	12.41
10	2.01	4.02	7.05	9.11	12.26
15	2.00	4.01	7.02	9.05	12.10

Temp. (°C)	Mer2	Mer4	Mer7	Mer9	Mer12
	pH 2	pH 4	pH 7	pH 9	pH 12
20	2.00	4.00	7.00	9.00	12.00
25	2.00	4.01	6.98	8.95	11.88
30	2.00	4.01	6.98	8.91	11.72
35	2.00	4.01	6.96	8.88	11.67
40	2.00	4.01	6.95	8.85	11.54
45	2.00	4.00	6.95	8.82	11.44
50	2.00	4.00	6.95	8.79	11.33
55	2.00	4.00	6.95	8.76	11.19
60	2.00	4.00	6.96	8.73	11.04
65	2.00	4.00	6.96	8.715	10.97
70	2.01	4.00	6.96	8.70	10.90
75	2.01	4.00	6.96	8.68	10.80
80	2.01	4.00	6.97	8.66	10.70
85	2.01	4.00	6.98	8.65	10.59
90	2.01	4.00	7.00	8.64	10.48
95	-	4.00	7.02	-	-

Merck CertiPUR (25°C)

Temp. (°C)	MerC4.01	MerC7.00	MerC9.00	MerC10.00
	pH 4.01	pH 7.00	pH 9.00	pH 10.00
0	-	-	-	-
5	4.00	7.09	9.22	10.22
10	4.00	7.06	9.16	10.16
15	4.00	7.04	9.10	10.10
20	4.00	7.02	9.05	10.05
25	4.01	7.00	9.00	10.00
30	4.01	6.98	8.96	9.94
35	4.03	6.98	8.93	9.90
40	4.03	6.97	8.89	9.86

Temp. (°C)	MerC4.01	MerC7.00	MerC9.00	MerC10.00
	pH 4.01	pH 7.00	pH 9.00	pH 10.00
45	4.05	6.97	8.87	9.80
50	4.06	6.97	8.84	9.73
55	-	-	-	-
60	-	-	-	-
65	-	-	-	-
70	-	-	-	-
75	-	-	-	-
80	-	-	-	-
85	-	-	-	-
90	-	-	-	-
95	-	-	-	-

Beckmann

Temp. (°C)	Bec4	Bec7	Bec10
	pH 4	pH 7	pH 10
0	4.00	7.12	10.32
5	4.00	7.09	10.25
10	4.00	7.06	10.18
15	4.00	7.04	10.12
20	4.00	7.02	10.06
25	4.00	7.00	10.01
30	4.01	6.99	9.97
35	4.02	6.99	9.93
40	4.03	6.98	9.89
45	4.05	6.98	9.86
50	4.06	6.97	9.83
55	4.08	6.98	-
60	4.09	6.98	-
65	4.11	6.99	-

Temp. (°C)	Bec4	Bec7	Bec10
	pH 4	pH 7	pH 10
70	4.12	6.99	-
75	4.14	7.00	-
80	4.16	7.00	-
85	4.18	7.01	-
90	4.19	7.02	-
95	4.21	7.03	-

Radiometer

Temp. (°C)	Rad4.01	Rad7.00	Rad9.18
	pH 4.01	pH 7	pH 9.18
0	4.000	7.118	9.464
5	3.998	7.087	9.395
10	3.997	7.059	9.332
15	3.998	7.036	9.276
20	4.001	7.016	9.225
25	4.005	7.000	9.180
30	4.011	6.987	9.139
35	4.018	6.977	9.102
40	4.027	6.970	9.068
45	4.038	6.965	9.038
50	4.050	6.964	9.011
55	4.064	6.965	8.985
60	4.080	6.968	8.962
65	4.097	6.974	8.941
70	4.116	6.982	8.921
75	4.137	6.992	8.900
80	4.159	7.004	8.885
85	4.183	7.018	8.867
90	4.210	7.034	8.850

Temp. (°C)	Rad4.01	Rad7.00	Rad9.18
	pH 4.01	pH 7	pH 9.18
95	4.240	-	-

Baker

Temp. (°C)	Bak4	Bak7	Bak9	Bak10
	pH 4.00	pH 7.00	pH 9.00	pH 10.00
0	4.00	7.13	9.23	10.30
5	4.00	7.09	9.17	10.24
10	4.00	7.05	9.10	10.17
15	4.00	7.03	9.05	10.11
20	4.00	7.00	9.00	10.05
25	4.00	6.98	8.96	10.00
30	4.01	6.98	8.91	9.96
35	4.02	6.98	8.88	9.93
40	4.03	6.97	8.84	9.89
45	4.04	6.97	8.81	9.86
50	4.05	6.96	8.78	9.82
55	4.07	6.96	8.76	9.79
60	4.08	6.96	8.73	9.76
65	4.10	6.97	8.71	9.74
70	4.12	6.97	8.69	9.72
75	4.14	6.98	8.68	9.70
80	4.16	6.98	8.66	9.68
85	4.19	6.99	8.64	9.66
90	4.21	7.00	8.62	9.64
95	-	-	-	-

Hamilton DURACAL

Temp. (°C)	Ham4.01	Ham7.00	Ham9.21	Ham10.01
	pH 4.01	pH 7.00	pH 9.21	pH10.01
0	-	-	-	-

Temp. (°C)	Ham4.01	Ham7.00	Ham9.21	Ham10.01
	pH 4.01	pH 7.00	pH 9.21	pH10.01
5	4.01	7.09	9.45	10.19
10	4.00	7.06	9.38	10.15
15	4.00	7.04	9.32	10.11
20	4.00	7.02	9.26	10.06
25	4.01	7.00	9.21	10.01
30	4.01	6.99	9.16	9.97
35	4.02	6.98	9.11	9.92
40	4.03	6.97	9.06	9.86
45	4.04	6.97	9.03	9.83
50	4.06	6.97	8.99	9.79
55	-	-	-	-
60	-	-	-	-
65	-	-	-	-
70	-	-	-	-
75	-	-	-	-
80	-	-	-	-
85	-	-	-	-
90	-	-	-	-
95	-	-	-	-

Precisa

Temp. (°C)	Pre4	Pre7	Pre9
	pH 4.00	pH 7.00	pH 9.00
0	3.99	7.11	9.27
5	3.99	7.08	9.18
10	3.99	7.06	9.13
15	3.99	7.04	9.08
20	3.99	7.02	9.04
25	4.00	7.00	9.00

Temp. (°C)	Pre4	Pre7	Pre9
	pH 4.00	pH 7.00	pH 9.00
30	4.00	6.99	8.96
35	4.01	6.98	8.93
40	4.02	6.98	8.90
45	4.03	6.97	8.87
50	4.04	6.97	8.84
55	4.06	6.97	8.81
60	4.07	6.97	8.79
65	4.09	6.98	8.76
70	4.11	6.98	8.74
75	4.13	6.99	8.73
80	4.15	7.00	8.71
85	4.18	7.00	8.70
90	4.20	7.01	8.68
95	4.23	7.02	8.67

5.6.5.5 CAL MEAS pH

5.6.5.5.1 CAL MEAS pH - Overview

Dialog window: **Method ▶ CAL MEAS pH ▶ Properties.. ▶ CAL MEAS pH - 'Command name'**

Measuring command for **Calibration with pH electrodes**, which is used together with the command **CAL LOOP pH**.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titrino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 794, 798, 799

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL MEAS pH** are configured on the following 2 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Command variables

The following command variables are generated in the method run by the command **CAL MEAS pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached

Identification	Description
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.5.5.2 CAL MEAS pH - General/Hardware

Tab: **Method** ▶ **CAL MEAS pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrandu, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855, 867

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos, 855 and 867.

5.6.5.5.3 CAL MEAS pH - Measuring parameters

Tab: **Method ▶ CAL MEAS pH ▶ Properties... ▶ Measuring parameters**

Command name

Name of the command.

Input	25 characters

The measuring parameters for the calibration are defined on this tab.

Measurement with drift control

The pH calibration is carried out drift-controlled. The measurement is stopped as soon as the **Signal drift** is reached or a defined **waiting time** has elapsed.

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrandos, 855, 867

Range	0.1 ... 999.0 mV/min
Default value	2.0 mV/min

Titrimo

Range	0.5 ... 9990. mV/min
Default value	2.0 mV/min



Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Titrandos, 855, 867

Range	0 ... 999999 s
Default value	10 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrandu, 855, 867

Range	0 ... 999999 s
Default value	110 s

Titirino

Range	0 ... 9999 s
Default value	110 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855, 867

Range	0.1 ... 999999.0 s (Increment: 0.1)
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s (Increment: 0.08)
Default value	2.0 s

Temperature

Temperature

The temperature at which calibration is carried out can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. The value is used for temperature compensation with the pH measurement.

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

5.6.5.6 CAL LOOP Conc

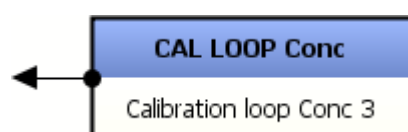
5.6.5.6.1 CAL LOOP Conc - Overview

Dialog window: **Method** ► **CAL LOOP Conc** ► **Properties..** ► **CAL LOOP Conc - 'Command name'**

Loop command for the **calibration of ion-selective electrodes**, which is used together with the command **CAL MEAS Conc**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL LOOP Conc** are configured in the following dialog window:

- *CAL LOOP Conc - Properties*

Command variables

The following command variables are generated in the method run by the command **CAL LOOP Conc** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value calculated from the calibration
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.ENP	Electrode zero point calculated from the calibration
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.LCO	Loop counter = current quantity of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (Date/Time)
.SLO	Electrode slope calculated from the calibration

5.6.5.6.2 CAL LOOP Conc - Properties

Dialog window: **Method** ▶ **CAL LOOP Conc** ▶ **Properties..** ▶ **CAL LOOP Conc** - 'Com-
mand name'

The number of standards and their concentration are defined in the dialog window **CAL LOOP Conc - 'Command name'**.

Command name

Name of the command.

Input	25 characters

Standards

Number of standards

Selection of the number of standards with which the concentration calibration is to be carried out.

Selection	1 2 3 4 5
Default value	2

Unit conc.

Selection of the concentration unit for the standards.

Selection	mol/L mmol/L ppm % g/L mg/L µg/L µg/mL mg/mL
Default value	ppm

Conc. standard

Enter the corresponding concentration for each standard used.

Range	0.001 ... 999999.999

Request for standard exchange

on | off (Default value: **on**)

If this option is enabled, a request for manual standard exchange is displayed after each measurement. This option must be disabled for automatic solution exchange when calibrating with a Sample Processor.

5.6.5.7 CAL MEAS Conc

5.6.5.7.1 CAL MEAS Conc - Overview

Dialog window: **Method ▶ CAL MEAS Conc ▶ Properties.. ▶ CAL MEAS Conc - 'Command name'**

Measuring command for **calibration with ISE electrodes**, which is used together with the command **CAL LOOP Conc.**

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 857, 904, 905, 906, 907

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL MEAS Conc** are configured on the following 2 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Command variables

The following command variables are generated in the method run by the command **CAL MEAS Conc** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifica- tion	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

Identification	Description
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.5.7.2 CAL MEAS Conc - General/Hardware

Tab: **Method** ▶ **CAL MEAS Conc** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrando

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Sensor

Selection of an ISE sensor from the ISE sensors available in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** will be used.

Stirrer

Stirrer

Selection of the stirrer.

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Range	0 ... 999999 s
Default value	110 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999 s
Default value	2.0 s

Temperature

Temperature

The temperature at which calibration is carried out can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. The value is used for temperature compensation with the pH measurement.

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

5.6.5.8 CAL Cond

5.6.5.8.1 CAL Cond - Overview

Dialog window: **Method ▶ CAL Cond ▶ Properties... ▶ CAL Cond - 'Command name'**

Command for **Conductivity standards measurements** for the determination of the cell constants of conductivity sensors.

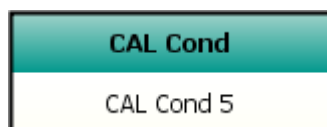
Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:



Identification	Description
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.RTE	Reference temperature in °C (only MEAS Cond and CAL Cond)
.STY	Type of stop with which the command was stopped: 1 = stopped normally, 0 = stopped manually with [Quit] or [Stop] .
.TC	Temperature coefficient in %/°C

5.6.5.8.2 CAL Cond - General/Hardware

Tab: **Method** ▶ **CAL Cond** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type.

Selection	712 Conductometer 856 Conductivity Module
Default value	856 Conductivity Module

Sensor

Sensor

Selection of a conductivity sensor from the conductivity sensors available in the sensor table.

Selection	'Sensor name' Conductivity sensor
Default value	Conductivity sensor

Temperature measurement

Type of temperature measurement.

856

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

This section is visible only if the 856 Conductivity Module was selected as device type.

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

on | off (Default value: **off**)

5.6.5.8.3 CAL Cond - Measuring parameters

Name of the command.

The parameters for the measuring procedure can be defined on this tab.

712

auto

Type of measurement selection.

712

856

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled. This option is not available for the 712 Conductometer.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

856

Range	0.001 ... 999.0 (mS/cm)/min
Default value	10.0 (mS/cm)/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

856

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. If the waiting time has not been newly entered then a waiting time that is suitable for the drift will be calculated automatically according to the following equation:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

856

Range	0 ... 999999 s
Default value	52 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Maximum period of time for measurement.

Range	0 ... 999999 s
Default value	120 s

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

Range	0.4 ... 999999 s
Default value	2.0 s

Range	0.1 ... 999999.0 s
Default value	2.0 s

Measurement temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

Range	-20.0 ... 150.0 °C
Default value	20.0

Tab: **Method** ▶ **CAL Cond** ▶ **Properties...** ▶ **Conductivity standard**

Name of the command.

Input	25 characters

Selection of the type as to how the data are to be defined for the conductivity standard.

Name standard

List box with conductivity standards. The data of one of these standards is used to calculate the temperature coefficient for the specified reference temperature.

Selection	'Conductivity standard'

5.6.5.8.5 CAL Cond - Data Conductivity standard

Dialog window: **Method ▶ CAL Cond ▶ Data Conductivity standard**

Current temperature

Display of the currently measured temperature of the conductivity standard.

Data transmission from standard

Input of the data of the conductivity standard, which should be as close as possible to the **Current temperature**. This data is as a rule contained in the Data Sheet/Certificate for the conductivity standard.

Reference temperature

Input of a temperature for which a calibration point of the conductivity standard is known. It should be as close as possible to the temperature at which measurements are carried out.

Range	-20.0 ... 150.0°C
Default value	20.0

Conductivity

Input of the conductivity of the standard at the reference temperature.

Range	0.00000 ... 2000.00 mS/cm
Default value	1.0 mS/cm

Temperature coefficient

Temperature coefficient of the standard with the reference temperature.

Range	0.00 ... 9.99 %/°C
Default value	1.00 %/°C

5.6.5.9 CAL Spec**5.6.5.9.1 CAL Spec - Overview**

Dialog window: **Method ▶ CAL Spec ▶ Properties... ▶ CAL Spec - 'Command name'**

Command for **wavelength calibration**.

Devices

This command can be executed with the following devices:

Spectrometer: Avantes

Identification	Description
.WL.CAL	Status of the calibration: 1 = calibrated normally, 0 = canceled , because reference wavelength was not found.
.WL.C0	Coefficient c0 of the calibration curve
.WL.C1	Coefficient c1 of the calibration curve
.WL.C2	Coefficient c2 of the calibration curve
.WL.C3	Coefficient c3 of the calibration curve
.WL.TOL	Tolerance within which a measured peak of a reference wavelength can be assigned.

5.6.5.9.2 CAL Spec - General/Hardware

Tab: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Avantes Spectrometer
Default value	Avantes Spectrometer

5.6.5.9.3 CAL Spec - Measuring parameters

Tab: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Integration time

Integration time for spectrum recording.

Range	0.01 ... 600000 ms
Default value	6 ms

Averaged spectra

The number of spectra that are recorded and averaged.

Range	1 ... 10000
Default value	10

5.6.5.9.4 CAL Spec - Calibration wavelengths

Tab: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **Calibration wavelengths**

Command name

Name of the command.

Input	25 characters

The reference wavelengths with which the spectrometer is calibrated can be entered on this tab.

Tolerance

Wavelength interval (symmetrical around the specified wavelength) in which the largest peak maximum of the calibration measurement found is assigned to the reference wavelength. If a peak is outside the tolerance, then the calibration will be stopped. The existing calibration in the configuration remains in effect.

Range	0.1 ... 1100.0 nm
Default value	0.5 nm

[New]

Opens the dialog window **Calibration wavelength #** to enter wavelengths and tolerances (*see Chapter 5.6.5.9.5, page 1015*).

[Properties]

Opens the dialog window **Calibration wavelength #** to edit the values selected in the table (see Chapter 5.6.5.9.5, page 1015).

[Delete]

Deletes the selected line.

5.6.5.9.5 CAL Spec - Calibration wavelength #

Tab: **Method ▶ CAL Spec ▶ Properties... ▶ Calibration wavelengths ▶ [New]/[Properties] ▶ Calibration wavelength #**

Wavelength

Range	200.0 ... 1100.0 nm
Default value	'empty' nm

5.6.6 Dosing commands**5.6.6.1 Dosing commands - Overview**

Menu item: **Method ▶ Paste ▶ New command... ▶ Dosing**

Commands for **Dosing** with dosing units and exchange units.

The following six 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.

5.6.6.2 ADD**5.6.6.2.1 ADD - Overview**

Dialog window: **Method ▶ ADD ▶ Properties... ▶ ADD - 'Command name'**

Command for **dosing a defined volume** of a solution with an exchange or dosing unit.

Devices

This command can be executed with the following devices:

Identification	Description
.TITER	Titer value of the solution used for the command
.VOL	Dosed volume

5.6.6.2.2 ADD - General/Hardware

Tab: **Method** ▶ **ADD** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the dosing device and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Dosing device

Dosing device

Selection of the dosing device to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrandos, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789, 814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

730, 774

Selection	1 2 3 4 5 6 7 8 9 10 11 12
Default value	1

Titrimo

Selection	internal D0

736, 751, 758, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, the dosing is carried out without interruption with a combination of two dosing devices so that the second dosing device is dosing while the first one is being filled and vice-versa. This parameter is displayed only for Titrandos, 846, 856, 867, 814, 815, 855, 864 and 874.

Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Titrande, 846, 856, 867

Selection	1 2 3 4
Default value	2

814, 815, 855, 864, 874

Selection	1 2 3
Default value	2

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

Titrande, 846, 856, 867, 814, 815, 855, 864, 874

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Filling rate

Speed with which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrande, 846, 856, 867, 814, 815, 855, 864, 874

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Stirrer

Stirrer

Selection of the stirrer.

Titrande, 846, 856, 867, 814, 815, 855, 864, 874

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Dosing rate

The rate at which the volume is dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrande, 846, 814, 815, 855, 864, 874

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

730, 774, 778, 789

Range	0.01 ... 160.00 mL/min
Default value	maximum mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	maximum mL/min



Note

The dosing rate should be reduced for viscous liquids.

Filling rate

The buret will be filled at this speed after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrande, 814, 815, 855, 864, 874

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

730, 774, 778, 789

Range	0.01 ... 160.00 mL/min
Default value	maximum mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	maximum mL/min



Note

The filling rate should be reduced for viscous liquids.

Fill automatically at start

on | off (Default value: **on**)

If this option is enabled, the buret is filled automatically before dosing. This parameter is displayed only for Titrandos, 846, 855, 856, 864, 867, 814, 815 and 874.

Using this option ensures that the buret is filled before the execution of the **ADD** command and that it is located at the dosing port of the selected solution.



Note

If **Fill automatically at start** is **deactivated**, then the **ADD** command will be begin immediately after the solvent has been added. It must be ensured in the method (e.g. by a preceding **ADD** or **LQH** command) that the buret is situated at the correct dosing port.

Fill automatically at end

on | off (Default value: **on**)

If this option is enabled, the buret is filled automatically after dosing.

Using this option ensures that the buret is filled after the execution of the **ADD** command and that it is located at the dosing port of the selected solution.

5.6.6.3 DOS

5.6.6.3.1 DOS - Overview

Menu item: **Method ▶ Paste ▶ New command...**

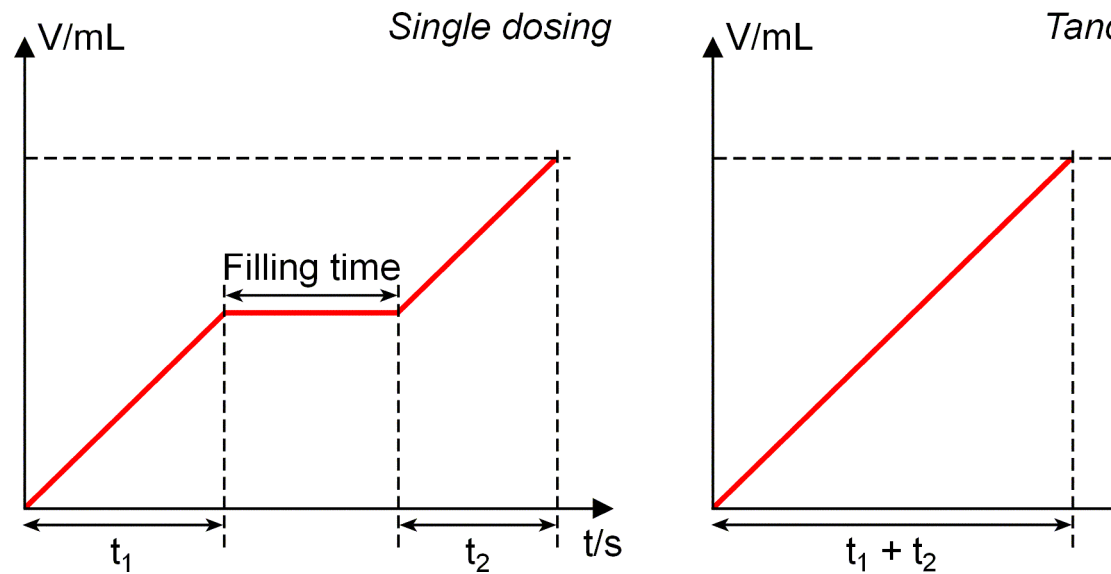
Command for **controlled dosing** with possibility for monitoring of measured value and temperature.

Principle

A predefined volume of a solution is dosed with the **DOS** command with simultaneous monitoring of measured value and temperature. Three different dosing types can be selected for the dosing. Two of the three parameters **Volume**, **Dosing rate** and **Dosing time** can be specified. The third parameter is calculated according to the following formula:

Volume = Dosing time • Dosing rate

If continuous dosing is required, 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.



The time defined as Dosing time corresponds to the net dosing time t_1+t_2 , i.e. the filling time of the exchange or dosing unit is included in the total.

If the specifications with the maximum dosing rate cannot be achieved, then dosing is carried out at the maximum rate. The following formula can be used to estimate whether the maximum dosing rate is used or not:

Dosing rate = desired flow rate in mL/min • 2.22



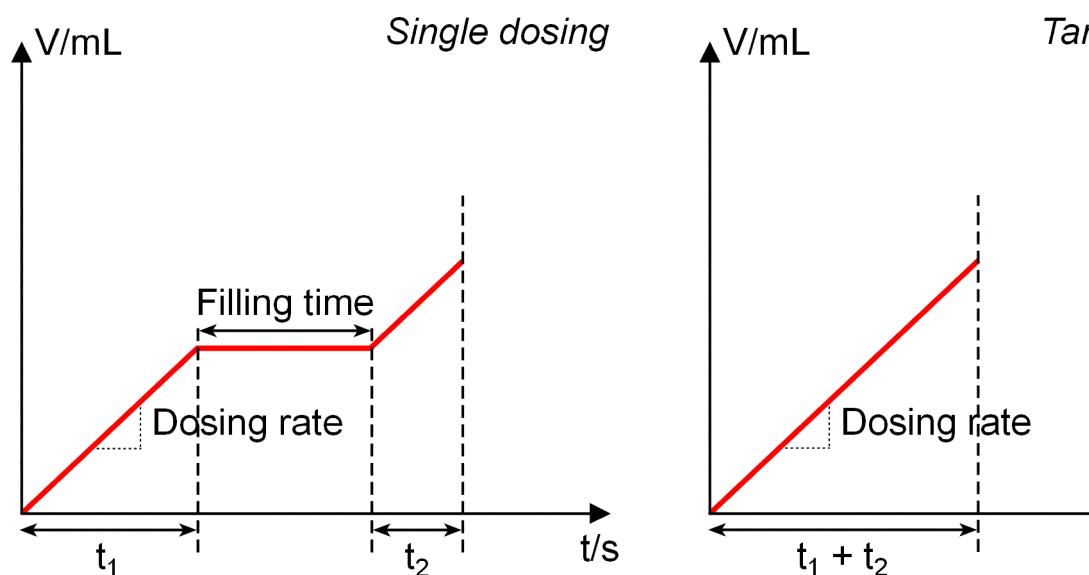
Note

This formula applies only for using a single dosing device. The dosing rate is equal to the flow rate in the case of tandem dosing.

If the required dosing rate exceeds the maximum dosing rate for the selected exchange or dosing unit (or cylinder volume, respectively), then a larger cylinder volume must be selected.

Specification of dosing rate and dosing time

You define the dosing rate with which dosing is to be carried out during a particular time. As in the previous case, the filling times are not included in the total, and dosing is prolonged accordingly.



Flow rate of a single dosing device

The cylinder volume and the filling time of the exchange or dosing unit must be taken into account for the calculation of the effective flow rate.

Cylinder volume	Max. flow rate	
	Exchange unit	Dosing unit
1 mL	approx. 80 mL/h	---
2 mL	---	approx. 170 mL/h
5 mL	approx. 400 mL/h	approx. 430 mL/h
10 mL	approx. 800 mL/h	approx. 860 mL/h
20 mL	approx. 1.6 L/h	approx. 1.7 L/h
50 mL	approx. 4.0 L/h	approx. 4.3 L/h

Filling times

Filling times are not included in the calculation of the dosing rate. The filling times (including valve switching) can be estimated according to the following formula:

$$\text{Filling time in s} = (\text{max. filling rate/current filling rate}) \cdot t + 4 \text{ s}$$

$$t = 20 \text{ s (for exchange units) or } 18 \text{ s (for dosing units)}$$

The maximum filling rate is dependent on the cylinder volume of the exchange/dosing unit that has been put into use. The approximate filling times (including valve switching) are given in the table below for various cylinder volumes (exchange and dosing unit) at different filling rates:

Cylinder volume	Filling time in s			
	max.	100 mL/min	50 mL/min	10 mL/min
1 mL	24/---	---	---	---
2 mL	---/22	---	---	---
5 mL	24/22	---	---	34
10 mL	24/22	---	---	64
20 mL	24/22	---	28	124
50 mL	24/22	34	64	304

Example

1 L reagent is to be dosed within 1 hour with a 50 mL exchange unit. What is the dosing rate?

Total duration = 60 min

Dosing volume = 1000 mL

Filling time = 24 s (at max. filling rate)

Cylinder volume = 50 mL

Number of refillings = dosing volume/cylinder volume = $1000/50 = 20$

If the division gives a whole number, the last filling is no longer a refilling and must be deducted. In our example, 19 refills are necessary. There is no dosing during this time, i.e. the net dosing time is

$$3600 \text{ s} - 19 \times 24 \text{ s} = 3144 \text{ s} = 52.4 \text{ min}$$

The dosing rate is thus

$$1000 \text{ mL}/52.4 \text{ min} = 19.1 \text{ mL/min}$$

Summary in a formula:

Dosing rate in mL/min = dosing volume/(total duration - number of refillings
• filling time • 1/60)

5.6.6.3.3 DOS - Track call

Dialog window: **Method** ▶ **DOS pH/DOS U** ▶ **Monitoring** ▶ **[New]/[Properties]** ▶ **Track call #**

Monitoring

Selects the quantity at which a track is to be started when its limit value is exceeded.

Selection	Measured value Temperature Any
Default value	Measured value

Any

Either one of the two sizes.

Limit exceeding

Selects the exceeded limit for which a track is to be started.

Selection	Lower limit Upper limit Any OK
Default value	Any

Any

The track will be started if either the upper or the lower limit is exceeded.

OK

The track is started when the monitored quantities are once again within the limit values (including hysteresis).

Track name

Selects the track that is to be started automatically.

Selection	Selection of available tracks

**Note**

If a track is called for that is already running then it will be allowed to finish and then restarted when it is free again.

5.6.6.3.4 DOS pH**5.6.6.3.4.1 DOS pH - Overview**

Dialog window: **Method ▶ DOS pH ▶ Properties... ▶ DOS pH - 'Command name'**

Command for **controlled dosing** with measured value pH.

Devices

This command can be executed with the following devices:

Titrand: 835, 836, 842, 857, 902, 906, 907

Titrim: 718, 736, 751, 799

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in $\mu\text{g}/\text{min}$ (KFC)
.LP.EXx	External value $\times (1 \dots 3)$ for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TITER	Titer value of the solution used for the command
.VOL	Dosed volume

DOS pH - General/Hardware

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrand

Dosing device

Dosing device

Selection of the dosing device to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrandu

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titrimo

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, then dosing will proceed continuously with two dosing devices in combination. The second dosing device is dosing while the first one is being filled and vice-versa. This parameter is displayed only for Titrandos and 855.

Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Titrando

Selection	1 2 3 4
Default value	2

855

Selection	1 2 3
Default value	2

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

Titrandu, 855

Selection	Solution name not defined
Default value	not defined

not defined

No tests will be carried out.

Filling rate

Speed with which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrandu, 855

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrandu

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrimo

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type **pH electrode** from the list of sensors available in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name pH electrode
Default value	pH electrode

Temperature measurement

Type of temperature measurement.

Titrand, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrand, 855

Selection	1 2 3 4 off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrand, 855

Range	-15 ... 15
Default value	8

Switch off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrandos and 855.

Switch on/off automatically

on | off (Default value: **on**)

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for Titrinos.

5.6.6.3.4.3 DOS pH - Dosing parameters

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **Dosing parameters**

Command name

Name of the command.

Input	25 characters

The volume to be added, the dosing rate and the dosing time are defined on this tab

Dosing criterion

Selects the two parameters that can be preset for dosing. The third parameter is calculated automatically from the formula **Volume = dosing time * dosing rate** and is not shown (*see Chapter 5.6.6.3.2, page 1023*).

Selection	Volume/dosing rate Volume/dosing time Dosing rate/dosing time
Default value	Volume/dosing rate

Volume

Fixed volume that is to be dosed. This parameter is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time**.

Range	0.00000 ... 99999.9 mL
Default value	10.0000 mL

Dosing rate

Rate at which dosing should take place. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value. This parameter is only displayed for **Dosing criterion = Volume/Dosing rate** or **Dosing rate/Dosing time**.

Titrand, 855

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	maximum mL/min

**Note**

The dosing rate should be reduced for viscous liquids.

Dosing time

Time during which dosing is to be carried out. This parameter is only displayed for **Dosing criterion = Volume/Dosing time** or **Dosing rate/Dosing time**.

Range	0 ... 9999999 s
Default value	100 s

Pause

Waiting period before dosing is started.

Range	0 ... 999999 s
Default value	0 s

Temperature

Measuring temperature which can be entered manually. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor to automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction during monitoring with pH measurements.

Titrand, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Titrandu, 855

Range	0.1 ... 999999 s
Default value	5.0 s

Titrimo

Range	1 ... 999999 s
Default value	5 s

5.6.6.3.4.4 DOS pH - Stop conditions

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the dosing are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the dosing.

Stop volume

Stops when the given volume has been added after the start of the dosing. The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

off

Means that no stop will take place.

Titirino

Range	0 ... 9999.99 mL
Default value	100.00 mL
Selection	off

off

Means that no stop will take place.

Stop time

Stops when the preset time has elapsed since the start of the dosing.

Range	0 ... 999999 s
Selection	off
Default value	off

off

Means that no stop will take place.

Filling rate

Rate at which the dosing cylinder is to be filled after dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrando, 855

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	maximum mL/min

**Note**

The filling rate should be reduced for viscous liquids.

5.6.6.3.4.5 DOS pH - Monitoring

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **Monitoring**

Command name

Name of the command.

Input	25 characters

The following monitoring processes can be switched on and defined on this tab:

Monitoring Measured value**Monitoring Measured value**

on | off (Default value: **off**)

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit pH

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

<i>Titrand, 855</i>	
Range	-20.000 ... 20.000
Default value	-20.000

<i>Titrimo</i>	
Range	-20.00 ... 20.00
Default value	-20.00

Lower hysteresis pH

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value, then the event **Measured value lower limit ok** is triggered.

<i>Titrande, 855</i>	
Range	0 ... 20.000
Default value	20

Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

<i>Titrande, 855</i>	
Range	-20.000 ... 20.000
Default value	20.000

<i>Titrino</i>	
Range	-20.00 ... 20.00
Default value	20.00

Upper hysteresis pH

The upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit ok** will be triggered.

<i>Titrande, 855</i>	
Range	0 ... 20.000
Default value	20

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrand) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **DOS** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Temperature**Monitoring Temperature**

on | off (Default value: **off**)

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

Titrandos, 855

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	-170.0 °C

Lower hysteresis

Lower hysteresis of the temperature. When the temperature once again exceeds the lower limit by this hysteresis value, the action **Temperature lower limit ok** is triggered.

Titrandos, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C



Upper limit

Upper limit of the temperature. When the temperature exceeds this value, the action **Temperature upper limit exceeded** is triggered.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	150.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	500.0 °C

Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

Titrando, 855

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrando) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **DOS** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is once again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

In this table, which cannot be edited directly, max. 20 entries can be defined for the track that is to be started automatically when a particular limit is exceeded

Opens the dialog window **Track call** in which the parameters for a new track call can be entered (*see Chapter 5.6.6.3.3, page 1026*).

Opens the dialog window **Track call** in which the parameters for the selected track call can be edited (see Chapter 5.6.6.3.3, page 1026).

Deletes the track call selected in the table.

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **Additional measured values**

Name of the command.

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.9.1, page 838*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.9.1, page 838*).

Parameters

The parameters for the command **DOS U** are configured in the following 5 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
Parameters for the dosing settings.
- *Stop conditions*
Definition of conditions which cause the stop of the dosing.
- *Monitoring*
Definition of measured value and temperature monitoring.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DOS U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL

Identification	Description
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point in the measuring point list in $\mu\text{g}/\text{min}$ (KFC)
.LP.EXx	External value $\times$ (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.TITER	Titer value of the solution used for the command

Identification	Description
.VOL	Dosed volume

5.6.6.3.5.2 DOS U - General/Hardware

Tab: **Method** ▶ **DOS U** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the dosing device to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Titirino

Selection	internal D0

736, 751, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

Tandem dosing

on | off (Default value: **off**)

If this option is enabled, then dosing will proceed continuously with two dosing devices in combination. The second dosing device is dosing while the first one is being filled and vice-versa. This parameter is displayed only for Titrados and 855.

Dosing device

Selection of the second dosing device (exchange or dosing unit) to be used for the dosing if the first dosing device is not available.

Titrandu

Selection	1 2 3 4
Default value	2

855

Selection	1 2 3
Default value	2

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

Titrande, 855

Selection	Solution name not defined
Default value	not defined

not defined

No tests will be carried out.

Filling rate

Speed with which the dosing cylinder of the second dosing device is to be refilled. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.

Titrande, 855

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Sensor

Measuring input

Selection of the measuring input to which the sensor is connected.

Titrande

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Titrino

Selection	1 2 diff.
Default value	1

Sensor

Selection of a sensor of type pH electrode, **metal electrode**, **pH electrode** or **ISE electrode** from the list of sensors defined in the sensor table. The calibration data for the sensor will be adopted for pH and ISE electrodes.

Selection	Sensor name pH electrode Metal electrode ISE electrode
Default value	Metal electrode

Temperature measurement

Type of temperature measurement.

Titrando, 855

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855

Selection **1** | **2** | **3** | **4** | **off**

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandu, 855

Range	-15 ... 15
Default value	8

on | off (Default value: **on**)

Switch on/off automatically

on | off (Default value: **on**)

5.6.6.3.5.3 DOS U - Dosing parameters

Name of the command.

Selects the two parameters that can be preset for dosing. The third parameter is calculated automatically from the formula **Volume = dosing time * dosing rate** and is not shown (*see Chapter 5.6.6.3.2, page 1023*).

Fixed volume that is to be dosed. This parameter is only displayed for **Dosing criterion = Volume/Dosing rate** or **Volume/Dosing time**.

Rate at which dosing should take place. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value. This parameter is only displayed for **Dosing criterion = Volume/Dosing rate** or **Dosing rate/Dosing time**.

Titrande, 855

Range	0.1 ... 999999 s
Default value	5.0 s

Titrimo

Range	1 ... 999999 s
Default value	5 s

5.6.6.3.5.4 DOS U - Stop conditionsTab: **Method ▶ DOS U ▶ Properties... ▶ Stop conditions****Command name**

Name of the command.

Input	25 characters

The conditions for stopping the dosing are defined on this tab. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the dosing.

Stop volume

Stops when the given volume has been added after the start of the dosing. The stop volume should be adapted to suit the measuring vessel size.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

Titrimo

Range	0 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Range	0 ... 999999 s
Selection	off
Default value	off

off

Stops when the preset time has elapsed since the start of the dosing.

Filling rate

Rate at which the dosing cylinder is to be filled after dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing device used. If the entered filling rate is too high for the selected dosing

device, it will automatically be reduced during dosing to the largest possible value.

Titrando, 855

Range	0.01 ... 166.00 mL/min
Default value	maximum mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	maximum mL/min



Note

The filling rate should be reduced for viscous liquids.

5.6.6.3.5.5 DOS U - Monitoring

Tab: **Methods** ▶ **DOS U** ▶ **Properties...** ▶ **Monitoring**

Command name

Name of the command.

Input	25 characters

The following monitoring processes can be switched on and defined on this tab:

Monitoring Measured value

Monitoring Measured value

on | off (Default value: **off**)

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

Titrandu, 855

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	-2000 mV

Lower hysteresis

Lower hysteresis of the measured value. If the measured value exceeds the lower limit by this hysteresis value, then the event **Measured value lower limit ok** is triggered.

Titrande, 855

Range	0.0 ... 2000.0 mV
Default value	2.0 mV

Upper limit

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	2000 mV

Upper hysteresis

The upper hysteresis of the measured value. If the measured value once again falls below the upper limit by this hysteresis value, then the event **Measured value upper limit ok** will be triggered.

Titrande, 855

Range	0.0 ... 2000.0 mV
Default value	2.0 mV

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrande) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrande)

The running **DOS** command is quit, then the next command is executed.

Titrando, 855

Range	-20.0 ... 150.0 °C
Default value	150.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	500.0 °C

Upper hysteresis

Upper hysteresis of the temperature. When the temperature once again falls below the upper limit by this hysteresis value, the action **Temperature upper limit ok** is triggered

Titrando

Range	0.0 ... 150.0 °C
Default value	0.2 °C

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrando) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **DOS** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is once again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is exceeded.

[New]

Opens the dialog window **Track call** in which the parameters for a new track call can be entered (see Chapter 5.6.6.3.3, page 1026).

[Properties]

Opens the dialog window **Track call** in which the parameters for the selected track call can be edited(see Chapter 5.6.6.3.3, page 1026) .

[Delete]

Deletes the track call selected in the table.

5.6.6.3.5.6 DOS U - Additional measured values

Tab: **Methods ▶ Commands ▶ DOS U ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.9.1, page 838).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (see Chapter 5.6.3.9.1, page 838).

[Delete]

Deletes the calculated measured value selected in the table.

Additional external measured values**Additional external measured values**

on | off (Default value: **off**)

If this option is enabled, then a maximum of 3 new measured values can be taken over and saved from existing measuring commands (i.e. **MEAS**) which can also be displayed in curves under the designation **Extern 1...3** and used in formulas as variables '**Command name.EX1...3**'-

[New]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.9.2, page 839*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.9.2, page 839*).

[Delete]

Deletes the external measured value selected in the table.

5.6.6.4 LQH**5.6.6.4.1 LQH - Overview**

Dialog window: **Method ▶ LQH ▶ Properties... ▶ LQH - 'Command name'**

Command for **complex dosing tasks** with a Dosino dosing device (700 or 800).

Devices

This command can be executed with the following devices equipped with a Dosino 700/800:

Titrandos: 808, 809, 835, 836, 841, 842, 857, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

pH/Ion Meter: 867

Sample Processor: 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the dosing device to be used for the liquid handling tasks. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789, 814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made

of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

5.6.6.4.3 LQH - Parameters

Tab: **Method** ▶ **LQH** ▶ **Properties...** ▶ **Parameters**

Command name

Name of the command.

Input	25 characters

The liquid handling function is defined on this tab.

Function

Selection of the liquid handling function that is to be carried out.

Selection	Dosing Fill Aspirate Eject to stop Eject to end volume Exchange position Change port Compensate
Default value	Dosing

Dosing

The given volume is added. No automatic filling takes place either before or after the command.

Fill

Fill the cylinder can take place from a freely selectable port. The valve disc then remains at the selected port.

Aspirate

With this function, liquid is aspirated from the given port. As with Dosing, the cylinder is not filled automatically beforehand or afterwards. It should be possible to achieve the volume to be aspirated with a single piston stroke.

Eject to stop

With this function, the entire cylinder content is ejected via the specified port. The piston is lowered to the stop point, i.e. past the maximum volume mark. This function should only be carried out to eject any air bubbles.

Eject to end volume

The whole cylinder content is ejected via the given port. In contrast to the function **Eject to stop**, the piston moves only to the maximum volume mark, i.e. until it has executed 10'000 pulses. This command should be used for pipetting functions for emptying the cylinder.

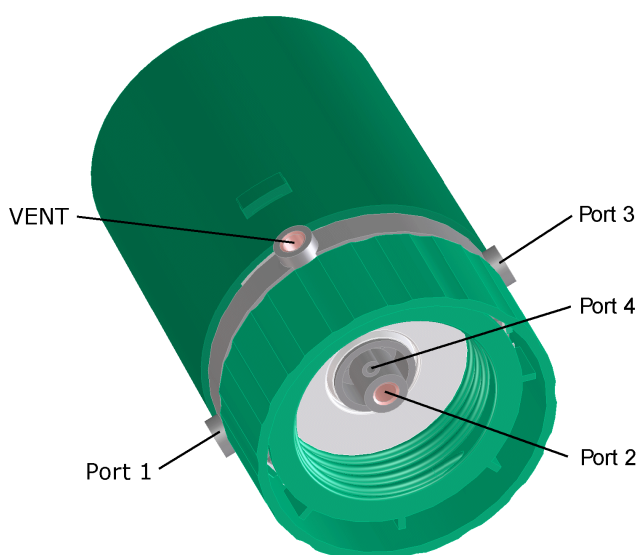
With this function the cylinder is filled via the given port first. The valve disc is then turned to **Port 2** and the dosing unit can be removed from the dosing drive.

With **Change port** the valve disc is only moved to the given port; no piston movement takes place.

As the dosing units are exchangeable, the coupling of the Dosino piston rod (spindle) has a low mechanical tolerance that can be noticed when the piston changes its direction of movement. This tolerance can be compensated for with the **Compensate** function. A short piston movement is first made in the same direction as the previous movement, which is then followed by a piston movement in the reverse direction.

The port where each function is to be carried out needs to be defined for each liquid handling command.

Selection	1	2	3	4
1	Default setting for Dosing and Aspirate			
2	Default setting for Fill, Exchange position and Change port			
4	Default setting for Eject to stop, Eject to end volume and Compensate			



Enter the volume to be moved. This parameter is available only for the **Functions Dosing** or **Aspirate**.

Dosing

Range	0.00000 ... 99999.9 mL
Default value	10.00000 mL

Aspirate

Range	0.00000 ... 50.0 mL
Default value	10.00000 mL

Rate

Speed at which the commands **Dosing**, **Fill**, **Aspirate**, **Eject** and **Exchange position** are carried out. The maximum rate depends on the cylinder volume of the exchange unit or dosing device used. **Aspiration** and **Ejection** of the sample should be done at a rate <10 mL/min.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

5.6.6.5 PREP

5.6.6.5.1 PREP - Overview

Dialog window: **Method** ► **PREP** ► **Properties...** ► **PREP - 'Command name'**

Command for **Rinsing cylinder and tubing** of an exchange or dosing unit.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrimo: 736, 751, 758, 799

Dosing Interface: 846**Conductometer:** 856

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **PREP** are configured in the following dialog window:

- *PREP - Properties*

Command variables

The following command variables are generated in the method run by the command **PREP** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.6.5.2 PREP - Properties

Dialog window **Method** ▶ **PREP** ▶ **Properties...** ▶ **PREP - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

Dosing device

Dosing device

Selection of the dosing device to be prepared. All the dosing device connections which are possible with the selected device type are displayed.

Titrandos, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789, 814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

730, 774

Selection	1 2 3 4 5 6 7 8 9 10 11 12
Default value	1

Titrimo

Selection	internal D0

736, 751, 758, 799

Selection	internal D0 external D1 external D2
Default value	internal D0

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

not defined
No tests will be carried out.

5.6.6.6.1 EMPTY - Overview

Command for **Emptying cylinder and tubing** of a dosing unit.

This command can be executed with the following devices:

Titrimo: 736, 751, 758, 799

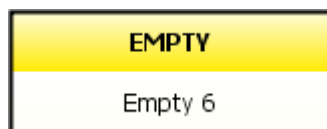
Dosing Interface: 846**Conductometer:** 856

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

The command has the following appearance:



The parameters for the command **EMPTY** are configured in the following dialog window:

- *EMPTY* - Properties

The following command variables are generated in the method run by the command **EMPTY** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.6.6.2 EMPTY - Properties

Dialog window: **Method** ▶ **EMPTY** ▶ **Properties...** ▶ **EMPTY** - 'Command name'

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the dosing device (Dosinos only) to be emptied. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	1 2 3 4
Default value	1

814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

730, 774

Selection	1 2 3 4 5 6 7 8 9 10 11 12
Default value	1

Titrimo

Selection	external D1 external D2
Default value	external D1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

Selection	'Solution name' not defined
Default value	not defined

not defined

No tests will be carried out.

■ *MOVE - Properties*

Command variables

The following command variables are generated in the method run by the command **MOVE** and can be used in formulas under the designation

'Command name.Variable designation':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended
.RAN	Current, absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when ending the command)
.RPO	Current rack position (entry at time of ending the command); 0 means ' not defined '
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)

5.6.7.2.2 **MOVE - Properties**

Dialog window: **Method ▶ MOVE ▶ Properties... ▶ MOVE - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Move = Rack position

Range	1 ... 999
Default value	1

Move = Special beaker (for 778, 789, 814, 815, 855, 864, 874)

Range	1 ... 16
Default value	1

Move = Special beaker (for 730)

Range	1 ... 8
Default value	1

Move = Special beaker (for 774)

Input	1

Move angle

This parameter specifies the angle by which the sample rack should be rotated relative to the current position. It is only visible for **Move = Relative angle**.

778, 789, 814, 815, 855, 864, 874

Range	-259.90 ... 259.90 °
Default value	5.00 °

Beaker test

Selection of the action to be carried out if the beaker sensor defined for the rack does not detect any beakers at the target position. If the **robotic arm** is selected as the beaker sensor, then a Swing Head must be installed. A work position also defined in the rack data must also be defined in such a way that a contact exists between beaker sensor and beaker. This work position will be approached automatically for beaker recognition after the command **MOVE**. This section is not visible when **Move = Relative angle**.

Selection	Display message Stop determination Stop determination and series
Default value	Display message

Display message

A message is displayed and the determination is stopped.

Stop determination

The determination is stopped and the next determination of the series is started.

Stop determination and series

The determination as well as the series are stopped. An Error track will be started if there is one defined.

Parameters

Shift rate

Selection of the speed at which the sample rack rotates.

Range	3 ... 20 °/s
Default value	20 °/s

Shift direction

Selection of the shift direction of the sample rack.

Selection	auto + -
Default value	auto

auto

The direction of rotation with the smallest angle of rotation is selected automatically.

+

Rack rotates counterclockwise.

Rack rotates clockwise.

Swing rate

Selects speed of the robotic arm when moving to a rack position or a special beaker (only with multiple row sample racks).

778, 789, 814, 815, 855, 864, 874	
Range	10 ... 55 %s
Default value	55 %s

5.6.7.3 SWING

5.6.7.3.1 SWING - Overview

Dialog window: **Method** ▶ **SWING** ▶ **Properties...** ▶ **SWING - 'Command name'**

Command for **swinging the robotic arm**. This command is only executable if the Sample Processor is equipped with a **786 Swing Head** with a robotic arm.

Devices

This command can be executed with the following devices:

Sample Processor: 778, 789, 814, 815, 855, 864

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SWING** are configured in the following dialog window:

- *SWING - Properties*

Command variables

The following command variables are generated in the method run by the command **SWING** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)
.SPO	Current external position (entry when ending the command); 0 means invalid position

5.6.7.3.2 SWING - Properties

Dialog window: **Method** ▶ **SWING** ▶ **Properties...** ▶ **SWING - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Range	1 ... 4
Default value	1

Swing angle

Angle by which the robotic arm is to be swung relative to the current position. This parameter is visible only when **Swing = Relative angle**.

Range	-180.0 ... 180.0 °
Default value	10.0 °

Parameters

Swing rate

Speed of the robotic arm when swinging to an external position or a particular angle.

Range	10 ... 55 °s
Default value	55 °s

5.6.7.4 LIFT

5.6.7.4.1 LIFT - Overview

Dialog window: **Method ▶ LIFT ▶ Properties... ▶ LIFT - 'Command name'**

Command for **moving to a Work position, Shift position, Rinse position and Special position** with a Sample Processor.

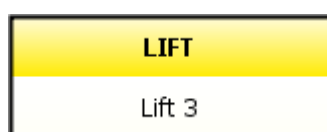
Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **LIFT** are configured in the following dialog window:

- *LIFT - Properties*

Command variables

The following command variables are generated in the method run by the command **LIFT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.LPO	Current absolute lift position in mm (entry when ending the command)

5.6.7.4.2 LIFT - Properties

Dialog window: **Method** ▶ **LIFT** ▶ **Properties...** ▶ **LIFT - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Target

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	1 2
Default value	1

Lift position

Entering the desired lift position in mm or selecting a lift position predefined for the rack **Work position**, **Shift position**, **Rinse position** or **Special position**. A lift height of 0 mm corresponds to the **Home position**. Here the lift is moved to the uppermost stop.

730, 778, 789, 814, 815, 855, 864

Range	0 ... 235 mm
Selection	Work position Shift position Rinse position Special position Home position
Default value	Work position

774

Range	0 ... 100 mm
Selection	Work position Shift position Rinse position Special position Home position
Default value	Work position

874

Range	0 ... 110 mm
Selection	Work position Shift position Rinse position Special position Home position
Default value	Work position



Note

Please make sure that none of the lift positions exceed the maximum stroke path given in the tower properties of the device.

Parameters

Lift rate

Selection of the speed for moving the lift.

778, 789, 814, 815, 855, 864, 874

Range	5 ... 25 mm/s
Default value	25 mm/s

730

Range	3 ... 25 mm/s
Default value	25 mm/s

774

Range	3 ... 12 mm/s
Default value	12 mm/s

5.6.7.5 PUMP

5.6.7.5.1 PUMP - Overview

Dialog window: **Method** ▶ **PUMP** ▶ **Properties...** ▶ **PUMP - 'Command name'**

Command for **controlling pumps** connected to or built into the Sample Processor.

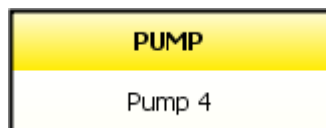
Devices

This command can be executed with the following devices:

Sample Processor: 730, 778, 789, 814, 815, 855, 864

Appearance

The command has the following appearance:



Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.7.5.2 PUMP - Properties

Dialog window: **Method ▶ PUMP ▶ Properties... ▶ PUMP - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

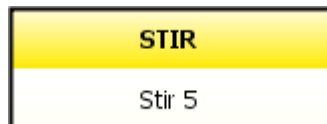
Pumps

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Robotic Titrosampler: 855

The command has the following appearance:



The parameters for the command **STIR** are configured in the following dialog window:

- *STIR - Properties*

The following command variables are generated in the method run by the command **STIR** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

Dialog window: **Methods** ▶ **STIR** ▶ **Properties...** ▶ **STIR - 'Command name'**

Name of the command.

Input	25 characters



Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Stirrer

Stirrer

on | off (Default value: **off**)

Selection of the stirrer.

<i>Titrande, 730, 846, 856, 867</i>	
Selection	1 2 3 4
Default value	1

<i>778, 789</i>	
Selection	T1 T2 (tower stirrer) 1 ... 3 (MSB stirrer)
Default value	T1

<i>814, 815, 855, 864, 874</i>	
Selection	1 2 3
Default value	1

<i>Titrimo, 756, 831</i>	
Selection	1

Stirrer type

Display of the stirrer type. **Unknown** is displayed either with devices unable to read out the stirrer type or if no stirrer is connected

Selection	801 Magnetic Stirrer 802 Rod Stirrer 803 Ti Stand magnetic stirrer 804 Ti Stand rod stirrer unknown

Stirring rate

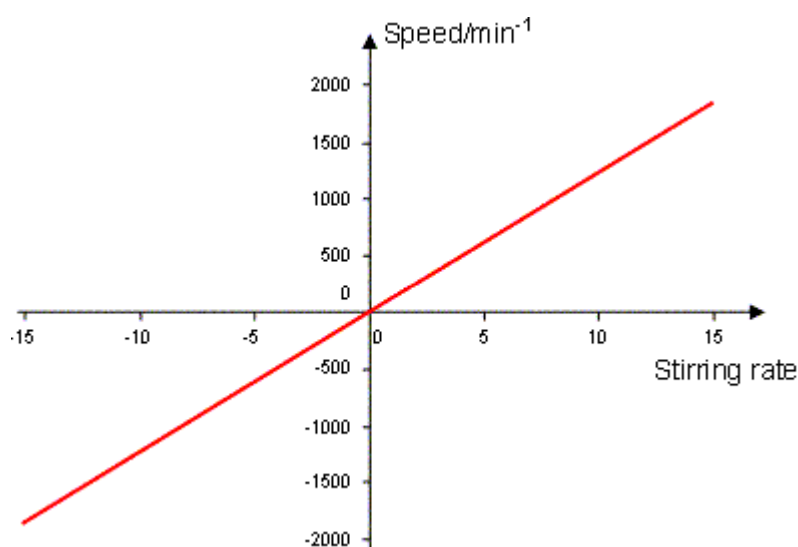
Setting the stirring rate or rotational speed. The algebraic sign of the stirring rate changes the direction in which the stirring is done. The default setting **8** corresponds to a stirrer speed of 1000 rpm.

Titrande, 814, 815, 846, 855, 856, 867, 864, 874

Range	-15 ... 15
Default value	8

730, 778, 789

Range	0 ... 15
Default value	8



Action

Selection	Switch on Switch off Period of operation
Default value	Switch on

Switch on

Switch on the stirrer. The stirrer keeps switched on after the command has finished.

Switch off

Switch off the stirrer.

5.6.7.7.2 RACK - Properties

Dialog window: **Method** ▶ **RACK** ▶ **Properties...** ▶ **RACK - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Rack test

on | off (Default value: **off**)

If this option is enabled, the rack attached will be checked to see that it is the correct one.

Test rack

Selection of the rack name for the rack which must be put on. In this way you can ensure that the method can only be carried out with this rack. If another sample rack is detected while executing the command, a message is displayed and an Error track will be started if there is one defined.

Selection	all sample racks listed in the configuration

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	774 Oven Sample Processor 874 Oven Sample Processor
Default value	874 Oven Sample Processor

Heater

Target temperature

Temperature to which the oven has to be heated. With **init.temp.** the oven heating is switched on at the same time as the device and the oven is heated up to this temperature. The initial temperature must be defined on the device itself and is displayed only in the device configuration.

Range	50 ... 250 °C
Selection	Initial temp.
Default value	Initial temp.



Note

It is advisable to define an initial temperature if you work always at the same temperature.

Heating time

The target temperature has to be reached within this time. The heating rate can be modified with the heating time in order to program temperature ramps or entire temperature profiles (with several **HEATER** commands).

Off causes heating at the maximum possible heating rate (see device manual).

Range	1 ... 999 min
Selection	off
Default value	off

Timeout

If the **Target temperature** is not reached within the defined **Heating time** then this waiting time will start. This parameter is only visible if a **Heating time** has been defined.

Range	1 ... 999 min
Selection	off
Default value	off

Action if timeout expires

on | off (Default value: **on**)

If this option is enabled, then an action can be defined which is to be carried out if the target temperature has not yet been reached after expiry of the maximum waiting time (is displayed only when **Timeout** ≠ **off**).

Selection	Display message Stop determination Stop determination and series
Default value	Display message

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it.

Stop determination

The determination is stopped and the next determination of the series is started.

Stop determination and series

Both the determination and the series are stopped and the (see Chapter 5.5.2.6, page 407) will be started (if available).

5.6.7.9 FLOW

5.6.7.9.1 FLOW - Overview

Dialog window: **Method** ► **FLOW** ► **Properties...** ► **FLOW - 'Command name'**

Command for **controlling the gas flow.**

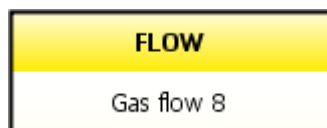
Devices

This command can be executed with the following devices:

Sample Processor: 774, 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **FLOW** are configured in the following dialog window:

- *FLOW - Properties*

Command variables

The following command variables are generated in the method run by the command **FLOW** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.7.9.2 FLOW - Properties

Dialog window: **Method** ► **FLOW** ► **Properties...** ► **FLOW - ' Command name'**

Command name

Name of the command.

Input **25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection **'Device name' | not defined**
Default value **not defined**

not defined

In this case, the device name must be assigned by the user at the start of the method.

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	774 Oven Sample Processor 874 Oven Sample Processor
Default value	874 Oven Sample Processor

Gas type of the carrier gas.

Selection	Air Nitrogen other gas
Default value	Air

Factor for the correct determination of the gas flow. This parameter is only visible for **Gas type = other gas**. The values for frequently used carrier gases are listed in the device manuals.

Range	0.001 ... 9.999
Default value	1.000

Selection of the inlet of the carrier gas

Selection	Pump Valve
Default value	Pump

Use of ambient air as carrier gas.

Use of gas out of a compressed gas cylinder.

874

Range	10 ... 150 mL/min
Default value	50 mL/min

Selection	Switch on Switch off
Default value	Switch on

Switch on
Switches on the gas flow.

Switch off
Switches off the gas flow.

5.6.8.1 Result commands - Overview

Commands for the **calculation, storage and output of results.**

The following four result commands can be selected:

- *CALC - Overview*
Calculation of intermediate and end results, titer values and common variables.
- *DATABASE - Overview*
Storage of the determination data in data bases.
- *REPORT - Overview*
Output of a report defined by a report template.
- *EXPORT - Overview*
Export of determination data.

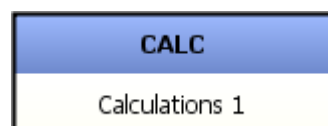
5.6.8.2.1 CALC - Overview

Dialog window: **Method** ► **CALC** ► **Properties...** ► **CALC - 'Command name'**

Command for the **calculation of intermediate and end results** and the assignment of titer values and common variables.

Appearance

The command has the following appearance:



Result table

All defined results are displayed in the Result table in the properties window of the command **CALC**.

Identification	Description
.OVF	Limit value violation for result; 1 = limit exceeded, 0 = limit not exceeded
.RSD	Relative standard deviation for the result
.STS	Statistics status for the result; 1 = Statistics on, 0 = Statistics off
.UNI	Result unit (Text)

5.6.8.2.2 CALC - Result table

Dialog window: **Method** ► **CALC** ► **Properties...** ► **CALC 'Command name'**

Command name

Name of the command.

Input **25 characters**



Moves the selected result up (changes the sequence).



Moves the selected result down (changes the sequence).

[New]

Opens the dialog window **New result** in order to select a new template (see Chapter 5.6.8.2.3, page 1094).

[Properties]

Opens the dialog window **Result - 'Result name'** in order to edit the properties of the result selected in the table (see Chapter 5.6.8.2.5.1, page 1096).

[Delete]

Deletes the result selected in the table.

[Templates]

Opens the dialog window **Manage templates** in order to delete or rename result templates (see Chapter 5.6.8.2.6.1, page 1101).

Table

Up to 25 results can be defined in the **CALC** command which are displayed in the results table. The table, which cannot be edited directly, contains the following information about the results:

Result name	Name of the result.
Formula	Calculation formula of the result.
Device	Result unit.
Decimal places	Number of decimal places of the result.
Assignment	Assignment of the result to one of the 25 result columns in the determination overview.
Statistics	Display whether the statistics calculation for the result is switched on or off.
Result monitoring	Display whether the monitoring for the result is switched on or off.

5.6.8.2.3 **CALC - New result**

Dialog window **Method ▶ CALC ▶ [New] ▶ New result**
A template for the new result can be selected in this dialog window.

Templates

Selection of a result template as the basis for a new result.	
Selection	'Result template' Empty
Default value	Empty
'Result template' Loads a saved result template. Pressing [Next >>] causes the dialog window Formula Assistant to open (see Chapter 5.6.8.2.4, page 1095).	
Empty Loads an empty result template. Pressing [Next >>] causes the dialog window Result - 'Result name' to open afterwards (see Chapter 5.6.8.2.5.1, page 1096).	

Description

Displaying the description of the selected result template.

5.6.8.2.4 CALC - Formula assistant

Dialog window **Method** ▶ **CALC** ▶ **[New]** ▶ **New resultat** ▶ **Formula-Assistent**

Existing determination templates can be adapted quickly in this dialog window to the required command drawings.

Formula

Display of the calculation formula of the result. In this formula, only the variable identifications themselves will be listed for command variables, and not the command designations.

Select command

All of the variables of the formula template will be listed which are generated by a command.

'Variable'

Assignment of the command to variables.

Selection	'Command name'
'Command name'	Selection of a command suitable for the variable which is already present in the method.

[Filling command variables]

Transfer of command names of the selected variable to all command variables. Command names that were already entered will be overwritten.

Select method variable

All of the method variables of the formula template will be listed.

'Variable'

Selection of the method variable.

Selection	'Method variable'
'Method variable' Selection of a method variable defined in the method.	

Select common variable

All of the common variables of the formula template will be listed.

'Variable'

Selection of the common variable.

Selection	'Common Variable'
'Common Variable' Selection of one of the common variables defined in the configuration.	

Device

Unit of the result for the output (text only). The unit can be used in further calculations as variable '**RS.Result name.UNI**'.

Input	16 characters
Selection	empty ppm % g/L mg/L mg/mL mg/100 g mol/L mmol/L mL µL g mg µg °C s mV µA S/cm mS/cm µS/cm µL/min
Default value	empty

Decimal places

Number of decimal places for the output of the calculated result. This parameter is ignored for results of the type **text** or **date/time**.

Range	0 ... 5
Default value	2

Assignment

Assignment of the result to one of the 25 possible result columns **RS01 ... RS25** in the determination overview into which the result is entered.

Selection	RS01 ... RS25 first unallocated result variable none
Default value	first unallocated result variable

none

The result will be assigned to no result column and displayed only in the subwindow **Results**.



Note

The assignments **RS01 ... RS25** can be used repeatedly in various **CALC** commands. If this is the case, then only the last result calculated will be entered in the assigned result column. By doing this it is possible either to display alternative results calculated in different **CALC** commands in the same result column or to use the same report template.



Caution

If the same **Assignment** is reused in several **CALC** commands with different **Result names**, then only the most recently calculated result will be saved in the determination. All other results are either no longer available or invalid if used in other formulas!

Statistics

on | off (Default value: **on**)

Mean value, absolute and relative standard deviations are calculated for the result if this option is enabled. Statistical calculations are only carried out if statistics is also activated in the **START** command and in the Run window.

Description

Freely selectable entry of a description of the result.

Input	1024 characters

[Save as template]

Open the dialog window **Save result template** in order to save the result parameters as template for the creation of new results (*see Chapter 5.6.8.2.6.2, page 1102*).

5.6.8.2.5.2 Result - Monitoring

Tab: **Method** ▶ **CALC** ▶ **Properties...** ▶ **[New]** ▶ **[Continue]** ▶ **Result - Monitoring**

The parameters for monitoring the result are defined on this tab.

Result monitoring

Result monitoring

on | off (Default value: **off**)

The question of whether the result is within the defined limit values is monitored while calculating the result during the determination if this option is enabled.

Lower limit

Lower limit for the result.

Input	10 digits

Upper limit

Upper limit for the result.

Input	10 digits

Message

Message

The message defined here can be put out to different targets if the upper limit is exceeded or if the lower limit is not reached. The text editor for entering or changing the message is opened with  or by double-clicking

Input	Text (unlimited)

Selection	Stop determination Stop determination and series
Default value	Stop determination



Stop determination

The determination is stopped and the next determination of the series is started.

Stop determination and series

The current determination and the series are terminated.

[Save as template]

Open the dialog window **Save result template** in order to save the result parameters as template for the creation of new results (*see Chapter 5.6.8.2.6.2, page 1102*).

5.6.8.2.5.3 Result - Options

Tab: **Method** ▶ **CALC** ▶ **Properties...** ▶ **[New]** ▶ **[Continue]** ▶ **Result - Options**

The assignment of the result to a common variable and/or titer can be activated on this tab.

Save result as common variable

on | off (Default value: **off**)

The result will be saved under the selected name as common variable if this option is activated (*see Chapter 6.8.1, page 1260*). In all cases, only the single value for this result will be saved as a common variable, even if the statistics are enabled for this result.

Name

The result is saved as new value for this common variable.

Selection	List of all the common variables defined



Note

As long as no common variable has been defined, the combo box will be empty. The creation of common variables is described in the configuration (see Chapter 6.8.1, page 1260).



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 reuse the altered value in a different formula. For this you should use Method variables (*see Chapter 2.4.3.2, page 30*).

Appearance

The command has the following appearance:



Parameters

The parameters for the command **DATABASE** are configured in the following dialog window:

- *DATABASE - Properties*
All the defined databases in the list of databases are displayed in the properties window of the command **DATABASE**.

Command variables

The following command variables are generated in the method run by the command **DATABASE** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.8.3.2 DATABASE - Properties

Dialog window: **Method ► DATABASE ► Properties... ► DATABASE - 'Command name'**

Command name

Name of the command.

Input **25 characters**

List of databases

A **DATABASE** command can define more than one database in which the determination data are stored which are available for the execution of the **DATABASE** command. If several databases are defined, the determination is stored with the same determination ID in each database.



Database

Name of the database in which the determination data is stored.

[New]

Opens the dialog window **Database - New** for the selection of a new database.

[Properties]

The dialog window **Database - 'Database name'** in which a different database can be selected.

[Delete]

Deletes the database selected in the list.



Note

The **DATABASE** command has to be executed at the end of the method sequence in order to guarantee that all data of a determination are stored. If the method contains an exit track, it would be best to insert the **DATABASE** command at the end of this track.

5.6.8.4 REPORT

5.6.8.4.1 REPORT - Overview

Dialog window: **Method** ▶ **REPORT** ▶ **Properties...** ▶ **REPORT - 'Command name'**

Command for the **output of determination data.**

Appearance

The command has the following appearance:



Parameters

The parameters for the command **REPORT** are configured in the following dialog window:

- *REPORT - Properties*



Note

A **REPORT** command must always be placed before a **DATABASE** command, because otherwise the command data (e.g., the report template used) will not be stored and no reprocessing will be possible.

Command variables

The following command variables are generated in the method run by the command **REPORT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.8.4.2 REPORT - Properties

Dialog window: **Method** ► **REPORT** ► **Properties...** ► **REPORT - 'Command name'**

Command name

Name of the command.

Input	25 characters

Report template

Report template

Selecting the predefined Report template which the report should be generated with.

Selection	'Report templates'

Report output

Printer

on | off (Default value: **on**)

The report is printed on the selected printer if this option is activated.

Selection	'Printer name' Default printer
Default value	Default printer
	The report will be printed on the default printer defined for the client.

Identifi- cation	Description
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.8.5.2 EXPORT - Properties

Dialog window: **Method ▶ EXPORT ▶ Properties... ▶ EXPORT - 'Command name'**

Command name

Name of the command.

Input **25 characters**

Export template

Export template

List box with saved export templates with which the determination data is to be exported (*see Chapter 4.4.4.1, page 245*).

Selection **'Export template'**

5.6.9 Communications commands

5.6.9.1 Communication commands - Overview

Menu item: **Method ▶ Paste ▶ New command... ▶ Communication**

Commands for communications within the program or with external devices.

The following Communications commands can be selected:

- *CTRL*
Setting remote output lines.
- *SCAN*
Scanning remote input lines.
- *SEND*
Sending event messages
- *RECEIVE*
Waiting for event messages or status messages.
- *TRANSFER*
Data transfer via RS-232 to external devices.
- *WEIGH*
Call up of a weight from a balance.

Identification	Description
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.9.2.2 CTRL - Properties

Dialog window: **Method ▶ CTRL ▶ Properties... ▶ CTRL - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Remote box

Selection of a remote box attached to the device.

Titrandos, 855, 856, 867, 814, 815, 864, 874

Selection	1 2 3 4
Default value	1

**Note**

For Titrinos with 3 output lines: only the first 3 characters are used.

5.6.9.3 SCAN**5.6.9.3.1 SCAN - Overview**

Dialog window: **Method** ► **SCAN** ► **Properties...** ► **SCAN** - 'Command name'

Command for **scanning remote input lines**.

Devices

This command can be executed only with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrim: 702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798, 799

Dosing Interface: 846

Coulometer: 756, 831

Conductometer: 856

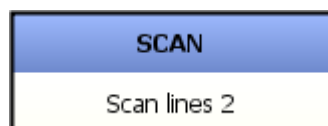
pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrator: 855

Appearance

The command has the following appearance:

**Parameters**

The parameters for the command **SCAN** are configured in the following dialog window:

- *SCAN - Properties*

Command variables

The following command variables are generated in the method run by the command **SCAN** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.TOU	Timeout status: 1 = Max. waiting time expired; 0 = Max. waiting time not expired

5.6.9.3.2 SCAN - Properties

Tab: **Method** ▶ **SCAN** ▶ **Properties...** ▶ **SCAN - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Remote box

Selection of the remote box at which the lines are to be scanned.

Titrande, 856, 867, 814, 815, 855, 864, 874

Selection	1 2 3 4
Default value	1

Scan lines

Input signal

Input of the binary pattern for the expected input signal or selecting a pre-defined signal pattern.

It is possible to enter the following characters:

0 = line deactivated

1 = line activated

***** = any line status

Selection	Bit-pattern with 8 characters (0, 1, *) ***** Signal pattern
Default value	*****

The bits are numbered from right to left:

Input 7 6 5 4 3 2 1 0

Bit 7 6 5 4 3 2 1 0

Example:

*******1** expects an active input line 0 (**1** = set). For example, this line is set by a Titrimeter after a titration has been completed and the Titrimeter 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 (Default value: **off**)

If this option is activated, then a maximum waiting time can be entered for the input signal.

Range	0 ... 9999.9
Default value	10

Selection	min s
Default value	s



Opens the dialog window **Send event message** for entering a new event message (see *Chapter 5.6.9.4.3, page 1115*).

Opens the dialog window **Send event message** to edit the event message selected in the table (see Chapter 5.6.9.4.3, page 1115).

Deletes the selected event message.

Dialog window: **Method ▶ SEND ▶ Properties... ▶ [New]/ [Properties] ▶ Send event message**

Selection of the type of recipient.

Selection of the recipient address. All of the command names already defined in the method are available for **Recipient Command**. This field is empty and cannot be edited for **Recipient System**.

Selection of the event message to be sent. The following event messages can be selected depending on the type of recipient:

Recipient	Selection	Event message	Significance
Command	SET, KFT, KFC	Start Titration	Start titration. For this, the option Only start titration by a start command from a SEND command must be enabled on the Conditioning tab for the titration command (Example: KFT).



Note

In order that the event message from the **SEND** command can be handled by the **RECEIVE** command, the **RECEIVE** command must be running and at the same time be able to process the message being sent. If, for example, a **SEND** command in track A should start a **KFT** command in track B by means of **Start titration**, then track B must be running and the conditioning in the **KFT** command must already be finished (= **Cond ok**) at the time that the **SEND** command is being executed. Otherwise the command **Start titration** would be discarded without a message.

Comment

Comment on the event message

Input	250 characters
Default value	'empty'

5.6.9.5 RECEIVE

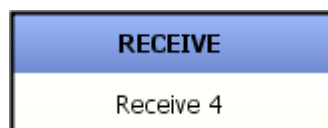
5.6.9.5.1 RECEIVE - Overview

Dialog window: **Method** ► **RECEIVE** ► **Properties...** ► **RECEIVE - 'Command name'**

Command for **awaiting event messages or status messages** produced by commands.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **RECEIVE** are configured in the following dialog window:

- RECEIVE - Properties

Command variables

The following command variables are generated in the method run by the command **RECEIVE** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.TOU	Timeout status: 1 = Max. waiting time expired; 0 = Max. waiting time not expired

5.6.9.5.2 RECEIVE - Properties

Dialog window: **Method ▶ RECEIVE ▶ Properties... ▶ RECEIVE - 'Command name'**

Command name

Name of the command.

Input	25 characters

Wait for event/status

Selection	Wait until all conditions are met Wait until one of the conditions is met
Default value	Wait until all conditions are met

Wait until all conditions are met

Waits until **all** conditions listed in the table below are fulfilled.

Wait until one of the conditions is met

Waits until **one** of the conditions listed in the table below is fulfilled.

[New]

Opens the dialog window **Wait for event/status** for entering a new event message which is to be waited for (*see Chapter 5.6.9.5.3, page 1119*).



Note

A maximum of 10 event messages can be entered.

[Properties]

Opens the dialog window **Wait for event/status** to edit the event message selected in the table which is to be waited for (*see Chapter 5.6.9.5.3, page 1119*).

[Delete]

Deletes the selected event message.

Timeout

on | off (Default value: **off**)

If this option is activated, then a maximum waiting time for event messages can be entered. If none of the conditions defined above are fulfilled after this time period, the command is canceled and the next command in the sequence is executed.

Value

Range	0 ... 9999.9
Default value	0

Unit

Selection	min s
Default value	s

Message

This message is displayed in the live window while waiting for the condition defined above. The text editor for entering or changing the message is opened with  or by double-clicking into the text field.

5.6.9.5.3 RECEIVE - Wait for event/status

Dialog window: **Method ▶ RECEIVE ▶ Properties... ▶ [New]/[Properties] ▶ Wait for event/status**

Command

Name of the command whose event message or status is to be waited for.

Selection	Command

Event message

Selection of the event message to be waited for, or of the status to be waited for. The following event messages and statuses can be selected.

Selection	Event message Start
Default value	Start



Parameters

The parameters for the command **TRANSFER** are configured in the following dialog window:

- *TRANSFER - Properties*

Command variables

The following command variables are generated in the method run by the command **TRANSFER** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.TOU	Timeout status: 1 = Max. waiting time expired; 0 = Max. waiting time not expired

5.6.9.6.2 TRANSFER - Properties

Dialog window: **Method ▶ TRANSFER ▶ Properties... ▶ TRANSFER - 'Command name'**

Command name

Name of the command.

Input **25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection **'Device name' | not defined**
 Default value **not defined**

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types RS-232 device
Default value	RS-232 device

Transfer commands

The **Transfer commands** defined in the dialog window are sent in the sequence in which they are listed. The table cannot be edited directly.



Note

10 transfer commands can be entered at maximum.



Moves the selected command up (changes the sequence).



Moves the selected command down (changes the sequence).

[New]

Opens the dialog window **Transfer command** for entering a new transfer command (see *Chapter 5.6.9.6.3, page 1123*).

[Properties]

Opens the dialog window **Transfer command** for editing the transfer command selected in the table (see *Chapter 5.6.9.6.3, page 1123*).

[Delete]

Deletes the selected transfer command.

Timeout

on | off (Default value: **off**)

If this option is activated, then a maximum waiting time can be entered. If not all transfer commands have finished after this time period, the command is canceled and the next command is started.

Range	0 ... 9999.9
Default value	1

Selection	min s
Default value	s

5.6.9.6.3 TRANSFER - Transfer command

Dialog window: **Method** ▶ **TRANSFER** ▶ **Properties...** ▶ **Transfer command**

Name

Freely definable name for the transfer command.

Input	50 characters

Action

Selection	Read Write Wait for Poll
Default value	Read

Read

The character string defined in **Command** (optional) will be sent to the device and the answer of the device is expected within the **Timeout** defined for the device settings and evaluated.

Write

The character string defined in **Command** (optional) will be sent to the device

Wait for

The character string defined in **Command** (optional) will be sent to the device, after which there is a waiting period until a received character string corresponds to the regular expression in **Comparison**. If this answer is not received within the **Timeout** defined in the command, then the command is canceled.

Poll

The character string defined in **Command** (optional) will be sent to the device; an answer is expected from the device and evaluated within the **Timeout** defined for the device settings. This action will be repeated until the answer of the device is identical to the regular expression in **Comparison**. If this answer is not received within the **Max. waiting time** defined in the command, then the command is canceled.

Command

Character string to be sent to the device. Details can be obtained from the documentation for the respective device.

Input	250 characters



Note

All ASCII characters can be entered with its two-digit hex code after backslash (e.g. **\1B = Escape**).

Variable

Selection of an available method variable under which the received data for the **Actions Read**, **Wait for** and **Scan** will be saved. Method variables must be defined in the **START** command for this purpose which are not permitted to be assigned to any system variables.

Selection	Method variables



Note

It is also possible to create several indexed variables (e.g. **Input1**, **Input2**, ...) in order to save the character substrings produced by regular expressions directly in the different variables.

Example

Variable = MV.Input1

Comparison = (\d+\.\d+),(\d+\.\d+)

Two measured values separated by a semicolon are filtered out of a random, received character string and saved in the two variables

MV.Input1 and **MV.Input2**.

Comparison

Entry of a character string which should be compared to the data received by one of the **Actions Read, Wait for** and **Scan**. In this field so-called **Regular Expressions** can be entered. You can use these exactly defined search patterns to interpret the received character strings and save contents from this strings in a method variable. Regular Expressions are widely used in computer science (operating systems UNIX or LINUX, script languages PERL, etc.) and are standardized to a great extent. *tiamo* uses **Extended Regular Expressions** in accordance with **Java 2 Platform SE v1.4.2** to their full extent (for details, see e.g. http://en.wikipedia.org/wiki/Regular_expression).

Input	100 characters

Examples for Regular Expressions:

Expression	Significance	Example

[abc]	OR function for single characters	receive a or b or c
[a-z0-9]	one character in the specified range	m or 5
(hallo)	substring	string contains hallo
^hallo	start of line	hallo is at start of line
hallo\$	end of line	hallo is at end of line
.	any single character	a or 4 or - or ...
\.	point	.
\d	one digit	3
\d+	several digits	324567
\d{4}	four digits	3143
\D	not one digit	A or ! or ...
\w	a digit or a letter	a or 3
\W	neither digit nor letter	! or .
.*	any character string	abcd or 41 or -\$=\$ or ...

Any combination of regular expressions is possible.



Note

Open and close brackets must be set in the field **Comparison** in any case in order to save the received data in a variable. Therefore, to save a complete character string in a variable, the expression **(.*)** must be entered in the field Comparison.

5.6.9.7 WEIGH

5.6.9.7.1 WEIGH - Overview

Dialog window: **Method** ▶ **WEIGH** ▶ **Properties...** ▶ **WEIGH - 'Command name'**

Command for **calling up the weight from a balance**.

Appearance

The command has the following appearance:



Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	AND Mettler Ohaus Precisa Sartorius Shimadzu
Default value	Precisa

Weighing command

Instructions

Character string that is sent via the RS-232 interface.

<i>AND</i>	
Input	S
<i>Mettler</i>	
Input	S
<i>Ohaus</i>	
Input	1S
<i>Precisa</i>	
Input	P1
<i>Sartorius</i>	
Input	\1bP
<i>Shimadzu</i>	
Input	ID08

Max. waiting time

Maximum time during which the balance data is waited for.

Value

Range	0.0 ... 9999.9
Default value	1

Device

Selection	min s
Default value	min

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.10.2.2 REQUEST - Properties

Dialog window: **Method** ► **REQUEST** ► **Properties...** ► **REQUEST - Data input #**

Command name

Name of the command.

Input **25 characters**

Sample data request

The sample types that are not to be entered until after the determination starts can be selected in the dialog window **REQUEST - Data input #**. The dialog window **Sample data request**, in which the sample parameters selected in the command are to be queried, appears in the method run during the execution of the command. The run is stopped until the input is confirmed.



Note

If the **run should not be stopped** (for example for back-weighing in KF titrations), the **REQUEST** command must be inserted in a track other than the one with the titration command with the option **Return immediately**.

Sample position

on | off (Default value: **off**)

If this option is enabled, then the position of the sample on the rack will be queried.

ID1 ... ID16

on | off (Default value: **off**)

If this option is enabled, then the sample identifications **ID1 ... ID16** will be requested. If other names were assigned to these variables in the **START** command, these names will be displayed in the dialog window **Sample data request**.



Note

Text is selected as type in the default settings for the sample identifications **ID1 ... ID16**. If you wish to enter numbers for these method variables for use in later calculations, then these variables must be switched in the dialog window **Method variable - Sample position** to the type **number**. **START ► Properties... ► Method variables ► [Properties] ► Method variables - Sample position**

Sample size

on | off (Default value: **off**)

If this option is switched on, then the sample size will be queried.

Sample size unit

on | off (Default value: **off**)

If this option is switched on, then the sample size unit will be queried.

Message

on | off (Default value: **off**)

If this option is enabled, then the message defined here will appear in the dialog window **Sample data request** in which the sample data is queried during the method run (*see Chapter 5.6.10.2.3, page 1131*). The text editor

for entering or changing the message is opened with  or by double-clicking into the text field (see Chapter 2.5.2, page 81).

Input	Text (unlimited)



Note

In the event the option **Comments on modification of sample data (live)** is enabled in the **Security settings**, the dialog window **Modification comment sample data** will be displayed after the sample data is entered, where a **Comment** and a **Reason** for the modification must be entered.

5.6.10.2.3 REQUEST - Sample data request

Dialog window: **Workplace** ► **[START]** ► **Sample data request**

Message

Displaying the message defined in the command **REQUEST**.

Sample position

Position of the sample on the Sample Processor rack. This number can be used for moving to a sample position with the command **MOVE** when **Target position = Sample position**.

Range	1 ... 999
Default value	1

ID1 ... ID16

Sample identifications.

Type = Number

Range	-1.0E-99 ... 1.0E+99

Type = Text

Input	max. 100 characters

Type = Date/Time

Selection	'YYYY-MM-DD' or 'YYYY-MM-DD hh:mm:ss'



Note

If the sample identifications are still invalid at the start of the method and are not entered until the time of the **REQUEST** command during the run, then the option **Check at start** in the **START** command must be **switched off** for these method variables.

Sample size

Sample size (initial weight).

Input	1 ... 10 digits.
Default value	1

Device

Unit of sample size.

Selection	g mg µg mL µL pcs
Default value	g



Note

Sample data can be loaded directly from a **balance** or a **barcode reader**. The **data import** must be enabled for this purpose in the Run window in which the determination is started (**Single determination** or **Determination series**) and the corresponding devices must be defined. The dialog window **Sample data request** will be closed automatically after the data has been received from these devices.



Note

In the event the option **Comments on modification of sample data (live)** is enabled in the **Security settings**, the dialog window **Modification comment sample data** will be displayed after the sample data is entered, where a **Comment** and a **Reason** for the modification must be entered.

5.6.10.3 CALL

5.6.10.3.1 CALL - Overview

Dialog window: **Method** ▶ **CALL** ▶ **Properties..** ▶ **CALL - 'Command name'**

Command for **calling tracks**. Optionally a condition can be defined which needs to be fulfilled in order to execute the **CALL** command.

Appearance

The command has the following appearance:

CALL	
	Call 2
▶	Call text Track 6
▶	Call text Track 7

Each command can include to 10 call-ups.

Parameters

The parameters for the command **CALL** are configured in the following dialog window:

- *CALL*

The following command variables are generated in the method run by the command **CALL** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

CALL - Properties

Dialog window: **Method** ▶ **CALL** ▶ **Properties...** ▶ **CALL - Call #**

Command name

Name of the command.

Input	25 characters

Call table

All the defined calls listed in the table are carried out simultaneously. The table cannot be edited directly.



Note

The **CALL** command waits for either the end of the tracks called or the acknowledgement signal of them. If the completion of a track is not to be waited for, the option **Return immediately** must be activated in the corresponding track command (*see Chapter 5.6.2.3, page 422*).

[New]

Opens the dialog window **Call** to enter a new call (see Chapter 5.6.10.3.3, page 1134).



Note

10 calls can be defined at maximum.



[Properties]

Opens the dialog window **Call** to edit the call selected in the table (see *Chapter 5.6.10.3.3, page 1134*).

[Delete]

Deletes the selected call.

5.6.10.3.3 CALL - Call

Dialog window: **Method** ▶ **CALL** ▶ **Properties...** ▶ **[New]**

Call text

Text (can be edited to suit) for designating the call that is shown in the command presentation.

Input	50 characters
Default value	'empty'

Track name

Selecting the track to be called. All the normal tracks defined in the method can be selected (with the exception of the main track).

Selection	'Track name' 'empty'
Default value	'empty'

Condition

on | off (Default value: **off**)

Expression for the condition(s) which can be created or edited with the formula editor after pressing on  or double-clicking in the text field (see *Chapter 2.4, page 26*).

If this check box is activated, then the call will be carried out only if the evaluation of the condition gives the result **1** (= true).

Input	1000 characters
Default value	'empty'

5.6.10.4 LOOP

5.6.10.4.1 LOOP - Overview

Dialog window: **Method ▶ LOOP ▶ Properties.. ▶ LOOP - 'Command name'**

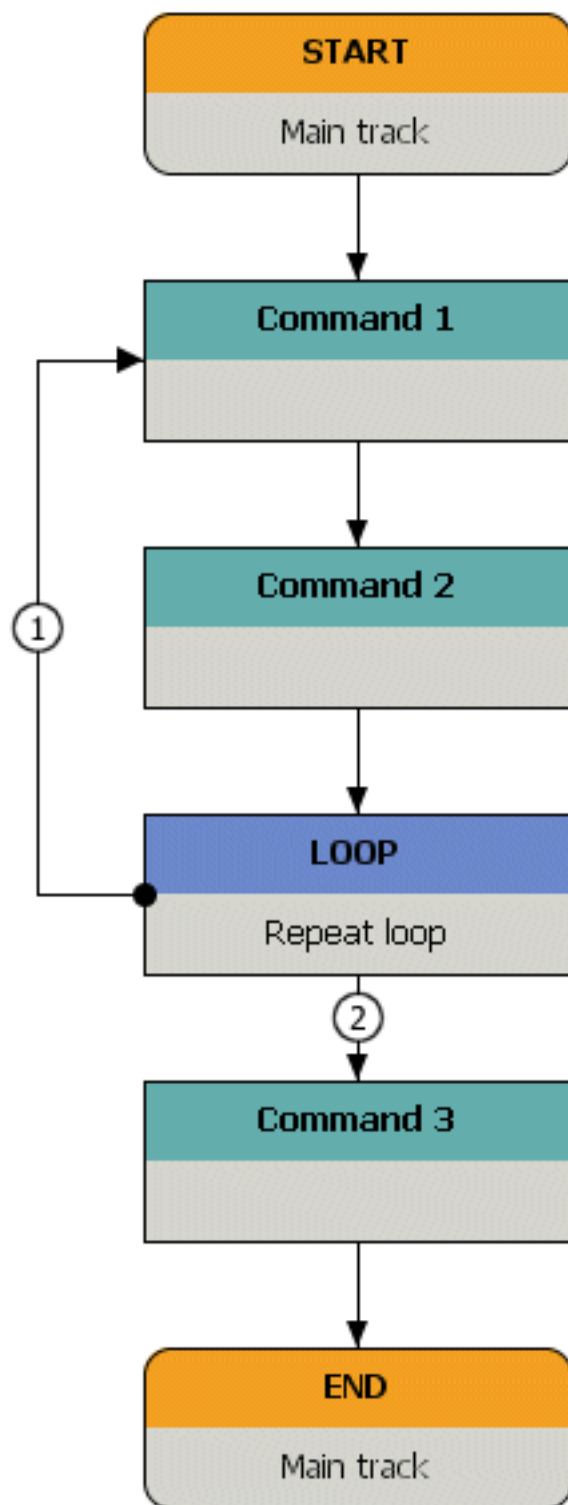
Command for the **repeated execution of a command sequence**. The loop can be terminated after fulfilling various stop criteria.

Appearance

The command has the following appearance:



Repeat loop



- ① Stop criterion not fulfilled
- ② Stop criterion fulfilled

The LOOP command is at the end of the loop for **Repeat loops**. As soon as one stop criterion is fulfilled (case 2), the command after the LOOP command is carried out. If no stop criterion is fulfilled, (case 1), the loop is run through again. In either case, the loop is run through at least once.

The LOOP command is at the beginning of the loop for **While loops**. If the arrow has been dragged to a command after the LOOP command, another arrow is automatically set from the previous command back to the LOOP command. As soon as one stop criterion is fulfilled (case 2), the command after the loop is carried out. If no stop criterion is fulfilled, (case 1), the loop is run through. It is possible with certain stop criteria that the loop is never run through.



Note

Nested and overlapping loops are not allowed.

Parameters

The parameters for the command **LOOP** are configured in the following dialog window:

- *LOOP*

Command variables

The following command variables are generated in the method run by the command **LOOP** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.LCO	Loop counter = current quantity of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (Date/Time)

5.6.10.4.2 LOOP - Properties

Dialog window: **Method** ▶ **LOOP** ▶ **Properties...** ▶ **LOOP - Loop #**

Command name

Name of the command.

Input	25 characters

Stop criteria

Definition of three possible stop criteria. The first stop criterion to be fulfilled will stop the loop.

Maximum run number

on | off (Default value: **on**)

If this option is enabled, then the maximum number of runs will be used as stop criterion by repeat and while loops. If the maximum number of runs is reached, the loop will be canceled at the time the LOOP command is started again.

Range	0 ... 999
Default value	1

Maximum run time

on | off (Default value: **off**)

If this option is enabled, then the maximum run time will be used as stop criterion by repeat and while loops. The starting point for the run time is the first start of the loop command, which means that the run time for While loops is started only after the loop has been run through once. If the maximum run time is reached, the loop will be canceled at the time the LOOP command is started again.

Range	0 ... 999.9
Selection	min s
Default value	min



Note

The run time is paused if the method is stopped with **[HOLD]**.

Condition

on | off (Default value: **off**)

If this option is enabled, then the condition defined here will be used as stop criterion by repeat and while loops.

The input field contains the expression for the condition(s) which can be created or edited with the formula editor after pressing on  or double-clicking in the text field (see Chapter 2.4, page 26). If the condition is fulfilled (evaluation of the formula gives the result **1** = true), then the loop will be canceled when the LOOP command is called.

Input	1000 characters
Default value	'empty'

5.6.10.5 WAIT

5.6.10.5.1 WAIT - Overview

Dialog window: **Method** ► **WAIT** ► **Properties...** ► **WAIT** - 'Command name'

Command for halting the method run and for output of **messages**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **WAIT** are configured in the following dialog window:

- *WAIT*

Command variables

The following command variables are generated in the method run by the command **WAIT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once , 0, invalid (variable not available) = Command has never been ended

on | off (Default value: **off**)

on | off (Default value: **off**)

on | off (Default value: **off**)

Paste

Use this context-sensitive menu item to paste the commands at the end of the table that were copied onto the clip board.

6.1.3 Configuration - Menu bar

6.1.3.1 Configuration - Main menu

Program part: **Configuration**

The menu bar in the program part **Configuration** includes the following main menu items:

- *File*
Export, import, backup, restore configuration data.
- *View*
Changes layout, load view, save view, quick access to subwindows.
- *Tools*
User administration, security settings, program administration, Audit Trail, templates, options.
- *Help*
Opens program help, display program information.

6.1.3.2 Configuration - Menu File

Program part: **Configuration**

Export...	Exports configuration data (<i>see Chapter 6.3.1.1, page 1174</i>).
Import...	Imports configuration data (<i>see Chapter 6.3.1.2, page 1176</i>).
Backup ►	
Automatically	Backup of configuration data automatically (<i>see Chapter 6.3.2.1, page 1179</i>).
Manual	Backup configuration data manually (<i>see Chapter 6.3.2.2, page 1180</i>).
Print (PDF)... ►	
PDF User administration	Outputs user administration data as PDF file (<i>see Chapter 6.2.1.1, page 1152</i>).
PDF Security settings	Outputs security settings as PDF file (<i>see Chapter 6.2.2.1, page 1161</i>).
 Logout...	Logs out user (<i>see Chapter 2.2.3, page 19</i>).
Exit	Ends program.

6.1.3.3 Configuration - Menu View

Program part: **Configuration**

 Change layout...	Modifies layout of loaded configuration view (<i>see Chapter 3.1.7.2, page 90</i>).

6.1.4 Configuration - Toolbar

Program part: **Configuration**

 Change layout...	Modifies layout of loaded configuration view (<i>see Chapter 3.1.7.2, page 90</i>).
 Load view...	Loads a saved configuration view (<i>see Chapter 3.1.7.3, page 91</i>).
 Save view	Saves current configuration view (<i>see Chapter 3.1.7.4, page 91</i>).
 User administration...	Manages users and groups of users with access rights, signature rights and options (<i>see Chapter 6.2.1.1, page 1152</i>).
 Security settings...	Options for login, password protection, Audit Trail and electronic signature (<i>see Chapter 6.2.2.1, page 1161</i>).
 Audit Trail...	Opens Audit Trail (<i>see Chapter 6.4, page 1192</i>).
 Logout	Logs out user (<i>see Chapter 2.2.3, page 19</i>).
 tiamo Help	Opens tiamo Help.

6.1.5 Configuration - Subwindows

Program part: **Configuration**

Selection

The following subwindows can be displayed in the main window:

- *Devices*
Shows the automatically recognized and manually added devices.
- *Titriments/Solutions*
Shows the data for the automatically recognized and manually added titriments and auxiliary solutions.
- *Sensors*
Shows the data for all defined sensors.
- *Common variables*
Shows the data for all defined common variables.
- *Sample solution (TC conductivity)*
Display of the data for the calculation of the temperature coefficient of a sample solution by means of the Chebyshev function
- *Rack data*
Shows the data for all Metrohm sample racks.



Presentation

The subwindows can be enlarged or made smaller to suit by dragging the separating bar between the windows.

By clicking on the button  top right, the subwindows can be maximized so that only one subwindow is displayed in the main window. The original view of all subwindows is restored when the  button in the maximized subwindow is clicked on again.

Via the menu item **View ► Quick access...** subwindows that are not in the current configuration view can be shown as a single window.

6.1.6 Configuration - Functions

Program part: **Configuration**

In the program part **Configuration** the following functions can be carried out:

Views

- *Change the layout of the configuration view*
- *Load configuration view*
- *Save configuration view*
- *Rename configuration view*
- *Delete configuration view*

User administration

- *Manage user groups*
- *Access rights*
- *Signatures*
- *Options*
- *Users*

Security settings

- Login/Password protection
- Audit Trail/Changes
- Electronic signature
- Default reasons

Program administration

- Backup directories
- Clients
- Licenses

Export/Import of configuration data

- *Export configuration data*
- *Import configuration data*

Backup/Restore configuration data

- Backup configuration data automatically
- Backup configuration data manually
- Restore configuration data

Templates

- Custom calibration buffers
- Input lines
- Output lines

Options

- *General program properties*

6.1.7 Views

6.1.7.1 Views - General

Program part: **Workplace / Database / Configuration**

Definition

The term **View** defines the contents and design of the main window in the program parts **Workplace**, **Database** and **Configuration**. The following elements belong to a view:

- Number, arrangement, sequence and size of the subwindows.
- Representation within the individual subwindows, i.e. column sequence, column width, sorting and filter.

Functions

The following functions are possible for views:

- *Change layout*
Defines the number, arrangement and sequence of the subwindows for the current view.
- *Save view*
Save current view.
- *Load view*
Load view saved.
- *Rename view*
Rename view saved.
- *Delete view*
Delete view saved.

Automatic save

If under **Options** on the **Save** tab the respective points under **Save on closing** is switched on then the current view of the program will be saved automatically.



Move the selected subwindow upward (modifies sequence).



Move the selected subwindow downward (modifies sequence).

6.1.7.3 Load view

Dialog window: **Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view**

With the symbol  or the menu item **View ► Load view...** the dialog window **Load view** is opened.

Name

Name of the view that should be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

6.1.7.4 Save view

Dialog window: **Workplace / Database / Configuration ▶ View ▶ Save view... ▶ Save view**

With the symbol  or the menu item **View ► Save view...** the dialog window **Save view** is opened.

Name

Name under which the view is to be saved.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

Saves the view under given name. The saved views are globally valid and available for client/server systems.

Each user group, with the exception of the **Removed users** group, contains the following items:

- ## Functions

- *Add user groups*
- *Copy user groups*
- *Rename user groups*
- *Delete user groups*
- *Define access rights for user groups*
- *Define signature rights for user groups*
- *Define options for user groups*
- *Add user*
- *Set start password for new user*
- *Deactivate user*
- *Activate user*
- *Remove user*

6.2.1.2.1 User groups - Details

If a user group is selected in the left-hand side of the **User administration** dialog window then details of this user group will be shown on the right-hand side together with a table containing all its members.

Group name

Description

Input	256 characters



[Rename group]

Renames selected user group.

[Delete group]

Deletes selected user group.

[Copy group]

Copies selected user group.

[Add group]

Adds new user group.

User group members

The table showing the group members contains information about all members of the selected user group. The table can neither be edited nor sorted.

User

Short name of the user.

Full name

Full name of the user.

Status

Current user status.

Selection	activated deactivated
activated	The user can log in as usual.
deactivated	The user can no longer log in. The Administrator must first assign him/her the status activated and provide a new Start password.

[Add user]

Adds new user to user group.

6.2.1.2.2 User administration - Access rights

Dialog window: **Configuration ▶ Tools ▶ User administration**

If in the left-hand part of the dialog window **User administration** the item **Access rights** is marked for a user group then the access rights of this group for program parts, menu items and functions will be shown in tree-form in the right-hand side of the window and can be 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 deactivated for the particular user, i.e. shown in gray.

Meaning of the symbols:

	Enlarge view	P	Program part
	Reduce view	M	Menu item
	Full access to function(s)	F	Function
	Limited access to function(s)		
	No access to function(s)		



Note

In the **Administrators** group all access rights are switched on as standard and cannot be altered.

6.2.1.2.3 User administration - Signatures

Dialog window: **Configuration ▶ Tools ▶ User administration**

If in the left-hand part of the dialog window **User administration** the item **Signatures** is marked for a user group, then the rights of this group will be shown in the right-hand part and can be altered there.



Note

For the version **tiamo light** these rights cannot be edited as no signatures are possible.

Permissions for methods

Signature Level 1

If this option is switched on then users in this user group can electronically sign methods at Level 1.

Selection	off on
Default value	off

Signature Level 2 (lock)

If this 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.

Selection	off on
Default value	off

Delete signatures Level 2

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.

Selection	off on
Default value	off

Permissions for determinations

Signature Level 1

If this option is switched on then users in this user group can electronically sign determinations at Level 1.

Selection	off on
Default value	off

Signature Level 2 (lock)

If this 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.

Selection	off on
Default value	off

Delete signatures Level 2

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.

Selection	off on
Default value	off

Permissions for Audit Trail

Delete records

If this option is switched on then users in this user group can confirm the deletion of Audit Trail entries with their signature.

Selection	off on
Default value	off



Note

In the **Administrators** group all signature rights are switched on as standard, but they can also be switched off.

Executable methods

Only methods with Signature Level 2

If this option is switched on, then only methods with Signature Level 2 can be started at the workplace by users in this user 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.

6.2.1.2.6 Copy user group

Dialog window: **Configuration** ▶ **Tools** ▶ **User administration** ▶ **[Copy group]** ▶ **Copy group**

Dialog window:

In order to copy a user group and save it under a new name, an existing group must be selected and either the context-sensitive menu item **Copy group** or the **[Copy group]** button must be pressed. This opens the dialog window **Copy group**.

Group name

Name of new group.

Input	24 characters

With **[OK]** a new group is generated under this name with same properties (access rights, signature rights, etc.) as the selected group; it does not contain any users. The **Description** field and the table of group members are empty.

6.2.1.2.7 Rename user group

Dialog window: **Configuration** ▶ **Tools** ▶ **User administration** ▶ **[Rename group]** ▶ **Rename group**

In order to rename a selected user group either the context-sensitive menu item **Rename group** or the **[Rename group]** button must be pressed. This opens the dialog window **Rename group**.

Group name

Enter the new group name.

Input	24 characters

6.2.1.2.8 Delete user group

Function: **Configuration** ▶ **Tools** ▶ **User administration** ▶ **[Delete group]**

In order to delete a selected user group either the context-sensitive menu item **Delete group** or the **[Delete group]** button must be pressed. The group is then deleted.



Note

It is only possible to delete a user group when the group no longer contains any users.

new start password when adding a new user or after a change in status to **activated**. If the user has logged in with the start password and then entered a new password, then the start password is deleted again.

Input	24 characters

[Set start password]

Opens the dialog window **Start password**. This button is enabled only for users with the status **activated**. If a user has forgotten his/her password then the Administrator can issue a new start password here.

User group

Current user group. The Administrator can modify the group 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.

Selection	Selection of the defined user group

Remarks

Optional entry of additional information for the user (e.g. function, address).

Input	1000 characters

6.2.1.3.2 Add user

Dialog window: **Configuration ▶ Tools ▶ User administration ▶ [Add user] ▶ Add user**

There are two ways of adding a new user:

- Select user group and the context-sensitive menu item **Add user**.
- Select user group and press the **[Add user]** button.

In both cases this opens the dialog window **Add user**.

User

Short name of new user that must be used to log in at program start. After the name has been entered a **Start password** must be issued with which the user is entered in the list of users.

Input	24 characters

6.2.1.3.3 Set start password

Dialog window: **Configuration** ▶ **Tools** ▶ **User administration** ▶ **[Set start password]** ▶ **Set start password**

Using the **[Set start password]** button in the dialog window **User administration** a start password can be issued for the selected user. It is enabled only for newly added users or for those who have once again achieved **activated** status. The dialog window **Start password** opens:

Start password

Enter a new start password. Password options are not used for the start password.

Input	25 characters

Confirm password

Confirms the start password.

Input	25 characters

6.2.2 Security settings

6.2.2.1 Security settings

Dialog window: **Configuration ► Tools ► Security settings**

Overview

In the dialog window **Security settings** the parameters for log-in, password protection, Audit Trail and electronic signatures can be configured. These are primarily used to ensure that work is carried out in accordance with the requirements of FDA Guideline 21 CFR 11.



Note

The version **tiamo light** cannot be configured to be in conformance with FDA guidelines. With the exception of the parameter **User name required** on the tab **Login/Password protection** all the options are inactive (*see Chapter 6.2.2.2, page 1162*).

With client/server systems the security settings are globally valid for all connected clients.

Security settings can be exported and imported. This means that these settings can be exchanged between different client/server systems.

The security settings can be put out as PDF file using the menu item **File ► Print (PDF) ► Security settings**.

Tabs

The security settings are configured on the following tabs:

- *Login/Password protection*
Settings for login and password protection.
- *Audit Trail/Changes*
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 modifying methods, determinations and sample data.

6.2.2.2 Login/Password protection

Tab: **Configuration ▶ Tools ▶ Security settings ▶ Login/Password protection**

On the tab **Login/Password protection** is defined whether the user must log in with his/her name or with name and password, and how the password is to be monitored and constructed.

Settings according to 21 CFR 11

[Set]

Sets the parameters to default settings for FDA-compliant work.

Login policies

Enforce long with user name

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 required and the user name logged in under Windows will be adopted. All subsequent parameters are deactivated in such cases.

Selection	on off
Default value	off
	FDA default: on

Enforce login with password

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 deactivated.

Selection	on off
Default value	off
	FDA default: on

Password monitoring by tiamo

If this option is **switched on** then the password will be monitored by **tiamo** according to the following parameters.

Selection	on off
Default value	off
	FDA default: on

Password monitoring by Windows

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 deactivated.

Selection	on off
Default value	off FDA default: off



When using password monitoring through Windows, to avoid an unwanted login by the standard defined user **Guest** in Windows, this must also either be provided with a password or (preferably) be deactivated.



If this option is switched on, the user name in Windows and **tiamo** must correspond with each other otherwise the user in **tiamo** cannot log in any more. In order to ensure this, the dialog window **Test Login** appears after this option has been selected in which the logged-in user must register with his or her Windows password. If this test login fails, then the dialog window **Security settings** will open.



With Windows 2000, proceed as follows for password monitoring by Windows:

1. Run/Execute "secpol.msc".
2. Under "Local Policies/User Rights Assignment", switch on the guideline "Act as part of the operating system" for all desired user groups.
3. Restart computer.

Maximum number of login attempts

If this option is **switched on** then a user will be given the status **deactivated** as soon as the number of incorrect login attempts defined here has been exceeded. A user with the status **deactivated** can no longer start the program. The counter for incorrect attempts is reset to zero for all users at each new start.

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. For running determinations the new user name applies immediately (Audit Trail entries, Save, Export, etc.).



Inactivity delay

If this option is **switched on** then the dialog window for signing will be automatically closed when the entered time limit has expired.

Selection	on off
Default value	off FDA default: on
Range	1 ... 60 min
Default value	10 min FDA default: 10 min

Remove password after signature

If this option is **switched on** then the password must be entered again after each signature.

Selection	on off
Default value	off FDA default: on

Sign each determination separately

If this option is **switched on** then each determination contained in the determination overview must be signed individually.

Selection	on off
Default value	off FDA default: on

6.2.2.5 Default reasons

Tab: **Configuration** ▶ **Tools** ▶ **Security settings** ▶ **Default reasons**

On the tab **Default reasons** the reasons are defined that have to be entered when methods and determinations have to be signed for, or when methods, determinations and sample data are altered.

Category

Selection of the category for which the reasons are to be defined.

Selection	Signature Level 1 Signature Level 2 Modification of methods Modification of determination Modification of sample data
Default value	Signature Level 1

Reasons

Shows the reasons defined for the selected category.

Input	50 characters



Moves text upward (alters sequence).



Move text downward (alters sequence).

[New]

Adds a new reason.

[Edit]

Edits the selected reason.

[Delete]

Deletes the selected reason.

6.2.2.6 Send E-mail

Tab: **Configuration** ▶ **Security settings** ▶ **Login/Password protection** ▶ **[E-Mail...]** ▶ **Send E-mail**

E-mail address

E-mail address of the receiver.

Input	200 characters

Subject

Title for describing the message.

Input	200 characters

Message

The message defined here will be transmitted as an E-mail if the maximum permitted number of incorrect attempts at login is exceeded.

The Text editor for entering or changing the message is opened with  or by double-clicking into the text field.

Selection	Text (unlimited)

Sender

E-mail address

E-mail address of the sender.

Input	200 characters

SMTP server

Address of SMTP mail server.

Input	200 characters

Port

Port number of the SMTP mail server.

Range	1 ... 65536
Default value	25

Authentication

on | off (Default value: **off**)

Check box for activating the authentication of the sender when sending the E-mail or selection of the authentication method.

Selection	SMTP SMTP after POP
Default value	SMTP

POP server

Address of POP mail server.

Input	200 characters

Port

Port number of the POP mail server.

Range	1 ... 65536
Default value	110

User

Name of the user for access to mail server. The name need not agree with the Windows user name.

Input	200 characters

Password

Password for access to the mail server. This password does not necessarily have to be identical to the Windows password.

Input	200 characters

6.2.3 Program administration

6.2.3.1 Program administration

Dialog window: **Configuration ▶ Tools ▶ Program administration**

Overview

In the dialog window **Program administration** backup directories and licenses can be managed.

Tabs

The parameters for program administration are defined on the following tabs:

- *Backup directories*
List of the defined backup directories.
- *Clients*
List of computers on which **tiamo** is installed.
- *Licenses*
List of installed licenses with number of clients. This tab is only shown on the server of a client/server installation.

6.2.3.2 Backup directories

6.2.3.2.1 Backup directories

Tab: **Configuration** ▶ **Tools** ▶ **Program administration** ▶ **Backup directories**

Table with the defined backup directories. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The directory **Default backup directory** is generated during installation.



Note

The following buttons are activated only when **tiamo** is running on the server; they are deactivated for the individual clients.

[New]

Adds a new backup directory (see *Chapter 6.2.3.2.2, page 1172*).

[Edit]

Edits the selected backup directory (see *Chapter 6.2.3.2.3, page 1172*).

[Delete]

Deletes the selected backup directory.



Note

The **Default backup directory** cannot be deleted.

6.2.3.2.2 Create new backup directory

Dialog window: Configuration ▶ Tools ▶ Program administration ▶ Backup directories ▶ [New] ▶ New backup directory

Name

Name for the backup directory.

Input

50 characters

Directory

Entry or selection (with ) of the path for the backup directory.

Input

1000 characters



Note

If the backup directory is on a network drive the saving date should be added manually to the **Backup name** because the saving date information is not available when the directory is restored.



Note

Make sure that you have read and write access rights on the selected directory.

6.2.3.2.3 Edit backup directory

Dialog window: Configuration ▶ Tools ▶ Program administration ▶ Backup directories ▶ [Edit] ▶ Edit backup directory

Name

Name for the backup directory.

Input

50 characters



Note

The **Default backup directory** generated during installation cannot be renamed.

Directory

Entry or selection (with ) of the path for the backup directory.

Input

1000 characters



Note

6.2.3.3 Clients

Table with information about the computers on which **tiamo** is installed. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.

Shows the ID for the client that has been entered for the client/server installation.

Shows the name of the computer on which the client has been installed.

Shows whether **tiamo** has been started (**activated**) or not (**deactivated**).



6.2.3.4 Licenses

Table with the licenses that are installed on the server (for **tiamo multi**) or local server (for **tiamo light** and **tiamo full**). The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.



Note

In client/server systems this tab is only visible on the server and only for members of the **Administrators** user group.

License code

Shows the entered license code.

Number of licenses

Shows the number of clients to have been enabled with the license code.

[Add licenses]

Adds new, additional licenses. The dialog window **Add licenses** opens.

License code

Entry of the license code.

6.3 Configuration data

6.3.1 Export/Import

6.3.1.1 Export configuration data

Dialog window: **Configuration** ► **File** ► **Export...** ► **Export configuration data**

With **File ► Export...** the dialog window **Export configuration data** opens, in which the following parts of the configuration database can be selected for export:

Devices

on | off (Default value: **on**)

Exports configuration data for devices (see *Chapter 6.5.1, page 1207*).

Titrants/Solutions

on | off (Default value: **on**)

Exports configuration data for titrants and solutions (see Chapter 6.6.2.1, page 1214).

Sensors

on | off (Default value: **on**)

Exports configuration data for sensors (see [Chapter 6.7.2.1, page 1237](#)).



Buffer data

on | off (Default value: **on**)

Exports configuration data for custom buffers (see "Buffer table", page 1182).

Conductivity standards

on | off (Default value: **on**)

Exports configuration data for conductivity standards (see *Chapter 6.3.3.4.1, page 1186*).

E-mail templates

on | off (Default value: **on**)

Exports saved E-mail templates (see Chapter 6.3.3.5, page 1187).

Security settings

on | off (Default value: **on**)

Exports saved security settings (see *Chapter 6.2.2.1, page 1161*).

User administration

on | off (Default value: **on**)

Exports saved user administration (see *Chapter 6.2.1.1, page 1152*).

[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 **.mcfq**.

6.3.1.2 Import configuration data

Dialog window: **Configuration ▶ File ▶ Import... ▶ Import configuration data**

With **File ► Import...** and after selection of the file ***.mcfg** to be imported, the dialog window **Import configuration data** opens, in which the following parts of the configuration database can be selected for import:



Note

Data that is not present in the export file cannot be selected.

Devices**on | off** (Default value: **on**)Imports configuration data for devices (*see Chapter 6.5.1, page 1207*).**Titrants/Solutions****on | off** (Default value: **on**)Imports configuration data for titrants and solutions (*see Chapter 6.6.2.1, page 1214*).**Sensors****on | off** (Default value: **on**)Imports configuration data for sensors (*see Chapter 6.7.2.1, page 1237*).**Common variables****on | off** (Default value: **on**)Imports configuration data for common variables (*see Chapter 6.8.1, page 1260*).**Rack data****on | off** (Default value: **on**)Imports configuration data for sample changer racks (*see Chapter 6.10.1, page 1276*).**Sample solutions (TC conductivity)****on | off** (Default value: **on**)Imports the configuration data for calculating the temperature coefficients of sample solutions (*see Chapter 6.9.2, page 1269*).**Configuration views****on | off** (Default value: **on**)Imports saved configuration views (*see Chapter 3.1.7.1, page 89*).**Workplace views****on | off** (Default value: **on**)Imports saved workplace views (*see Chapter 3.1.7.1, page 89*).**Database views****on | off** (Default value: **on**)Imports saved database views (*see Chapter 3.1.7.1, page 89*).



Result templates

on | off (Default value: **on**)

Imports saved result templates (see [Chapter 5.6.8.2.6.1](#), page 1101).

Control chart templates

on | off (Default value: **on**)

Imports saved control card templates (see Chapter 4.4.2.1, page 235).

Curve overlay templates

on | off (Default value: **on**)

Imports saved curve overlay templates (see Chapter 4.4.3.1, page 239).

Buffer data

on | off (Default value: **on**)

Imports configuration data for custom buffers (see "Buffer table", page 1182).

Conductivity standards

on | off (Default value: **on**)

Imports configuration data for conductivity standards (see Chapter 6.3.3.4.1, page 1186).

E-mail templates

on | off (Default value: **on**)

Imports saved E-mail templates (see Chapter 6.3.3.5, page 1187).

Security settings

on | off (Default value: **on**)

Imports security settings (see [Chapter 6.2.2.1, page 1161](#)).

User administration

on | off (Default value: **on**)

Imports user administration (see *Chapter 6.2.1.1, page 1152*).

[OK]

The selected data is imported.



6.3.2.2 Backup configuration data manually

Dialog window: **Backup ► Configuration ► File ► Manually ► Backup Configuration**
File Manually

Backup target

Backup directory

Selection of a pre-defined backup directory (see *Chapter 6.2.3.2.1, page 1171*).



Note

Make sure that you have read and write access rights on the selected directory.

Backup name

Selection of an existing name for the backup file or entry of a new name. If an existing backup file is selected it will be overwritten.

Input	50 characters
Selection	Backup names



Note

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

[Start]

Start manual backup of complete configuration database (including method groups and methods).

6.3.2.3 Restore configuration data

Dialog window: **Restore configuration data**

Procedure

Proceed as follows to restore a configuration database that has been backed up manually or automatically:

1 Exit tiamo

- **tiamo light, tiamo full**
Exit **tiamo**.

- 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.

- Start **ConfigRestore.exe** in the program directory ...\\tiamo\\bin on the server.

The dialog window **Restore configuration data** opens.

3

Select the required backup data in the dialog window **Restore configuration data** and then click on **[Start.]**

Dialog window "Restore configuration data"

Backup directory

Selection of a directory predefined in the Program administration that contains the backed up configuration database.

Selection	Backup directories

Backup name

Selection of a backup file.

Selection	Backup files

Backup date

Shows the time at which the configuration database was backed up. If the backup file is located on a network drive, this information is not available.

Database name

Shows the name of the configuration database. If the backup file is located on a network drive, this information is not available.

Size

Shows the size of the configuration database in KB.

Save as

Name under which the configuration database will be restored.



[Start]

Starts the recovery of the configuration database. After the start, a progress bar appears in the window. When the backup has been completed, the dialog window closes automatically.

6.3.3 Templates

6.3.3.1 Template - Custom calibration buffer

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Custom calibration buffer**

You can define 5 of your own calibration buffers for pH calibration with automatic buffer recognition in the dialog window **Custom calibration buffers**. This buffer series is globally valid and can be selected as buffer type **Custom** in the command **CAL LOOP pH**. The dialog window consists of 5 identical tabs for the 5 buffers.

Buffer table

The buffer table shows the defined pH values for the calibration buffers in 5°C increments. The table can neither be edited nor sorted.

[Edit]

The dialog window **Change pH value** opens (see below).

[Delete All]

All the pH values of the selected buffer will be set to **off**.

Dialog window "Change pH values"

In the dialog window **Change pH values** you can edit the pH values for the buffer selected in the buffer table.

Temperature

Selects the temperature for which the pH value is to be edited.

Range	0 ... 95 °C

pH value

pH value of the buffer for the selected temperature.

Range	-20.000 ... 20.000
Selection	off
Default value	off



Note

For your own calibration buffers you should enter the pH values for the particular temperature range in which your pH calibration and measurements will later be carried out. If you do not know the pH values for individual temperatures these will be automatically calculated by linear interpolation.

6.3.3.2 Templates for input lines

6.3.3.2.1 Manage the templates for input lines

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Input lines...** ▶ **Templates for input lines**

In the dialog window **Templates for input lines**, client-specific bit-patterns for scanning remote input signals can be defined which can be selected with the command **SCAN** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title.

[New]

Generates a new template (see *Chapter 6.3.3.2.2, page 1183*).

[Edit]

Edit the selected template (see Chapter 6.3.3.2.2, page 1183).

[Delete]

Delete the selected template.

6.3.3.2.2 Edit the templates for input lines

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Input lines...** ▶ **Templates for input lines** ▶ **[New]/[Edit]** ▶ **New template/Edit template**

With **[New]** or **[Edit]**, the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Signal name

Name of the pattern for the input signal.

Input	25 characters

Input signal

Entry of the bit-pattern for the input signal with exactly 8 characters. It is possible to enter the characters

0 = Line deactivated,

1 = Line activated and

* = Any line status.

Selection	Bit-pattern with 8 characters (0, 1, *) *****
Default value	*****

The input lines and bits are numbered from right to left:

Input 7 6 5 4 3 2 1 0

Bit	7	6	5	4	3	2	1	0

Example: ***1** expects an activated input line 0 (**1** = set). For example, this line is set by a Titrino after a titration has been completed and the Titrino can accept a start signal again.



Note

Input lines that are of no interest or for which no defined condition can be predicted should be masked with an asterisk *.

6.3.3.3 Templates for output lines

6.3.3.3.1 Manage templates for output lines

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Output lines...** ▶ **Templates for output lines**

The client-specific bit-pattern for setting remote output signals can be defined in the dialog window **Templates for output lines**; these can be selected with the command **CTRL** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

[New]

Generates a new template (see Chapter 6.3.3.3.2, page 1184).

[Edit]

Edits the selected template (see *Chapter 6.3.3.3.2, page 1184*).

[Delete]

Deletes the selected template.

6.3.3.3.2 Edit templates for output lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Output lines... ▶ Templates for output lines ▶ [New] / [Edit] ▶ New template / Edit template**

With **[New]** or **[Edit]** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

With **<New>** or **<Edit>** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Name of the pattern for the output signal.

Input	25 characters

Entry of the bit-pattern for the output signal with exactly 14 characters.

0 = Line deactivated,

1 = Line activated,

* = Any line status and

p = Set pulse

Selection	Bit-pattern with exactly 14 characters (0, 1, *, p) *****
Default value	*****

The output lines are numbered from right to left:

Output 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Bit	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Example: *****1* sets the output line 1 to activated (= set), which would result in a Stop command for a connected Titrino, for example.
*****0* sets the line to deactivated.



Note

We recommend masking the irrelevant output lines with an asterisk * so as not to modify these line conditions.

Duration of the transmitted pulse.

Range	100 ... 1000 ms
Default value	200 ms

Parameters	Binary pattern	Function

Start Dos1	*****p*****	Starts Dosimat 1 (Titrino via "activate")
Start Dos2	*****p*****	Starts Dosimat 2 (Titrino via "activate")
Start Dos*	*****p*p*****	Starts Dosimat 1 and 2 (Titrino via "activate")

6.3.3.4 Templates - Conductivity standards

6.3.3.4.1 Manage conductivity standards

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Conductivity standards ▶ Conductivity standards**

Conductivity standards can be defined in the dialog window, which can be selected with the command **CAL Cond**. The table cannot be edited.

[New]

Creation of a new conductivity standard. The window **Edit conductivity standard** opens, in which a new conductivity standard can be defined (*see Chapter 6.3.3.4.2, page 1186*).

[Properties]

Edits the selected conductivity standard. The window **Edit conductivity standard** opens, in which the conductivity standard can be edited (*see Chapter 6.3.3.4.2, page 1186*).

[Delete]

Deletes the selected conductivity standard.

[Copy]

Copies the selected conductivity standard, which is saved under the name **Copy of.....**

6.3.3.4.2 Edit conductivity standard

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Conductivity standards** ▶ **Conductivity standards** ▶ **Edit conductivity standard**

With **[New]** or **[Properties]** in the dialog window **Conductivity standards**, the dialog window **Edit conductivity standard** opens for entering a new conductivity standard or for editing an existing conductivity standard.

Name

Name of the conductivity standard.

Input	25 characters

Comment

Comment on the conductivity standard.

Input	1000 characters

Measured observational pairs

Table with the value pairs for **Temperature** and **Conductivity**, which were determined for the conductivity standard. The table cannot be edited, but with a click on the column title the temperature can be sorted according to either increasing or decreasing sequence.

[New]

Creation of a new value pair. The window **Edit value pair** opens, in which a new value pair can be entered (see Chapter 6.3.3.4.3, page 1187).

[Edit]

Edits the selected value pair. The window **Edit value pair** opens, in which the value pair can be edited (see *Chapter 6.3.3.4.3, page 1187*).

[Delete]

Deletes the selected value pair.

6.3.3.4.3 Edit observational pair

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Conductivity standards ▶ Conductivity standards ▶ Edit conductivity standard ▶ Edit observational pair**

With **[New]** or **[Edit]** in the **Edit conductivity standards** dialog window, the dialog window **Edit value pair** opens for entering a new value pair or for editing an existing value pair.

Temperature

Temperature at which the conductivity was determined.

Range	-20 ... 150 °C

Conductivity

Conductivity for the specified temperature (6 significant places).

Range	0.00000 ... 2000.00 mS/cm

6.3.3.5 E-mail templates

6.3.3.5.1 Manage E-mail templates

Dialog window: **Configuration** ► **Tools** ► **Templates** ► **E-mail templates...** ► **E-mail templates**

The stored E-mail templates are displayed in a table in the dialog window **E-mail templates**. The table cannot be edited, but with a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.



[New]

Generates a new template. The window **Edit E-mail template** opens, in which a new template can be defined (see *Chapter 6.3.3.5.2, page 1188*).

[Edit]

Edits the selected template. The window **Edit E-Mail template** opens, in which the template can be edited (*see Chapter 6.3.3.5.2, page 1188*).

[Delete]

Deletes the selected template.

[Copy]

Copies the selected template and saves it under the name **Copy of....**

6.3.3.5.2 Edit E-mail templates

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **E-mail templates...** ▶ **E-mail templates** ▶ **[New]** / **[Properties]** ▶ **Edit E-mail template**

With **[New]** or **[Edit]** in the **E-mail templates** dialog window, the dialog window **Edit E-mail template** opens for entering a new template or for editing an existing template.

E-mail template

Name of the E-mail template.

Input	16 characters

Receiver

E-mail address

E-mail address of the receiver.

Input	200 characters

Sender

E-mail address

E-mail address of the sender.

Input	200 characters

SMTP server

Address of SMTP mail server.

Input	200 characters

Port

Port number of the SMTP mail server.

6.3.4.2 Options - General

Tab: **Configuration** ▶ **Tools** ▶ **Options** ▶ **Options** ▶ **General**

Dialog language

Dialog language

Selection of the dialog language.

Selection	German English additional languages (dependent on installed language patches)
Default value	English



Note

For the altered setting to become effective the program must be restarted.

Emergency stop button

If this option is enabled then the emergency stop button will be shown in all program parts.

Selection	on off
Default value	off



This button can be moved to any position with the left-hand mouse button pressed down and is always shown right up at the top on the screen, both in the program window and outside it on the Windows desktop. A mouse click on this button immediately stops all running determinations on all activated workplaces. When this happens, all devices are stopped (including pumps; any device commands that may have been started will be carried out to their ends, e.g. **PREP** with Dosino) and the exit track will be started. The emergency stop is effective even if no user is logged in, e.g. when the user has been logged out automatically.

The emergency stop has no effect on running actions in the manual control, each of which must therefore be stopped with **<Stop>**.

6.3.4.3 Options - Save

Tab: **Configuration** ▶ **Tools** ▶ **Options** ▶ **Options** ▶ **Save**

Save on closing

Here you can define the settings to be saved when the program is exited. If the option is **switched on** the current view with its settings will be saved automatically when the program is exited. If the option is **switched off**

Configuration settings

Switches Save configuration view on/off when exiting the program.

Switches Save workplace view on/off when exiting the program.

Switches Save database view on/off when exiting the program.

Security permissions for PDF files

If this option is **switched off** none of the PDF file contents can be copied or extracted.

If this option is **switched off** the PDF file cannot be printed out.

If this option is **switched off** comments and form fields can neither be added nor altered.

If this option is **switched off** no changes can be made to the PDF file.

6.4.1.3.1 Audit Trail - Main menus

The menu bar in the **Audit Trail** program window contains the following main menu items:

- *File*
Prints, exports, archives, deletes Audit Trail
- *View*
Updates table, defines column display.
- *Filter*
Defines and uses special filters and quick filters.
- *Tools*
Monitors Audit Trail
- *Help*
Opens program help, display program information.

Program window: **Configuration** ► **Tools** ► **Audit Trail...** ► **Audit Trail**

 Print (PDF)...	Prints Audit Trail data sets as PDF file (<i>see Chapter 6.4.2.8, page 1206</i>).
Export...	Exports Audit Trail data sets (<i>see Chapter 6.4.2.5, page 1203</i>).
Archive...	Archives Audit Trail data sets (<i>see Chapter 6.4.2.6, page 1204</i>).
Delete	Deletes archived Audit Trail data sets (<i>see Chapter 6.4.2.7, page 1205</i>).
Exit	Exits the Audit Trail window.

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

 Update	Updates Audit Trail table (<i>see Chapter 6.4.2.4, page 1203</i>).
Column display	Defines the columns for the Audit Trail table (<i>see Chapter 6.4.2.2, page 1198</i>).

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

 Last filter	Uses the last quick or special filter again (<i>see Chapter 6.4.2.3.2, page 1199</i>).
 Quick filter	Uses the quick filter (<i>see Chapter 6.4.2.3.3, page 1199</i>).



 Special filter...	Defines and uses special filter (<i>see Chapter 6.4.2.3.4.1, page 1199</i>).
 Remove filter	Removes current filter (<i>see Chapter 6.4.2.3.5, page 1203</i>).

6.4.1.3.5 Audit Trail - Menu Tools

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

Monitoring	Defines Audit Trail table monitoring (<i>see Chapter 6.4.2.9, page 1206</i>).
Installation log	Opens log file for installation.
Verify export/archive	Checks the checksum of an exported or stored Audit Trail file (<i>see Chapter 6.4.2.10, page 1207</i>).

6.4.1.3.6 Audit Trail - Menu Help

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

 tiamo Help Info	Opens tiamo Help. Displays information about the program and the installation.

6.4.1.4 Audit Trail - Toolbar

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

 Print (PDF)...	Prints Audit Trail data sets as PDF file (<i>see Chapter 6.4.1.3.2, page 1193</i>).
 Last filter	Uses the last quick or special filter again (<i>see Chapter 6.4.2.3.2, page 1199</i>).
 Quick filter	Uses the quick filter (<i>see Chapter 6.4.2.3.3, page 1199</i>).
 Special filter...	Defines and uses special filter (<i>see Chapter 6.4.2.3.4.1, page 1199</i>).
 Remove filter	Removes current filter (<i>see Chapter 6.4.2.3.5, page 1203</i>).
 Update	Updates Audit Trail table (<i>see Chapter 6.4.2.4, page 1203</i>).
 tiamo Help	Opens tiamo Help.

6.4.1.5 Audit Trail - Filter selection

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

Filter

Selection of the filter with which the Audit Trail table is to be filtered:

All entries

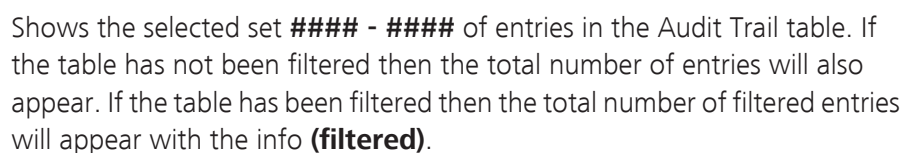
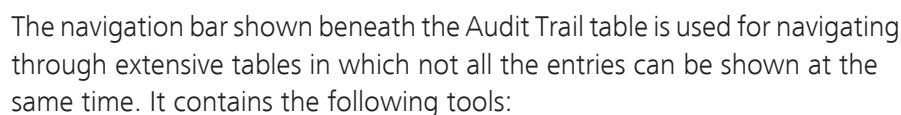
Quick filter

Temporary filter

Filter name

The table is filtered according to the selected and saved Special filter (see Chapter 6.4.2.3.4.1, page 1199).

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**



Date _____

Date, time and time zone of the action.

User

Short name of the logged-in user.

Full name

Full name of the logged-in user.

Client

Name of the Client on which the action was carried out or which is affected by the action.

Category

Program part to which the action belonged.

Action

Short description of the action.

Details

Detailed information about the action.

Archived

Shows whether the action has already been archived or not (only archived actions can be deleted).

With the menu item **View ► Column display...** unwanted columns can be removed.

Table view

The Audit Trail table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The following functions can be carried out:

- #### 6.4.2.3.2 Audit Trail - 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 activated once again.

Menu item: **Audit Trail** ▶ **Filter** ▶ **Quick filter**

Peter Klose



The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

6.4.2.3.4.1 Special filter table

With the menu item **Filter ► Special filter** or the symbol  in the **Audit Trail** program window, the dialog window **Special filter - Database 'ConfigDB'** opens for defining user-specific filters.

Selects the filter to be loaded for processing. An empty table with the name **New filter** is loaded as standard.

Selection	Filter name New filter
Default value	New filter



[Save filter]

Opens the dialog window **Save filter** in which the filter criteria entered in the table can be saved as a special filter under the required name (see Chapter 6.4.2.3.4.3, page 1202).

[Delete filter]

Deletes the special filter that is currently loaded.

Table view

The overview table shows all the defined filter criteria and cannot be directly edited. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

For the meaning of the columns, see *Edit filter criterion*.

Functions

The menu **[Edit]** beneath the filter table contains the following menu items:

Edit line	Opens the dialog window Edit filter criterion in which the filter condition of the line selected in the table can be edited (<i>see Chapter 6.4.2.3.4.2, page 1201</i>).
Insert a new line	Inserts a new empty line above the line selected in the table. The dialog window Edit filter criterion opens automatically (<i>see Chapter 6.4.2.3.4.2, page 1201</i>).
Cut lines	Transfers selected lines to clipboard.
Copy lines	Copies selected lines to the clipboard.
Paste lines	Inserts lines from the clipboard above the selected line.
Delete lines	Deletes the selected lines.

[Apply filter]

Applies filter conditions to Audit Trail table.

Special filter - Editing filter criterion

Dialog window: **Audit Trail** ▶ **Filter** ▶ **Special filter...** ▶ **Special filter - Database 'ConfigDB'** ▶ **[Edit]** ▶ **Edit line** ▶ **Edit filter criterion #**

With **[Edit]** ► **Edit line** the dialog window **Edit filter criterion #** opens in which the filter criterion selected in the filter table can be edited.

Link

Selection of the type of link (logic operator) with the previous filter criterion.

Selection	AND OR
Default value	AND

Field

Selection of the field according to which the filtering is to be carried out.

Selection	Last 10 selected fields

[Other...]

Opens the dialog window **Filter - Field selection**, in which all fields that can be used for filtering are listed in a tree structure. A field can be added to the filter condition by marking it and closing the dialog window with **[OK]**.

Condition

Type

Selection of the type of format for columns in which several types are possible. For columns with a fixed type only this type will be shown.

Selection	Text Number Date
Default value	Text

Operator

Selection of the comparison operator for the filter criterion.

for fields of type 'Text'

Selection	=	<> empty not empty
Default value	=	

for fields of type 'Number'

Selection	= <> < > <= >= invalid out of limits
Default value	=

for fields of type 'Date'

Selection	= <> < > <= >= Today
Default value	=



Note

If for the column **Date**, the **Operator Today** is selected then filtering will be carried out for the actual date. In the field **Comparative value**, a range in days (**-9999 ... 9999**) can also be defined for filtering based on the current date.

Comparative value

Selection or entry of the comparative value for the filter criterion.

for fields of type 'Text'

Input

250 characters

^* can be used as a wildcard for any strings.

for fields of type 'Number'

Input

Numerical value

for fields of type 'Date'

The  opens the window **Select date** to select the date (*see Chapter 2.5.1, page 80*).

for fields of type 'Date' and 'Operator = Today'

Range

-9999 ... 9999

Default value

0

Match case

on | off (Default value: **off**)

If this option is switched on, the asterisk ***** can be used as a wildcard for any character strings for filtering fields with **Type = Text**.

Use asterisk (*) as wildcard

on | off (Default value: **off**)

If this option is switched on then upper/lower case will be differentiated when filtering fields with **Type = Text**.

6.4.2.3.4.3 Special filter - Saving filter

Dialog window: **Audit Trail** ▶ **Filter** ▶ **Special filter...** ▶ **Special filter - Database 'ConfigDB'** ▶ **[Save filter]** ▶ **Save filter**

With the **[Save filter]** button the dialog window **Save filter** opens for saving a Special filter.

Selection

Selection	All records Selected records
Default value	All records

- All records**
All the entries from the filtered Audit Trail table are exported.
- Selected records**
Only the entries selected in the Audit Trail table will be exported.



Note

Audit Trail entries are exported in text format and cannot be imported back into the Audit Trail table. The export file contains a checksum which allow to verify whether the file has been modified later on.

6.4.2.6 **Archive Audit Trail**

Dialog window: **Audit Trail ▶ File ▶ Archive... ▶ Archive Audit Trail**

With menu item **File ▶ Archive...** the dialog window **Archive Audit Trail** opens.

Target directory

Entry or selection (with ) of the directory in which the Audit Trail entries are to be archived.

Input	1000 characters

Selection

Selection	All records Records until ...
Default value	All records

- All records**
All entries from the filtered Audit Trail table will be archived.
- Records until ...**
Only data sets from the Audit Trail table up to the selected date will be archived.



6.4.2.7 Delete Audit Trail

Dialog window: **Audit Trail** ▶ **File** ▶ **Delete** ▶ **Delete Audit Trail**

With the menu item **File ► Delete** the dialog window **Delete Audit Trail** opens.

Selection

Selection	All archived records Archived records until ...
Default value	All archived records

All archived records

All the archived entries will be deleted from the Audit Trail table.

Archived records until ...

Only the archived entries generated up to the entered date will be deleted from the Audit Trail table.

User 1

User

Short name of the first user to have the right to delete Audit Trail entries.

Input	24 characters

Password

Password of the first user to have the right to delete Audit Trail entries.

Input	24 characters

User 2

User

Short name of the second user to have the right to delete Audit Trail entries.

Input	24 characters

Password

Password of the second user to have the right to delete Audit Trail entries.

Maximum number

Maximum number of entries allowed in the Audit Trail table. If this number is exceeded an error message appears.

Range	10 ... 500000
Default value	100000

6.4.2.10 Verify Audit Trail

Dialog window: **Audit Trail ▶ Tools ▶ Verify export/archive ▶ Verify Audit Trail export/archive**

With the menu item **Extras ► Verify export/archive**, the dialog window **Verify Audit Trail export/archive** opens, in which the checksum of a file exported or archived from the Audit Trail can be checked.

Selecting file

Entering or selecting (with ) the file that is to be verified

[Verify export/archive]

Triggers the checking of the selected file.

Result

The result of the checking of the checksum is displayed.

6.5 Subwindow Devices

6.5.1 Configuration - Devices

Subwindow: **Configuration ▶ Devices**

Subwindow Devices

The subwindow **Devices** contains the device table with all automatically recognized and manually added devices and is always shown in the program part **Configuration**, i.e. it cannot be removed from the Configuration view. The subwindow can be enlarged and reduced as required; it can also be maximized.

USB devices

Devices connected to the PC via USB are automatically recognized at the start of the program and entered in the device table. If the connection between PC and device or the current supply is interrupted then the device will remain in the device table with the status **not ok**. If it is reconnected then it will be recognized automatically by its serial number and again assigned to the existing device entries. The status will change to **ok**.



Peripheral devices of USB devices

Peripheral devices connected to USB devices (e.g. dosing devices, stirrers, etc.) are also recognized automatically. If they are connected or removed while a program is running, then after confirming a corresponding message, either the device must be reinitialized, the USB connection must be interrupted and then re-established or the program must be restarted.

RS-232 devices

Devices that are connected to the PC via an RS-232 interface will not be recognized automatically. They must be added manually to the device table as new devices. If the connection between PC and device or if the current supply is interrupted, the device will nevertheless remain in the device table with the status **ok**. In order to update the status to **not ok**, the properties window of the device must be opened and then closed again. The same applies when the device is connected again or switched on.

6.5.2 Device table

6.5.2.1 Device table - Desktop

Subwindow: **Configuration ▶ Devices**

Contents

In the device table the following information about automatically recognized or manually added devices is shown as standard:

Device name

Name of the device.

Device type

Type of device.

Device serial number

Serial number of the device.

Status

Device status. A device that is ready has the status **ok** shown in green, a device that is not ready has the status **not ok** shown in red.



Set to work

Next GLP test

Remarks

Note

As soon as a determination is started all the devices or device components used in the method (dosing devices, measuring inputs) will be occupied, i.e. they can neither be used at a different workplace nor used or configured in manual control until the determination has been terminated. The line for an occupied device is shown in gray letters.

The device table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- If the content of a field is larger than the column width, then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Devices - Column display

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Column display... ▶ Column display**

With **[Edit] ► Column display...**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the device table.

Columns available

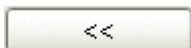
Shows all the fields that can be shown as columns in the device table.

Columns displayed

Shows all the fields that will be shown as columns in the device table. The default position is that the columns **Device name**, **Device type**, **Device serial number**, **Status**, **Set to work**, **Next GLP test** and **Remarks** will be shown. The columns **Device name** and **Device type** are always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.



Modifies the sequence of displayed columns by moving the selected column up.



Modifies the sequence of displayed columns by moving the selected column down.

Edit ignored devices

Dialog window: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Ignored devices...** ▶ **Ignored devices**

The dialog window **Ignored devices** is opened with **[Edit] ► Ignored devices....** Here the list of ignored devices can be edited.

Ignored devices are devices which are recognized automatically upon connection but are ones which the user does not wish to have permanently displayed in the device table. Ignored devices will no longer be recognized automatically at the time of the next program start.

- 756/831 Coulometer
- 712 Conductometer
- 856 Conductometer
- 867 pH Module
- 846 Dosing Interface
- 730 Sample Changer
- 774 Oven Sample Processor
- 778/789 Sample Processor
- 814/815 Sample Processor
- 855 Robotic Titroprocessor
- 864 Balance Sample Processor
- 874 Oven Sample Processor
- Avantes Spectrometer
- RS-232 device
- Balance
- Barcode reader

6.6 Subwindow Titrants/Solutions

6.6.1 Titrants/Solutions - General

Subwindow: **Configuration ▶ Titrants/solutions**

Subwindow Titrants/Solutions

The subwindow **Titants/Solutions** contains the solution table with all automatically recognized and manually added titrants and auxiliary solutions. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ▶ Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Titrant

Titrants are used as solutions for the titration commands **DET**, **MET**, **SET**, **KFT** and **STAT**. They can be used in exchange units or dosing units.

Auxiliary solutions

Auxiliary solutions are used as solutions for the dosing commands **ADD**, **DOS** and **LQH**. They can be used in exchange units or dosing units.

Intelligent exchange units (IEU) and dosing units (IDU)

Intelligent exchange and dosing units have a data chip with stored solution data. When mounted on intelligent devices (e.g. Titrand) they are recognized automatically and stored in the solution table.

Non-intelligent exchange units (EU) and dosing units (DU)

Non-intelligent exchange and dosing units must be added manually to the solution table.

6.6.2 Solution table

6.6.2.1 Solution table

Subwindow: Configuration ▶ Titrants/Solutions

Contents

In the solution table the following information about automatically recognized or manually added solutions is shown as standard:

Solution name

Name of the solution.

Concentration

Concentration (value and unit) of the solution.

Cylinder volume

Cylinder volume of the exchange or dosing unit in mL.

Type

Type of exchange unit or dosing unit.

Dosing device

Device name and dosing connection of the device to which the exchange or dosing unit is fitted (only for intelligent exchange/dosing units).

Titer

Titer (value and unit) of the solution.

Date titer det.

Date on which the last titer determination was carried out.

Next titer determination

Date on which the next titer determination is to be carried out. If titer monitoring is switched on and the set date is before the current date (i.e. the titer determination has not yet been carried out) then the date will be shown in red.

Expiry date

Expiry date of the solution. If solution monitoring is switched on and the set date is before the current date (i.e. the expiry date has elapsed), then the date will be shown in red.

With menu item **[Edit] ► Column display...** further columns from the solution properties can be shown.



Table view

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

Functions

New...	Adds new solution manually (<i>see Chapter 6.6.2.2, page 1215</i>).
Delete	Deletes selected solution (<i>see Chapter 6.6.2.3, page 1216</i>).
Properties...	Edits selected solution (<i>see Chapter 6.6.3.1, page 1217</i>).
Column display...	Defines the columns for the solution table (<i>see Chapter 6.6.2.4, page 1216</i>).
Print (PDF)	Shows the solution table as a PDF file (<i>see Chapter 6.6.2.5, page 1217</i>).

Menu item: Configuration ▶ Titrants/Solutions ▶ [Edit] ▶ New...

1215



Note

Solutions in intelligent 806 Exchange Units (IEU) or 807 Dosing Units (IDU) with data chip need only be manually added and configured when they are fitted to devices that cannot read out the data automatically (e.g. Titrimo, 700 Dosino).

6.6.2.3 Delete solution

Menu item: Configuration ▶ Titrants/Solutions ▶ [Edit] ▶ Delete

With **[Edit] ► Delete**, the solution selected in the solution table is deleted.

6.6.2.4 Solutions - Column display

Dialog window: Configuration ▶ Titrants/Solutions ▶ [Edit] ▶ Column display... ▶ Column display

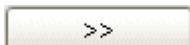
With **[Edit] ► Column display...**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the solution table..

Columns available

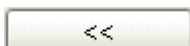
Shows all the fields that can be shown as columns in the solution table.

Columns displayed

Shows all the fields that will be shown as columns in the solution table. The default situation is that the columns **Solution name**, **Concentration**, **Cylinder volume**, **Type**, **Dosing device**, **Titer**, **Date titer det.**, **Next titer determination** and **Expiry date** are shown. The column **Solution name** is always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.



Modifies the sequence of displayed columns by moving the selected column up.



Modifies the sequence of displayed columns by moving the selected column down.

Dialog window: Configuration ▶ Titrants/Solutions ▶ [Edit] ▶ Print (PDF)... ▶ Print list of solutions (PDF)

Orientation

Selection	Portrait Landscape
Default value	Portrait

Prints the solution table in portrait format.

Print the solution table in landscape format.

Stop determination

The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.6.3.3 Properties - Titer

Tab: **Configuration** ▶ **Titration/solutions** ▶ **Properties** ▶ **Titer**

Titer determination

Titer (value)

Titer value of the solution. The value for the titer of a solution used by the titration commands **DET**, **MET**, **SET** and **KFT** is available for calculations as a variable '**Command name.TITER**' Command name.

Range	1E-12 ... 1E+12 (max. 10 digits)
Default value	1.000

Titer (unit)

Titer unit of the solution.

Input	10 characters
Selection	mol/L mmol/L μmol/L g/L mg/L μg/L mg/mL ppm % mEq/L
Default value	mol/L

Date titer det.

Display of the date and time of last titer determination, which is automatically entered with each automatic titer determination or manual entry.

Titer method

Name of the method with which the last titer determination was carried out.
If the titer has been entered manually then **manual** will be shown here.

User

Short name of the user logged in during titer determination or when the titer was entered manually. If work is not carried out using log in, then the user logged in under Windows will be entered automatically.

Statistics

Statistical data will only be shown if the titer has been assigned by the titer method as a mean value of a multiple determination. If the titer has been determined with a single determination or entered manually then no statistics values will be shown.

Number of titer determinations (n)

Number of determinations used to determine the titer.

Abs. standard dev. (s abs)

Absolute standard deviation for the titer determination in the units of the titer.

Rel. standard dev. (s rel)

Relative standard deviation for the titer determination in %.

Monitoring of titer validity

on | off (Default value: **off**)

If this option is switched on then the validity of the titer will be monitored.

Validity of titer

Validity of the titer in days. If a value is entered here then the date for the **Next titer determination** will be automatically adapted.

Range	0 ... 999 Days
Default value	999 Days

Next titer determination

Date on which the next titer determination is to be carried out. The date can be selected by pressing  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the **Validity period** field will be adapted automatically.

Set value	Date Titer det.+ 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the E-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

Pressing **[E-mail]** opens the **Send E-mail** (see Chapter 2.6.1, page 83) window.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Name of the method with which the titer determination was carried out. If the titer has been entered manually then **manual** will be shown here.



This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are written into the solutions table from the IEU/IDU.

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.



This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are written into the solutions table from the IEU/IDU.

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**.



The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

Opens the dialog window Limits for titer, in which the warning and intervention limits can be defined for the titer (*see Chapter 6.6.3.5, page 1224*). These limits apply only to the graph, no monitoring is carried out during the titer determination.



[Delete history]

Deletes titer history.

6.6.3.5 Titer history Limit values

Dialog window: **Configuration** ▶ **Titrants/solutions** ▶ **Properties** ▶ **Titer history** ▶ **[Limit values]** ▶ **Limit values titer**

Warning and intervention limits can be defined for the titer in the dialog window **Limits for titer**. If you have defined limits then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. Whether these limits are observed is not monitored, i.e. if the limits are exceeded no action will be taken and these solutions can be used in determinations.

Warning limits for titer

on | off (Default value: **off**)

If this option is **switched on**, then the titer value will be shown in **orange** if this limit is exceeded.

Lower limit

Lower warning limit.

Input	10 digits
Default value	0.9750

Upper limit

Upper warning limit.

Input	10 digits
Default value	1.0250

Intervention limits for titer

on | off (Default value: **off**)

If this option is **switched on** then the titer value will be shown in **red** if this limit is exceeded.

Lower limit

Lower intervention limit.

Input	10 digits
Default value	0.9500

Upper limit

Upper intervention limit.

Input	10 digits
Default value	1.0500

Tab: **Configuration** ▶ **Titration/solutions** ▶ **Properties** ▶ **Exchange unit**

Name

Input	24 characters
Default value	'empty'

Shows the type of exchange unit:

Selection **EU | IEU**

Non-intelligent exchange unit without data chip.

Intelligent 806 Exchange Unit with data chip.

Order number of exchange unit. With intelligent exchange units the order number is read off automatically and cannot be edited.

Input	24 characters
Default value	'empty'

Serial number of exchange unit. With intelligent exchange units the serial number is read off automatically and cannot be edited.

Input	10 characters
Default value	'empty'

Cylinder volume of exchange unit. With intelligent exchange units the cylinder volume is read off automatically and cannot be edited. If in the method you have selected a solution in a titration or dosing command then the cylinder volume will be checked in the run.

Selection	1 mL 5 mL 10 mL 20 mL 50 mL
Default value	20 mL

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.

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



Enter lower rates for high-viscosity liquids.

Defines the length and diameter of the tubing connected to the exchange unit.



Default values have already been entered for the tubing parameters; these correspond to the dimensions of the standard tubing supplied. If you do not make any alterations to the tubing connections then you do not need to modify the tubing parameters. For information on length and diameter of other tubings see **Products/Accessories and columns** under <http://products.metrohm.com>.

Length

Length of the tubing connecting the cock to the dosing tip.

Range	0.0 ... 999.9 cm
Default value	40.0 cm

Diameter of the tubing connecting the cock to the dosing tip.

Range	0.0 ... 9.9 mm
Default value	2.0 mm

tiamo 2.0

Length of the tubing connecting the cock to the cylinder.

Range	0.0 ... 999.9 cm
Default value	13.0 cm

Diameter of the tubing connecting the cock to the cylinder.

Range	0.0 ... 9.9 mm
Default value	2.0 mm

Length

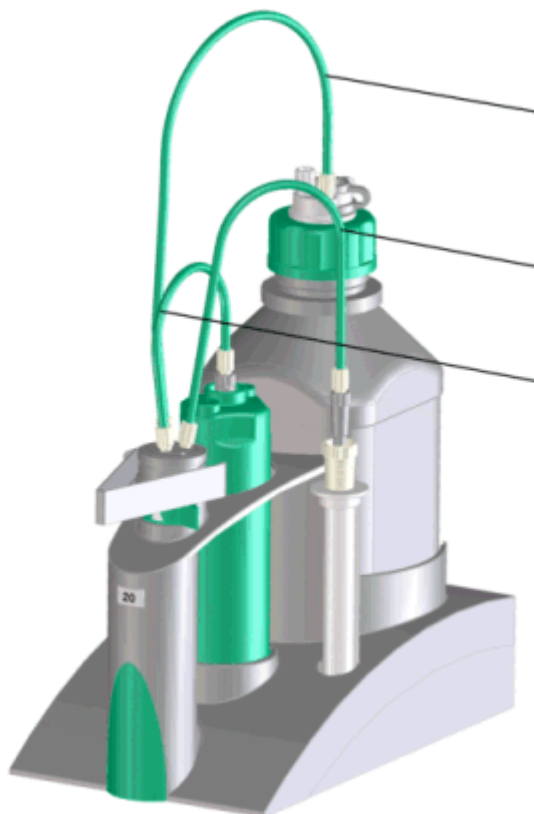
Length of the tubing connecting the cock to the reagent bottle.

Range	0.0 ... 999.9 cm
Default value	25.0 cm

Diameter of the tubing connecting the cock to the reagent bottle.

Range	0.0 ... 9.9 mm
Default value	2.0 mm

Exchange unit tubing connections



Tab:Configuration ▶ Titrants/Solutions ▶ Properties... ▶ Dosing unit

Freely definable name for the dosing unit.

Input	24 characters
Default value	'empty'

Shows the type of dosing unit:

Selection	DU	IDU

Non-intelligent dosing unit without data chip.

Intelligent 807 Dosing Unit with data chip.

Order number of dosing unit. With intelligent dosing units the order number is read off automatically and cannot be edited.

Input	24 characters
Default value	'empty'

Serial number

Serial number of dosing unit. With intelligent dosing units the serial number is read off automatically and cannot be edited.

Input	10 characters
Default value	'empty'

Cylinder volume

Cylinder volume of dosing unit. With intelligent dosing units the cylinder volume is read off automatically and cannot be edited. If in the method you have selected a solution in a titration or dosing command then the cylinder volume will be checked in the run.

Selection	2 mL 5 mL 10 mL 20 mL 50 mL
Default value	20 mL

Cylinder serial number

Serial number of cylinder. It is printed on new cylinders. With intelligent dosing units it is read off automatically. It can be altered at any time, e.g. if the cylinder has to be replaced.

Input	8 characters
Default value	'empty'

Parameters for preparation

Configures the parameters to be used in the commands **PREP** and **EMPTY**.

Dosing port Prep/Empty

Dosing port via which the cylinder contents are to be ejected during preparation and emptying.

Selection	Dosing port 1 Dosing port 2 Fill port Special port
Default value	Dosing port 1

Dosing rate Dosing port 1

Speed at which dosing is to be carried out at **Dosing port 1**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Dosing rate Dosing port 2

Speed at which dosing is to be carried out at **Dosing port 2**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Dosing rate Fill port

Speed at which dosing or filling is to be carried out at the **Fill port**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

Dosing rate Special port

Speed at which dosing is to be carried out at the **special port**. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 166.00 mL/min
Selection	maximum
Default value	maximum

The maximum dosing rate depends on the cylinder volume of the dosing unit used (see below):

Cylinder volume	Maximum rate
2 mL	6.67 mL/min
5 mL	16.67 mL/min
10 mL	33.3 mL/min
20 mL	66.6 mL/min
50 mL	166.0 mL/min



Note

Enter lower rates for high-viscosity liquids.

Diameter

Range	0.0 ... 9.9 mm
Default value	2.0 mm

Port

Selection	Port 1 Port 2 Port 3 Port 4
Default value	Port 2

Range	0.0 ... 999.9
Default value	25.0

Range	0.0 ... 9.9 mm
Default value	2.0 mm

Port

Selection	Port 1 Port 2 Port 3 Port 4
Default value	Port 4

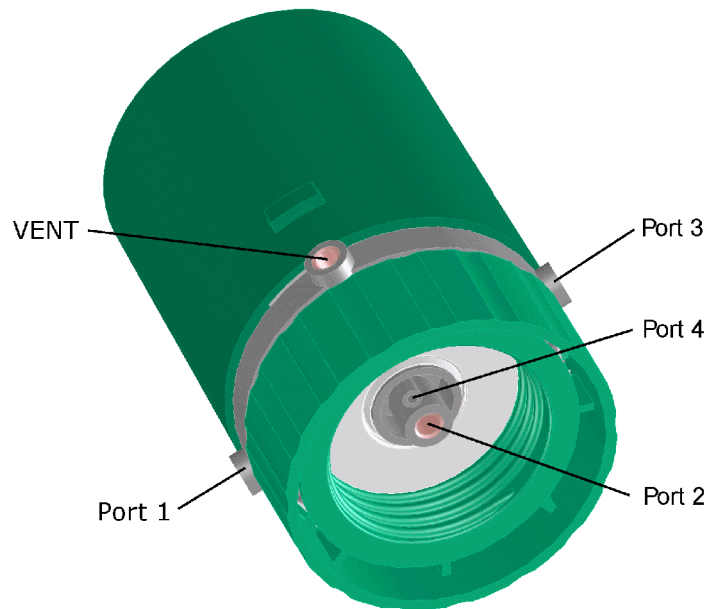
Range	0.0 ... 999.9 cm
Default value	0.0 cm

Diameter of tubing attached to special port.



Range	0.0 ... 9.9 mm
Default value	2.0 mm

Port assignment of dosing unit:



Valve disc

Rotating direction

Specification of the shift direction of the valve disc. **Automatic** is the shift direction with the shortest distance.

Selection	ascending descending automatic not over
Default value	automatic

Not over

Here you can choose the protected port. The protected port is the one which is not driven at during rotation.

Selection	Port 1 Port 2 Port 3 Port 4
Default value	Port 4

6.6.3.8 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment on GLP test.

Input	1000 characters

on | off (Default value: **off**)

Monitoring can only be switched on when a date has been entered in the field GLP test date.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

The message options can only be edited if monitoring is switched on.

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

6.7 Subwindow Sensors

6.7.1 Sensors - General

Subwindow: **Configuration** ▶ **Sensors**

Subwindow Sensors

The subwindow **Sensors** contains the Sensor table with automatically recognized and manually added sensors. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Intelligent sensors (IS)

Intelligent sensors have a data chip with stored sensor data. When connected to intelligent devices (e.g. 857 Titrando) via **854 iConnect**, they are recognized automatically and stored in the sensor table.

Non-intelligent sensors

Non-intelligent sensors must be added manually to the sensor table.

The sensor table contains the following sensors as standard; these cannot be deleted:

- ### 6.7.2 Sensor table

Subwindow: **Configuration** ▶ **Sensors**

In the sensor table the following information about the configured sensors is shown as standard:

Name of the sensor.

Type of the sensor. Intelligent sensors will be marked with **IS** and shown automatically in green.

Name of device to which sensor is connected.

Device and measuring input to which the sensor is connected. In the case of intelligent sensors, the device and the measuring input are displayed with green lettering.

Date on which the sensor was used for the first time.

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 of the sensor in % or mV.

pH(0)/E(0)

Electrode zero point of the sensor.

Next calibration

Date on which the next calibration is to be carried out. If calibration data monitoring is switched on and if the set date is before the current date (i.e. the calibration has not yet been carried out) then the date will be shown in red.

Additional columns from the Sensor properties can be shown with the menu item **Edit ► Column display**.



Note

Lines that contain red entries will also show the line number with a red background.

Table view

The sensor table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **Edit** beneath the sensor table contains the following menu items:

New...	Adds new sensor manually (<i>see Chapter 6.7.2.3, page 1239</i>).
Delete	Deletes the selected sensor (<i>see Chapter 6.7.2.4, page 1240</i>).
Properties...	Edits the selected sensor (<i>see Chapter 6.7.3.1, page 1241</i>).
Column display...	Defines columns for the sensor table(<i>see Chapter 6.7.2.2, page 1239</i>)
Print (PDF)...	Outputs the sensor table as a PDF file(<i>see Chapter 6.7.2.5, page 1240</i>)

Sensors - Column display

Dialog window: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Column display...** ▶ **Column display**

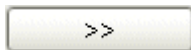
In the dialog window **[Column display]**, you can define the columns to be shown in the sensor table.

Columns available

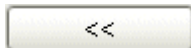
Shows all the fields that can be shown as columns in the Sensor table.

Columns displayed

Shows all the fields that will be shown as columns in the Sensor table. The default situation is that the columns **Sensor name**, **Sensor type**, **Measuring input**, **Set to work**, **Expiry date**, **Slope**, **pH(0)/E(0)** and **Next calibration** will be shown. The two columns **Sensor name** and **Sensor type** are always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.



Modifies the sequence of displayed columns by moving the selected column up and down.

Add new sensor

Menu item: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **New**

In order to add a new non-intelligent sensor to the Sensor table, the menu item **Edit ► New** must be pressed and then one of the following possible sensor types must be selected:

- pH electrode
- Metal electrode
- ISE electrode
- Temperature sensor
- Conductivity sensor
- Other sensor

The Properties window then opens automatically for the configuration of the sensor (*see Chapter 6.7.3.1, page 1241*). 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.

lon

Selection	Ag BF4 Br Ca Cd Cl CN Cu F I K Na NH4 NO2 NO3 Pb S SCN SO4 Surfactant Custom
Default value	F

F

Selection of the measuring ion from the list or defines another ion with **Custom**. The valency of the selected measuring ion will also be shown automatically.

Name

Entry of the name for the self-selected ion. This parameter is only visible if **Custom** has been selected in the field **Ion**.

Input	6 characters
Default value	'empty'

Valency

Selection of the valency for the self-selected ion. This parameter is only visible if **Custom** has been selected in the field **Ion**.

Selection	-4 -3 -2 -1 +1 +2 +3 +4
Default value	+2

6.7.2.4 Delete sensor

Menu item: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Delete**

With **Edit ► Delete**, the sensor selected in the sensor table is deleted.

6.7.2.5 Print list of sensors

Dialog window: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Print (PDF)...** ▶ **Print list of sensors (PDF)**

With **Edit ► Print (PDF)...**, the dialog window **Print list of sensors (PDF)** opens.

Orientation

Selection of the printing orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Prints the sensor table in portrait format.

Landscape

Prints the sensor table in landscape format.

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.

6.7.3.1 Edit 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, set to work, etc.
- *Calibration data*
Information about calibration of the sensor.
- *Limits*
Definition of limits monitoring for slope and electrode zero point.
- *History*
Shows the last 10 calibration values.

Tab: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Sensor** ▶ **Sensor**

Name of the sensor.

Input	24 characters



Note

The sensor name for the 5 non-deletable default sensors **pH electrode**, **Metal electrode**, **ISE electrode**, **Temperature sensor** and **Conductivity sensor** cannot be changed.

Shows the type of sensor. Intelligent sensors are marked in addition with **IS**.

Shows the ion to be measured and its valency. This parameter only appears for **ISE electrodes**.

Order number

Order number of the sensor (read-only for intelligent sensors).

Input	24 characters
Default value	'empty'

Sensor serial number

Serial number of the sensor (read-only for intelligent sensors).

Input	10 characters
Default value	'empty'

Device

For non-intelligent sensors it is possible to select the device to which the sensor is connected. All the devices in the device table which have a measuring input are shown in the selection list. The connection of a sensor to a particular device is not checked during the run. In the case of intelligent sensors, the device to which the sensor is connected is shown here automatically.

Selection	Selecting device 'empty'
Default value	'empty'

Measuring input

For non-intelligent sensors it is possible to select here the measuring input to which the sensor is connected. The connection of a sensor to a particular measuring input is not checked during the run. This parameter only appears if a **Device** has been chosen. For intelligent sensors the measuring input to which the sensor is connected is shown here automatically.

Selection	1 2
Default value	1

Comment

It is possible to enter remarks about the sensor.

Input	24 characters
Default value	'empty'

Set to work

The current date is automatically entered here for a newly added sensor.

When editing an existing sensor, the date can be selected by pressing  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Specific calibration data for ISE electrodes

Slope

Slope of the ISE electrode. This value can be determined automatically with a calibration from the linearized calibration curve or entered manually. The slope of an ISE electrode is available for calculations as the variable '**Command name.SLO**'.

Range	-999.9 ... 999.9 mV
Default value	59.2/Valency mV

E(0)

E(0) is the second characteristic quantity of the calibration function $U = f(\log c)$. **E(0)** is the y-axis intercept of the calibration curve and corresponds to the potential at $\log c = 0$. The electrode zero point **E(0)** of an ISE electrode is available as a variable '**Command name.ENP**' for calculations.

Range	-2000.0 ... 2000.0 mV
Default value	0.0 mV

c (blank)

c (blank) is the third characteristic quantity of the calibration function $U = f(\log c)$. It reflects to a certain extent the curvature of the calibration function at the lowest concentrations. This curvature is caused by the influence of so-called interfering ions. If the concentration calibration is carried out with less than 3 standards then **c (blank)** will be set to zero. The parameter **c (blank)** is available as a variable '**Command name.BLV**' for calculations.

Value

Range	0.00 ... 999999999
Default value	0.00

Unit

Input	10 characters
Default value	'empty'
Selection	mol/L mmol/L ppm % g/L mg/L µg/L mg/mL µg/mL

Specific calibration data for conductivity sensors

Cell constant

Cell constant of the conductivity sensor. This value can be determined automatically with a calibration or entered manually. The cell constant is available as a variable '**Command name.BLV**' for calculations.

Range	0.001 ... 500 /cm
Default value	1 /cm



Shared calibration data

Calibration temperature

Temperature during the calibration. The display also shows whether the temperature was measured with a Pt1000 or an NTC temperature sensor or entered manually.

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Calibration date

Date and time of last calibration that is entered automatically after each automatic calibration or manual entry.

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.

Measuring input

Display of the type and the serial number of the measuring input at which the sensor was connected during the calibration (only for Titrandos).

[Initial data]

Opens the dialog window **Initial data sensor** (see Chapter 6.7.3.6, page 1253), in which the initial calibration data stored in the sensor chip is displayed (only for intelligent sensors).

Calibration data monitoring

on | off (Default value: **off**)

If this option is switched on then the validity of the calibration will be monitored.

Calibration interval

Validity of the calibration in days. If a value is entered here then the date for the **Next calibration** will be adapted automatically.



Can only be edited if monitoring is switched on.

Range	0 ... 999 Days
Default value	999 Days

Can only be edited if monitoring is switched on.

Set value	Calibration date + 999 days

The message options can only be edited if monitoring is switched on.

If during calibration monitoring it is found that its validity has expired then one of the following actions will be triggered automatically at Start test:

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity of the calibration has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity of the calibration has expired will be saved automatically with the determination.

Stop determination

The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.7.3.4 Properties - Limits

Tab: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Sensor** ▶ **Limits**



Note

This tab is displayed only for sensors of the type **pH electrode**, **ISE electrode** or **conductivity sensor**.

Slope monitoring (for pH and ISE electrodes only)

on | off (Default value: **off**)

If this option is switched on then a check will be made to see whether the **Slope** determined during calibration is within the defined limits. If it is outside them a corresponding message appears and you can choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit value for the slope.

for pH electrode

Range	-2.147E+9 ... 2.147E+9 %
Default value	96.0 %

for ISE (+1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	55.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-61.0 mV

Range	2.147E+9 ... 2.147E+9 mV
Default value	25.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-31.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	16.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-23.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	12.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-17.0 mV

Upper limit value for the slope.

Range	-2.147E+9 ... 2.147E+9 %
Default value	101.0 %

Range	-2.147E+9 ... 2.147E+9 mV
Default value	61.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-55.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	31.0 mV

for ISE (-2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-25.0 mV

for ISE (+3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	23.0 mV

for ISE (-3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-16.0 mV

for ISE (+4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	17.0 mV

for ISE (-4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-12.0 mV

pH(0) monitoring (for pH electrodes only)

on | off (Default value: **off**)

If this option is switched on then a check will be made to see whether the electrode zero point **pH(0)** determined during the calibration of a pH electrode is within the defined limits. If it is outside them, a corresponding message appears and you can choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Lower limit

Lower limit for $\text{pH}(0)$.

Range	-2.147E+9 ... 2.147E+9
Default value	6.750

Upper limit

Upper limit for $\text{pH}(0)$.

Range	-2.147E+9 ... 2.147E+9
Default value	7.250

E(0) monitoring (for ISE electrodes only)

on | off (Default value: **off**)

If this option is switched on then a check will be made to see whether the electrode zero point **E(0)** determined during the calibration of an ISE electrode is within the defined limits. If it is outside them, a corresponding

Lower limit

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-2000.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	2000.0 mV

If this option is switched on, then a check will be made to see whether the value determined during the determination of the **cell constant** of a conductivity sensor is within the defined limits. If it is outside them, a corresponding message appears and you can choose whether you will nevertheless accept the value or whether the previous value is to be retained.

Range	0.001 ... 500 /cm
Default value	0.001 /cm

Range	0.001 ... 500 /cm
Default value	0.001 /cm

This tab only appears for pH and ISE electrodes.

The table contains the last 10 calibrations for the selected sensor and cannot be edited or sorted. The individual calibrations are arranged chronologically according to date so that the most recent determination appears last. For

pH electrodes, the **Slope** and the **pH(0)** are displayed, for ISE electrodes the **Slope**, **E(0)** and **c(blank value)**, and for conductivity sensors the **cell constant**.

Slope, pH(0), E(0), c(blank), cell constant

The values are shown in the following colors:

- **Blue**, when the values were determined automatically by a method.
- **Black**, when the values have been entered manually.
- **Orange**, when the values are outside the warning limits.
- **Red**, when the values are outside the intervention limits.

If the warning or intervention limits are exceeded then the line number will also be shown with an orange and red background respectively.

Calibration date

Date and time of the calibration.

Calibration method

Name of the method with which the calibration was carried out. If the calibration data was entered manually then **manual** will appear here.



Note

This parameter is not saved on the data chip of intelligent sensors, i.e. this parameter will be empty if the data are written into the sensor table from the sensor.

User

Short name of the user logged in during calibration or when the calibration data was entered manually. If work is not carried out using login then the user logged in under Windows will be entered automatically.



Note

This parameter is not saved on the data chip of intelligent sensors, i.e. this parameter will be empty if the data are written into the sensor table from the sensor.

History graph

On the two tabs **Slope** and **pH(0)** or **E(0)** the last 10 values are shown for the selected sensor. As in the history table, the values are shown in different colors:

- **Blue**, when the values were determined automatically by a method.

- If limits have been defined then the warning limits will be shown in **orange** and the intervention limits in **red**.



The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

Opens the dialog window **Limits for sensor** in which the warning and intervention limits for the calibration data can be defined. These limits only apply to the graph, no monitoring will take place during calibration. For monitoring during calibration, the limits set on the **Limit values** tap apply.

Deletes the sensor history.

Dialog window: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Sensor** ▶ **Calibration data** ▶ **Initial data sensor**

Display of the slope in % for the first calibration.

Display of the asymmetry potential U_{as} in mV during the first calibration.

Temperature display in °C during the calibration.

Dialog window: **Configuration** ▶ **Sensors** ▶ **Edit** ▶ **Sensor** ▶ **History** ▶ **[Limit values]** ▶ **Limits Sensor**

In the dialog window **Limits for sensor** you can define warning and intervention limits for the slope and pH(0) or E(0). If you have defined limits then these will be shown in the graph in **orange** for warning limits and **red** for intervention limits. However, whether these limits are observed is not monitored, i.e. exceeding these limits does not trigger any action. For monitoring during calibration, the limits set on the **Limits** tab apply.

Warning limits for slope (only for pH and ISE electrodes)

on | off (Default value: **off**)

If this option is **switched on**, then the values for the slope will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for the slope.

for pH electrode

Range	-2.147E+9 ... 2.147E+9 %
Default value	97.5 %

for ISE (+1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	57.2 mV

for ISE (-1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-61.2 mV

for ISE (+2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	27.7 mV

for ISE (-2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-31.7 mV

for ISE (+3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	17.7 mV

for ISE (-3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-21.7 mV

for ISE (+4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	12.8 mV

for ISE (-4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-16.8 mV

Upper limit

Upper warning limit for the slope.

for pH electrode

Range	-2.147E+9 ... 2.147E+9 %
Default value	102.5 %

for ISE (+1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	61.2 mV

for ISE (-1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-57.2 mV

for ISE (+2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	31.7 mV

for ISE (-2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-27.7 mV

for ISE (+3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	21.7 mV

for ISE (-3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-17.7 mV

for ISE (+4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	16.8 mV

for ISE (-4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-12.8 mV

Intervention limits for slope (only for pH and ISE electrodes)

on | off (Default value: **off**)

If this option is **switched on**, then the values for the slope will be shown in **red** if the limits are exceeded.

Lower intervention limit for the slope.

Range	-2.147E+9 ... 2.147E+9 %
Default value	95 %

Range	-2.147E+9 ... 2.147E+9 mV
Default value	55 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-62.4 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	26.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-32.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	16.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-22.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	11.8 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-17.8 mV

Upper intervention limit for the slope.

Range	-2.147E+9 ... 2.147E+9 %
Default value	105.0 %

Range	-2.147E+9 ... 2.147E+9 mV
Default value	62.4 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-55.0 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	32.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-26.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	22.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-16.7 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	17.8 mV

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-11.8 mV

on | off (Default value: **off**)

If this option is **switched on**, then the values for pH(0) will be shown in **orange** if the limits are exceeded.

Lower warning limit for pH(0).

Range	-2.147E+9 ... 2.147E+9
Default value	6.500

Upper warning limit for pH(0).



Range	-2.147E+9 ... 2.147E+9
Default value	7.500

Intervention limits for pH(0) (only for pH electrodes)

on | off (Default value: **off**)

If this option is **switched on**, then the values for pH(0) will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for pH(0).

Range	-2.147E+9 ... 2.147E+9
Default value	6.000

Upper limit

Upper intervention limit for pH(0).

Range	-2.147E+9 ... 2.147E+9
Default value	8.000

Warning limits for E(0) (only for ISE electrodes)

on | off (Default value: **off**)

If this option is **switched on**, then the values for E(0) will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for E(0).

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-15 mV

Upper limit

Upper warning limit for E(0).

Range	-2.147E+9 ... 2.147E+9 mV
Default value	15 mV

Intervention limits for E(0) (only for ISE electrodes)

on | off (Default value: **off**)

If this option is **switched on**, then the values for E(0) will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for E(0).

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-30 mV

Upper limit

Upper intervention limit for $E(0)$.

Range	-2.147E+9 ... 2.147E+9 mV
Default value	30 mV

Warning limits for cell constant (only for conductivity sensors)

on | off (Default value: **off**)

If this option is **switched on** then the values for the cell constant will be shown in **orange** if the limits are exceeded.

Lower limit

Lower warning limit for the cell constant.

Range	0.001 ... 500 /cm
Default value	2.0 /cm

Upper limit

Upper warning limit for the cell constant.

Range	0.001 ... 500 /cm
Default value	400 /cm

Intervention limits for cell constant (only for conductivity sensors)

on | off (Default value: **off**)

If this option is **switched on** then the values for the cell constant will be shown in **red** if the limits are exceeded.

Lower limit

Lower intervention limit for the cell constant.

Range	0.001 ... 500 /cm
Default value	0.001 /cm

Upper limit

Upper intervention limit for the cell constant.

Range	0.001 ... 500 /cm
Default value	500 /cm

6.8 Common variables subwindow

6.8.1 Configuration - Common variables

Subwindow: **Configuration** ▶ **Common variables**

Common variables subwindow

The subwindow **Common variables** contains the table with the configured common variables. It can be shown in a separate window in the program part **Configuration** as a part of the Configuration view or (if not present on the desktop) with **View ► Quick access**. The subwindow can be enlarged and reduced as required; it can also be maximized.

Using common variables

Common variables are 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 (*see Chapter 2.4.3.2, page 30*).

6.8.2 Table of common variables

6.8.2.1 Table of common variables

Subwindow: **Configuration** ▶ **Common variables**

Contents

The table of common variables shows the following information about the common variables as standard:

Name	Name of common variable.
Type	Type of common variables (Number , Text or Date/Time).
Value	Value of common variables.

Unit

Unit of the common variables.

Assignment date

Date of the last value assignment for the common variable.

Assignment method

Name of the method used to assign the value.

User

Short name of the user logged in during value assignment.

Next assignment

Date on which the next value assignment is to be carried out. If monitoring the common variable is switched on and the set date is before the current date (i.e. the value assignment has not yet been carried out) then the date will be shown in red.

Additional columns can be shown from the properties of the common variables with the menu item **[Edit] ► Column display**.



Note

Lines that contain red entries will also show the line number with a red background.

Table view

The table of common variables cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

Functions

The menu **[Edit]** beneath the table of common variables contains the following menu items:

New...	Adds new common variable manually (see Chapter 6.8.2.2, page 1262).
Delete	Deletes the selected common variable (see Chapter 6.8.2.3, page 1262).
Properties...	Edits the selected common variable (see Chapter 6.8.3.1, page 1263).
Column display...	Defines the columns of the table of Common variables (see Chapter 6.8.2.4, page 1262).
Print (PDF)...	Outputs the table of common variables as a PDF file (see Chapter 6.8.2.5, page 1263).

6.8.2.2 Add new common variable

Menu item: **Configuration ▶ Common variables ▶ [Edit] ▶ New...**

With **[Edit] ▶ New...** a new common variable is added manually to the table of common variables. The Properties window then opens automatically for editing the common variable. After the Properties window has been closed the common variable will be entered in the table of common variables. The parameters can be altered at any time with **[Edit] ▶ Properties...**

6.8.2.3 Delete common variable

Menu item: **Configuration ▶ Common variables ▶ [Edit] ▶ Delete**

With **[Edit] ▶ Delete** the common variable selected in the table is deleted.

6.8.2.4 Common variables - Column display

Dialog window: **Configuration ▶ Common variables ▶ [Edit] ▶ Column display... ▶ Column display**

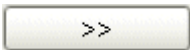
With **[Edit] ▶ Column display...** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the Common variables table.

Columns available

Shows all the fields that can be displayed as columns in the table of common variables.

Columns displayed

Shows all the fields that will be displayed as columns in the table of common variables. The default situation shows the columns **Name, Type, Value, Unit, Assignment date, Assignment method, User** and **Next assignment**. The three columns **Name, Type** and **Value** are always present and cannot be removed.



Adds the selected column to the table.



Modifies the sequence of displayed columns by moving the selected column up.



6.8.2.5 Print list of common variables

Orientation

Portrait

Landscape

[OK]

6.8.3 Common variables properties

6.8.3.1 Edit properties of common variables

With menu item **[Edit] ► Properties...** in the subwindow **Common variables** the properties window for the common variable selected in the table opens, in which the parameters of the common variables can be edited. It consists of the following tabs:

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Input	256 characters

Assignment date

Date and time at which the last value was assigned; this is entered automatically each time that a value is assigned automatically or manually.



Note

In contrast to automatic value assignment, when assigning the value manually the date is only entered if the value has really been changed.

Assignment method

Name of the method with which the last value assignment was carried out.
If the value was entered manually then **manual** will be shown here.

User

Short name of the user who was logged in during value assignment or who entered the value manually. If work is not carried out using log in then the user logged in under Windows will be entered automatically.

Common variable monitoring

on | off (Default value: **off**)

If this option is switched on then the validity of the common variables will be monitored.

Validity

Period that the common variable is valid in days. If a value is entered here then the field **Next assignment** will be adapted automatically.

Range	0 ... 999 Days
Default value	999 Days

Next assignment

Date on which the next value assignment must take place. The date can be selected by pressing  in the dialog window **Select date** (see *Chapter 2.5.1, page 80*). After a date has been entered the value for the **Validity** will be automatically adapted.

Selection	Date selection

Message

The message options can only be edited if monitoring for common variables is switched on.



Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the E-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-mail] opens the **Send E-mail** window.

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring for common variables is switched on.

If during common variable monitoring it is found that the validity period has expired, then one of the following actions will be triggered automatically at Start test:

Selection	Record message Display message Stop deter- mination
Default value	Display message

Record message

The message that the validity period of the common variable has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period of the common variable has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

6.8.3.3 Properties - History

Tab: **Configuration** ▶ **Common variables** ▶ **[Edit]** ▶ **Properties** ▶ **Common variable**
- **'Name'** ▶ **History**

History table

The table contains the last 10 values for the selected common variable and cannot be edited or sorted. The individual values are sorted according to date so that the most up-to-date assignment is shown last.

c0 ... c4

Coefficients of the Chebyshev polynomial for the calculation of the function.

Assignment date

Point in time at which the data for the calculation of the temperature coefficient was entered or determined.

Assignment method

Name of the method with which the automatic value assignment took place.
If the value has been entered manually then **manual** will be shown.

User

Short name of the user who was logged in during value assignment or who entered the value manually.

Measuring input

Type and serial number of the measuring input the conductivity sensor was connected to.

Determination ID

Unique identification for the determination of the data.

Comment

Comment which can be entered by the user.

With menu item **[Edit] ► Column display...** further columns from the solution properties can be shown.



Note

Lines that contain red entries will also show the line number with a red background.

Table view

The table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

Functions

- Adds a new column manually (*see Chapter 6.9.2.2, page 1271*) .
- Deletes the selected line (*see Chapter 6.9.2.3, page 1271*).
- Edits the selected line (*see Chapter 6.6.3.1, page 1217*).
- Defines the columns for the table (*see Chapter 6.9.2.4, page 1271*).
- Outputs the table as a PDF file (*see Chapter 6.9.2.5, page 1272*).

Menu item: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **New...**

Menu item: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **Delete**

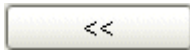
Dialog window: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **Column display...** ▶ **Column display**

Columns available

Columns displayed

>>

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Removes the selected column from the table.



Modifies the sequence of displayed columns by moving the selected column up.



Modifies the sequence of displayed columns by moving the selected column down.

6.9.2.5 Print solution list

Dialog window: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **Print (PDF)...** ▶ **Print list of sample solutions (TC conductivity) (PDF)**

[Edit] ► Print (PDF)... opens the dialog window **Print list of sample solutions (TC conductivity) (PDF)**.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Prints the table in portrait format.

Landscape

Prints the table in landscape format.

[OK]

The table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed and/or saved.

6.9.3 Sample solutions (TC conductivity) properties

6.9.3.1 Edit properties

Dialog window: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **Properties...** ▶ **Sample solution (TC conductivity)**

The parameters for the selected line are defined on the following tabs:

- *General*
General properties.
- *TC data*
Data for TC determination and monitoring.

c0 ... c4

Coefficients of the Chebyshev polynomial for the calculation of the function.

Range	1E-08 ... 1E+08
Default value	0.0

Assignment date

Display of the point in time at which the data for the calculation of the temperature coefficient was entered or determined. This value is entered automatically by **tiamo**.

Assignment method

Name of the method with which the automatic value assignment took place.
If the value has been entered manually then **manual** will be shown.

User

Short name of the user who was logged in during value assignment or who entered the value manually. If work is not carried out using log in, then the user logged in under Windows will be entered automatically.

Measuring input

Type and serial number of the measuring input at which the conductivity sensor was connected.

Determination ID

Unambiguous identification for the determination with which the determination of the TC data was carried out.

Monitoring TC data

on | off (Default value: **off**)

If this option is switched on, then the period of validity of the data will be monitored.

Validity

Period that the data is valid in days. If a value is entered here, then the date in the field **Next assignment** will be adapted automatically.

Range	0 ... 999 Days
Default value	999 Days

Next assignment

Date on which the next assignment is to be carried out. The date can be selected by pressing  in the dialog window **Select date** (see *Chapter 2.5.1, page 80*). After a date has been entered, the value for the **Validity** will be automatically adapted.

Message

Message by E-mail

The message is additionally sent to the E-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

Pressing **[E-mail]** opens the **Send E-mail** (see Chapter 2.6.1, page 83) window.

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically canceled. The following message must be confirmed with **[OK]**.

Table view

The rack table cannot be edited directly. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the margin between column titles:**
Sets the column width
- **Double-click on the margin between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a tooltip if the mouse cursor is kept on the field.

With sample racks that are placed on a Sample Processor and are recognized automatically the corresponding device name will be shown in the **Instrument** column. In addition the line number will be shown with a green background.

If a rack is reserved for a running determination or for manual control then the line will be shown in gray and the rack cannot be edited until the determination has been finished.

Functions

The menu **[Edit]** below the solution table contains the following menu items:

New...	Adds new rack manually (<i>see Chapter 6.10.2.2, page 1277</i>).
Delete	Deletes the selected rack (<i>see Chapter 6.10.2.3, page 1278</i>).
Properties...	Edits the selected rack (<i>see Chapter 6.10.3.1, page 1278</i>).
Print (PDF)...	Outputs the rack table as a PDF file .(<i>see Chapter 6.10.2.4, page 1278</i>)

6.10.2.2 Add new rack

Dialog window: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **New...** ▶ **New rack**

A new rack can only be generated as a copy of an already existing rack under a new rack name and with a new rack code. **[Edit]** ► **New...** opens the dialog window **New rack**.

Copy from

Selection of the rack to be used as a template for the new rack.

Selection	All existing racks

Rack name

Name for the new rack. The selected name must not already exist.

Input	25 characters

Rack code

Code of the new rack. The selected rack code must not already exist.

Input	6-figure binary pattern made up of 0 and 1

6.10.2.3 Delete rack

Menu item: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Delete**

With **[Edit] ▶ Delete** the rack selected in the rack list will be deleted.

6.10.2.4 Print list of racks

Dialog window: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Print (PDF)...** ▶ **Print list of racks (PDF)**

[Edit] ► **Print (PDF)...** opens the dialog window **Print list of racks (PDF)**.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Prints rack table in portrait format.

Landscape

Prints rack table in landscape format.

[OK]

The rack table is shown in the required format as a PDF file and can be opened directly with Acrobat Reader; it can then be printed and/or saved.

6.10.3 Rack properties

6.10.3.1 Edit rack properties

Dialog window: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Properties...** ▶ **Rack data**

Rack name

Shows the name of the rack attached. If no rack is in position then "-----" will be shown.

Rack code

Shows the number of positions on the rack in position. The rack code corresponds to the arrangement of magnets on the base of the rack and is read

in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

The parameters for the rack in position are defined in the following tabs:

- *Rack parameters*
Defines the parameters that are valid for all rack positions.
- *Lift positions*
Defines the work, rinse, shift and special positions for Tower 1 and Tower 2 (if present).
- *Special beakers*
Special beaker Settings for all special beakers on the rack in position.

6.10.3.2 Properties - Rack parameters

Tab: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Properties...** ▶ **Rack data** ▶ **Rack parameters**

Beaker radius samples

Radius of the sample beakers on the rack. If the lift is moved to the work position then this value will be compared with the parameter **Min. beaker radius** (see Chapter 7.10.3, page 1336) that can be specifically defined for each tower. If **Beaker radius samples < min. beaker radius** then a corresponding error message will appear. With **off** the beaker radius will not be checked.

Range	1.0 ... 100.0 mm
Selection	off

Beaker sensor

When a sample position is moved to with the command **MOVE** then the beaker sensor (**Tower, Robotic arm**) checks whether the special beaker is present or not. With **off** no check will be made. For the option **Robotic arm** a swing head with beaker sensor must be installed and a suitable work position with beaker contact must be defined for the lift, as this must move to the beaker recognition position.

With the parameter **Beaker test** in the command **MOVE** you can determine whether the determination is to be terminated if a beaker is missing with or without the display of a corresponding message and whether the series is to be continued or also terminated.

Selection	Tower Robotic arm off

Rack offset

The rack offset is a production-dependent tolerance value between the upper part of the rack and the lower part. The value is determined by a rack adjustment and displayed here. If necessary, it can be edited.

Range	-5.00 ... 5.00 °

6.10.3.3 Properties - Lift positions

Tab: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Properties...** ▶ **Rack data** ▶ **Lift positions**

Tower 1

Defines the lift positions for Tower 1. These apply for all rack positions except those that are defined as **Special beaker**.

Work position

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Range	0 ... 235 mm

Rinse position

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Range	0 ... 235 mm

Shift position

Shift position for Lift 1. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Range	0 ... 235 mm

Special position

Special position for Lift 1. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Range	0 ... 235 mm

Tower 2

Defines the lift positions for Tower 2. These apply for all rack positions except those that are defined as **Special beaker**.

Work position

Work position for Lift 2. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Rinse position

Range	0 ... 235 mm

Shift position for Lift 2. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Range	0 ... 235 mm

Special position for Lift 2. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Range	0 ... 235 mm

Tab: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **Properties...** ▶ **Rack data** ▶ **Special beakers**

The table shows all the data of all the special beakers of the attached rack in tabular form. Each special beaker can be assigned to any position on the rack. The table is cannot be edited directly.



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 of the affected tower are taken from the general rack positions.

The following columns are shown in the table:

Number of the special beaker for the selected rack.

Number of the rack position for the special beaker.

Work position Tower 1

Work position for the special beaker at Tower 1.

Work position Tower 2

Work position for the special beaker at Tower 2.

Beaker radius

Radius of the special beaker.

Beaker sensor

Shows whether and which beaker sensor is to be used for the special beaker.

[Edit]

Opens the dialog window **Special beaker #** (*see Chapter 7.10.3, page 1336*) for editing the data of the selected special beaker.

6.10.3.5 Special beaker

Dialog window: **Configuration ▶ Rack data ▶ [Edit] ▶ Properties... ▶ Rack data ▶ Special beaker ▶ [Edit] ▶ Special beaker #**

The parameters for the special beaker selected in the table of special beakers can be defined in the dialog window **Special beaker #**.

Rack position

Number of rack position for selected special beaker.

Range	0 ... n (n is rack-dependent)



Note

Special beakers should preferably be set at high rack positions, so that 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 skipped during an automatic movement to a sample position.

Work position Tower 1

Work position of the selected special beaker at Tower 1.

Range	0 ... 235 mm

Work position Tower 2

Work position of the selected special beaker at Tower 2.

Range	0 ... 235 mm

Beaker sensor

Range	1.0 ... 100.0 mm
Selection	off

Selection	Tower	Robotic arm	off



- *Special beakers*
Display of the special beaker for the rack in position.

6.10.3.7 Properties - Lift positions (774)

Dialog window: **Configuration** ▶ **Rack data** ▶ **Properties**

Tower 1

Defines the lift positions for Tower 1. These apply for all rack positions except those that are defined as (*see Chapter 6.10.3.8, page 1284*).

Work position

Work position for Lift 1. At this lift position the electrodes, stirrer and buret tips are optimally positioned for work.

Range	0 ... 100 mm

Rinse position

Rinse position for Lift 1. This lift position is used for rinsing the electrodes.

Range	0 ... 100 mm

Shift position

Shift position for Lift 1. Each time that the rack shifts, the lift will move to this position if it is located at a lower lift position. If the lift is located at a higher lift position than that defined here, then the shifting will take place at the current lift position. This means that the shift position must be selected so that a safe movement across the entire rack is possible at any time.

Range **0 ... 100 mm**

Special position

Special position for Lift 1. This additional definable position can be used e.g. during pipetting so that the tip is just immersed in the sample solution.

Range	0 ... 100 mm

6.10.3.8 Properties - Special beaker (774)

Dialog window: **Configuration** ▶ **Rack data** ▶ **Properties**

Special beaker

Shows the number of the special beaker for the selected rack.

Rack position

Shows the number of the rack position for the special beaker.

Measuring input 1/2 (iConnect)

ADC type

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	Pt 1000 NTC
Default value	Pt 1000

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Range	1000 ... 99999 Ohm
Default value	30000 Ohm

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Range	1000 ... 9999
Default value	4100

7.1.4 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.



Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.1.6 Load new program version

Dialog window: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General** ▶ **[Update]** ▶ **Load new program version**

If it is discovered that the device to connect has an old program version not supported by **tiamo**, it must be updated. Select the device from the device table. **[Edit] ► Properties...** opens the properties window. On the **General** tab, **[Update]** is now active and can be used to open the **Load new program version** dialog window.

Old version

Shows the old device program version.

New version

Shows the new device program version to be loaded.

[Load]

Loads new program version.

**Note**

Make sure that the device is not manipulated or switched off during the loading process and follow the instructions shown.

7.2 Titrino**7.2.1 Titrino - Overview**

The parameters for the **702, 716, 718, 719, 720, 721, 736, 751, 758, 784, 785, 794, 795, 798** and **799 Titrinos** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Int. Dosing device D0*
Properties of the internal dosing device.
- *Ext. Dosing device D1/D2*
Properties of the connected external dosing devices (685 Dosimat or 700 Dosino)

**Note**

These tabs for external dosing devices are only available for 736, 751, 758 and 799 Titrinos.

- *RS-232*
Selection of the serial interface the Titrino is connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

Program versions

tiamo supports only the following program versions of the Titrinos:

Device serial number

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Set to work

Selection	on off
Default value	off

Input	1000 characters
Default value	empty



Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Connected devices

Here the device (685 or 700) connected to the dosing device connector is displayed with its properties.

Dosing device type

Display of the dosing device type.

7.2.5 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.2.6 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range 1 ... 999 Days

Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Default value	GLP test date + 999 days

The message options can only be edited if monitoring is switched on.

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop deter- mination
Default value	Display message

The message that the validity period has expired will be automatically saved with the determination.

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.3.4 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range 1 ... 999 Days

Default value **999 Days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Default value	GLP test date + 999 days

The message options can only be edited if monitoring is switched on.

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop deter- mination
Default value	Display message

The message that the validity period has expired will be automatically saved with the determination.

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.4.3 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.4.4 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Shows the serial number of the device.

Shows the date on which the device was automatically added to the device table.

Indicates whether the balance has its own calibratable data memory.

Selection	on off
Default value	off

Remarks about the device.

Input	1000 characters
Default value	empty

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)

Shows the type of analog-digital converter.

Shows the serial number of the measuring input interface.

Selects the type of temperature sensor connected to the measuring input.

Selection	Pt 1000 NTC
Default value	Pt 1000

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Range	1000 ... 99999 Ohm
Default value	30000 Ohm

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Range	1000 ... 9999
Default value	4100

7.5.4 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop deter- mination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.6 867 pH Module

7.6.1 867 pH Module - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **867 pH Module** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
Properties of the measuring inputs.
- *MSB #*
Properties of the MSB connections 1...4 and the peripheral devices connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop deter- mination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.7.3 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Information about the following peripheral devices connected to the MSB connection appears here:

Display of the dosing device type.

Display of the serial number of the connected dosing device.

Display of the stirrer type.

Display of the serial number of the connected stirrer.

Display of the connected remote box.

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

Date of the last GLP test. This date can be selected by clicking on in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.8 730 Sample Changer

7.8.1 730 Sample Changer - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **730 Sample Changer** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Towers*
Properties of Tower 1 and Tower 2 (if present). This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *Rack*
Information on the rack attached. This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *Dosing device*
Properties of the connection and the dosing devices connected to. This tab is only displayed if the Sample Changer is connected to the PC via an RS-232 interface.
- *RS-232*
Selection of the serial interface the device is connected to.



- *GLP*
Information on GLP tests and GLP monitoring.

7.8.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display or selection of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1290).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.8.3 Properties - Tower

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Towers**



Note

This tab is only displayed if a PC and a sample changer are connected via an RS-232 interface.

On the tab **Towers** the tower parameters for Tower 1 and Tower 2 (if present) are shown for the **730 Sample Changer**. These cannot be edited, but must be set on the device itself via the keyboard.

Tower 1 / Tower 2

Max. stroke path

Shows the lowest permitted lift position for the two towers. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Beaker sensor

Shows whether the beaker sensor for the two towers is switched on or off. Each time a sample position is moved to the beaker sensor checks whether a beaker is present or not.

Tower 1

Number of pumps

Shows how many pumps are connected to Tower 1.

759 Swing Head

Shows whether a swing head is mounted on Tower 1.

Tower 2

Number of pumps

Shows how many pumps are connected to Tower 1.



Note

A swing head can only be mounted on Tower 1.



 **Note**

Connecting the dosing devices is described in the manual for the 730 Sample Changer or 774 Oven Sample Processor. If no dosing device is connected then the tab will remain empty.

7.8.6 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



 **Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.8.7 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).



Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Range	3 ... 20 °/s
Default value	20 °/s

[Rack Data]

Opens the dialog window **Rack data** (see Chapter 6.10.3.1, page 1278) or **Rack data (774)** (see Chapter 6.10.3.6, page 1283) in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.9.5 Properties - Dosing device

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Dosing**

On the tab **Dosing device** the number and type of dosing devices connected to the **730 Sample Changer** or **774 Oven Sample Processor** is displayed. A maximum of 12 dosing devices of the type **685 Dosimat** or **700 Dosino** can be connected.

Dosing devices

Shows the dosing device type for each dosing device connected.



Note

Connecting the dosing devices is described in the manual for the 730 Sample Changer or 774 Oven Sample Processor. If no dosing device is connected then the tab will remain empty.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop deter- mination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.



[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1290).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.10.3 Properties - Turm

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1276) for general **Sample posi-**

Selection	1.0 ... 100.0 mm off
Default value	off

Lift speed for manual operation.

Range	100.0 ... 300.0 mm

Selection	166.0 mm
Default value	166.0 mm

Selection	196.0 mm
Default value	196.0 mm

This parameter is only shown when a swing head is mounted on the tower.

Shows the serial number of the swing head.

Range	0 ... 235 mm
Default value	0 mm

Range	0 ... 235 mm
Default value	0 mm



[Configuration]

Opens the dialog window **Configuration** in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** in which the parameters for the external position selected from the table can be edited.

7.10.4 Properties - Rack

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "-----" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Range	3 ... 20 °/s
Default value	20 °/s

[Rack Data]

Opens the dialog window **Rack data** (see Chapter 6.10.3.1, page 1278) or **Rack data (774)** (see Chapter 6.10.3.6, page 1283) in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.10.5 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h



 **Note**

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.10.7 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ [Edit] ▶ Properties... ▶ 'Properties - 'Device type' - 'Device name' ▶ GLP

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range 1 ... 999 Days

Default value **999 Days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.



This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.11.3 Properties - Turm

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1276) for general **Sample positions**(see Chapter 6.10.3.2, page 1279) and **Special beakers**(see Chapter 6.10.3.4, page 1281) will be compared with the **Min. beaker radius**. If

this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	1.0 ... 100.0 mm off
Default value	off

Lift rate

Lift speed for manual operation.

Range	3 ... 25 mm/s
Default value	25 mm/s

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Range	100.0 ... 300.0 mm

814 USB Sample Processor XL

Selection	166.0 mm
Default value	166.0 mm

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 Balance Sample Processor

Selection	196.0 mm
Default value	196.0 mm

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Range	0 ... 235 mm
Default value	0 mm

Rinse position

Rinse position valid for all 4 external positions.

Range	0 ... 235 mm
Default value	0 mm

[Configuration]

Opens the dialog window **Configuration** in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** in which the parameters for the external position selected from the table can be edited.

7.11.4 Properties - Rack

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "-----" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Range	3 ... 20 °s
Default value	20 °s

[Rack Data]

Opens the dialog window **Rack data** (see Chapter 6.10.3.1, page 1278) or **Rack data (774)** (see Chapter 6.10.3.6, page 1283) in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.11.5 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Range	1 ... 999 Days
Default value	999 Days

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Default value	GLP test date + 999 days

The message options can only be edited if monitoring is switched on.

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

The message that the validity period has expired will be automatically saved with the determination.



Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.12 855 Robotic Titrosampler

7.12.1 855 Robotic Titrosampler - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **855 Robotic Titrosampler** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Measuring inputs*
Properties of the measuring inputs.
- *MSB #*
Properties of the MSB connections 1...3 and the peripheral devices connected to.
- *Tower*
Properties of Tower 1.
- *Rack*
Information on the rack attached.
- *GLP*
Information on GLP tests and GLP monitoring.

7.12.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display or selection of the device type.

Only visible with devices that have their own firmware.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Only visible and editable with Sartorius balances.

Input	1000 characters
Default value	empty

1351



Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	Pt 1000 NTC
Default value	Pt 1000

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Range	1000 ... 99999 Ohm
Default value	30000 Ohm

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Range	1000 ... 9999
Default value	4100

7.12.4 Properties - Turm

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1276) for general **Sample positions**(see Chapter 6.10.3.2, page 1279) and **Special beakers**(see Chapter 6.10.3.4, page 1281) will be compared with the **Min. beaker radius**. If

Selection	1.0 ... 100.0 mm off
Default value	off

Lift speed for manual operation.

Range	3 ... 25 mm/s
Default value	25 mm/s

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Range	100.0 ... 300.0 mm

Selection	166.0 mm
Default value	166.0 mm

Selection	196.0 mm
Default value	196.0 mm

This parameter is only shown when a swing head is mounted on the tower.

Shows the serial number of the swing head.

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Range	0 ... 235 mm
Default value	0 mm

Rinse position valid for all 4 external positions.

Range	0 ... 235 mm
Default value	0 mm



[Configuration]

Opens the dialog window **Configuration** in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** in which the parameters for the external position selected from the table can be edited.

7.12.5 Properties - Rack

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Rack**

On the tab **Rack** the rack-specific data of the attached rack are shown.

Rack name

Shows the name of the rack attached. If no rack is in position then "-----" is shown.

Rack code

Shows the rack code of the rack attached. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

Shift rate

Sample rack speed of rotation for manual operation.

Range	3 ... 20 °s
Default value	20 °s

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

At program start

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

If this option is switched on then at each program start the request to prepare the dosing device will appear.

on | off (Default value: **on**)

Time interval

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Range	1 ... 999 Days
Default value	999 Days

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Default value	GLP test date + 999 days

The message options can only be edited if monitoring is switched on.

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.13 864 Balance Sample Processor

7.13.1 864 Balance Sample Processor - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - "Device type" - "Device name"**

The parameters for the device **864 Balance Sample Processor** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Tower #*
Properties of Tower 1 and Tower 2 (if present).
- *Rack*
Information on the rack attached.
- *MSB #*
Properties of the MSB connections 1...3 and the peripheral devices connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

7.13.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display or selection of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1290).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.13.3 Properties - Turm #

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters**Max. stroke path**

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1276) for general **Sample positions**(see Chapter 6.10.3.2, page 1279) and **Special beakers**(see Chapter 6.10.3.4, page 1281) will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	1.0 ... 100.0 mm off
Default value	off

Lift rate

Lift speed for manual operation.

Range	3 ... 25 mm/s
Default value	25 mm/s

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Range	100.0 ... 300.0 mm

814 USB Sample Processor XL

Selection	166.0 mm
Default value	166.0 mm

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 Balance Sample Processor

Selection	196.0 mm
Default value	196.0 mm

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Range	0 ... 235 mm
Default value	0 mm

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.14 874 Oven Sample Processor

7.14.1 874 Oven Sample Processor - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **874 Oven Sample Processor** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Tower*
Properties of the tower.
- *Rack*
Information on the rack attached.
- *MSB #*
Properties of the MSB connections 1...3 and the peripheral devices connected to.
- *Oven*
Information on the oven.
- *GLP*
Information on GLP tests and GLP monitoring.



[Rack Data]

Opens the dialog window **Rack data** (see Chapter 6.10.3.1, page 1278) or **Rack data (774)** (see Chapter 6.10.3.6, page 1283) in which the data of the rack attached can be displayed and edited.

[Initialize rack]

Initializes the attached rack. This resets the rack, the lift and the robotic arm, reads out the rack code and transfers the corresponding rack data to the Sample Processor.

7.14.5 Properties - MSB

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1062) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

on | off (Default value: **on**)

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

on | off (Default value: **on**)

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

on | off (Default value: **off**)

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Information about the following peripheral devices connected to the MSB connection appears here:

Display of the dosing device type.

Display of the serial number of the connected dosing device.

Display of the stirrer type.

Display of the serial number of the connected stirrer.

Display of the connected remote box.

On the tab **Oven** the oven parameters are set:

Display for the 874 Oven Sample Processor only.

Display for the 874 Oven Sample Processor only.

Enter the initial temperature of the oven. Entering an initial temperature means that the oven will heat up to the set temperature when it is switched on. **off** means that the oven will not be switched on.

With the 774 Oven Sample Processor display of the initial temperature set on the device only.

Range	50 ... 250 °C
Default value	off °C

Max. temperature

With the 774 Oven Sample Processor display of the maximum temperature set on the device only.

With the 774 Oven Sample Processor display only.

Range	50 ... 250 °C
Default value	250 °C

Temperature correction

Enter the temperature correction. This parameter directly affects the temperature control and allows it to be adjusted. In this way any temperature difference that may occur between the oven and sample temperature can be compensated.

With the 774 Oven Sample Processor display of the temperature correction set on the device only.

Range	-10 ... +10 °C
Default value	0 °C

7.14.7 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.



Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.15 Avantes Spectrometer

7.15.1 Avantes Spectrometer - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the **Avantes Spectrometer** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Settings*
Information on light source and output signal.
- *Detector*
Information on the detector.
- *Kalibrierung*
Information on wavelength calibration.
- *Dark spectrum*
Information on dark spectrum.
- *Reference spectrum*
Information on reference spectrum.
- *GLP*
Information on GLP tests and GLP monitoring.

7.15.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

Device type

Program version

Only visible with devices that have their own firmware.

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1290).

Device serial number

Set to work

Data storage under legal control

Only visible and editable with Sartorius balances.

Remarks

Input	1000 characters
Default value	empty

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Settings**

Type

1373

7.15.5 Properties - Calibration

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Calibration**

On the tab **Calibration** the data of the wavelength calibration is displayed. A specific wavelength, defined by four wavelength coefficients, is assigned to each pixel on the detector. The wavelength calibration is carried out with the command **CAL Spec**, the calibration data is calculated automatically and displayed on this tab.

Date _____

Display of the time and date of the wavelength calibration.

User

Display of the user logged in at the time of the wavelength calibration.

Method

Display of the method the wavelength calibration has been carried out with.

Selection	Factory settings "Method name"
Default value	Factory settings

[Reset calibration]

Resets the device to factory-adjusted calibration. The **dark spectrum** and **reference spectrum** will be deleted.

Determination ID

ID of the determination the wavelength calibration has been carried out with. With calibration method **Factory setting**, --- is displayed.

Calibration coefficients

Coefficients of the regression function with which the assignment of the CCD pixels to a wavelength is carried out.

C#

Display of the wavelength coefficients **c1** ... **c4**.

7.15.6 Properties - Dark spectrum

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Dark spectrum**

On the tab **Dark spectrum** information on the dark spectrum stored in the device is displayed.

If no dark spectrum has been recorded yet or the calibration has been reset to factory settings, -- is displayed in the fields.

Date _____

Display of date and time the dark spectrum has been recorded.

User

Display of the user logged in during recording of the dark spectrum.

Method

Display of the method the dark spectrum has been recorded with.

Determination ID

ID of the determination the dark spectrum has been recorded in.

Integration time

Display of the integration time at recording the dark spectrum.

Averaged spectra

Number of spectra recorded and averaged.

Smoothing

Display of the number of neighbor pixels the light intensity of each pixel has been averaged with.

Spectrum

Display of the dark spectrum. The graph can be zoomed with the mouse. By double-clicking the whole spectrum is displayed again.

x axis

Display of the wavelength. Unit mm.

y axis

Display of the intensity. Unit Counts.

7.15.7 Properties - Reference spectrum

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Reference spectrum**

On this tab information on the reference spectrum stored in the device is displayed.

If no reference spectrum has been recorded yet or the calibration has been reset to factory settings, -- is displayed in the fields.

Date _____

Display of date and time the reference spectrum has been recorded.

Display of the user logged in during recording of the reference spectrum.

Display of the method the reference spectrum has been recorded with.

ID of the determination the reference spectrum has been recorded in.

Display of the integration time at recording the dark spectrum.

Number of spectra recorded and averaged.

Display of the number of neighbor pixels the light intensity of each pixel has been determined with.

Display of the reference spectrum. The graph can be zoomed with the mouse. By double-clicking the whole spectrum is displayed again.

Display of the wavelength in mm.

Display of the intensity in Counts.

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.16 RS-232 device

7.16.1 RS-232 device - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

The parameters for a generic **RS-232 device** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *RS-232*
Selects and configures the serial interface the device is connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

7.16.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

COMn
First free COM port.

Transmission speed. Additionally, this baud rate must be set on the device itself.

Number of data bits.

Type of parity testing.

Number of stop bits.

Type of data transmission protocol.

Maximum waiting time for receiving characters. If this time is exceeded, receiving will be stopped.

Final character for transmission in hexadecimal code.



Selection	\0D \0D\0A \0D\0A\0A \0D\0D\0A
Default value	\0D\0A (\0D = CR, \0A = LF)

Terminator for receive

Final character for reception in hexadecimal code.

Selection	\0D \0D\0A \0D\0A\0A \0D\0D\0A
Default value	\0D\0A (\0D = CR, \0A = LF)

Code page

Code page used for the data transmission.

Selection	Cp437 Cp850 Cp852 ASCII
Default value	Cp437

Send byte per byte

Send byte per byte

on | off (Default value: off)

If this option is enabled each character is sent separately. Before sending the next character, the waiting time is waited for.

Waiting time

Only editable if each character is sent separately.

Range	0 ... 9000 ms
Default value	0 ms

[Connect]

Establishes the connection to the RS-232 device. The dialog window **Establish connection** (see Chapter 7.16.5, page 1384) opens.

[Disconnect]

Disconnects the connection to the RS-232 device (only then the device can be deleted out of the configuration).

7.16.4 Properties - GLP

Tab: Configuration ▶ Device ▶ [Edit] ▶ Properties... ▶ 'Properties - 'Device type' - 'Device name' ▶ GLP

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

on | off (Default value: **off**)

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is swichted on.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 80). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is swichted on.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

on | off (Default value: **off**)

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 83).

Acoustic signal

on | off (Default value: **off**)

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

Action

The actions can only be edited if monitoring is switched on.

If during monitoring it is found that the validity period has expired then one of the following actions will be triggered automatically at Start test.

Selection	Record message Display message Stop determination
Default value	Display message

Record message

The message that the validity period has expired will be automatically saved with the determination.

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.16.5 Establish a connection to the RS-232 device

Dialog window: **Configuration** ▶ **Devices** ▶ **Properties** ▶ **RS-232** ▶ **Connect**

In order to establish a connection to a RS-232 device the button **[Connect]** has to be pressed on the tab **RS-232**.

If then a message is entered in the field besides the button **[Send]** and is sent, the message received by the device appears in the large text field.

Text field

The messages sent to and received by the device are shown in the large text field.

Input field

Input field for a message to be sent to the device.

[Send]

Sends the message shown in the input field to the device.



Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.17.3 Properties - RS-232

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	300 600 1200 2400 4800 9600 19200 57600 115200
Default value	9600

Data bit

Number of data bits.

Selection	7 8
Default value	8

Parity

Type of parity testing.

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.17.5 Establish a connection to the balance

Dialog window: **Configuration ▶ Devices ▶ Properties ▶ RS 232 ▶ Connect**

In order to establish a connection to a balance the button **[Connect]** has to be pressed on the tab **RS 232**.

If then the print key on the connected balance is pressed, the data provided by the balance will be inserted in the following fields:

Device name

Name of balance.

Sample size

Sample size.

Sample size unit

Sample size unit.

ID1

Sample identification ID1.

ID2

Sample identification ID2.

7.18 Barcode reader

7.18.1 Barcode reader - General

A barcode reader is used to enter sample and other data in **tiamo**.



Note

A barcode reader only has to be configured as a **device** in **tiamo** when the functions for automatic data import into sample tables are to be used. If a USB barcode reader not configured as a device is connected to the PC it will be recognized in a similar way to a keyboard as being an **HID** (Human Interface Device) and can be used for data entry in all fields.

Barcode reader as device



Note

If the functions of a barcode reader for automatic data import into sample tables are to be used it must be added in **tiamo** as a device and configured 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 barcode reader connected)

Postamble #1: **04hex** (^D, EOT)

Finish: <CR> <LF>

Refer to the manual of the barcode reader for its configuration.

Barcode reader as HID



Note

If a barcode reader is to be used as HID it must be configured the way it does not transmit any preamble check characters.

Refer to the manual of the barcode reader for its configuration.

7.18.2 Barcode reader - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

The parameters for a **barcode reader** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Settings*
Settings for the barcode reader.
- *GLP*
Information on GLP tests and GLP monitoring.

7.18.3 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

On the tab **General** general properties of the device are displayed.

Device name

Name of device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display or selection of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1290).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Set to work

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.18.4 Properties - Settings

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Settings**

Barcode reader ID

Shows the identification of the barcode reader.

Input target

Selection of the field into which the output from the barcode reader is to be entered.

Selection	Active input field Method ID1...16 Sample size Sample size unit Sample position
Default value	Active input field

[Connect]

Establishes a connection to the barcode reader. The dialog window **Establish connection** (see Chapter 7.18.6, page 1394) appears.

[Disconnect]

Disconnects the connection to the barcode reader (only then the device can be deleted out of the configuration).

7.18.5 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 80).

Comment GLP test

Comment on GLP test.

8 Manual control

8.1 Manual Control - General

Program part: **Manual Control**

Definition

In **tiamo**, **Manual control** refers to the program part in which the connected devices can be directly actuated, i.e. without a predefined execution specification. The precondition for this is that the devices are switched on and detected by **tiamo**. The Manual control is also possible live when running a method.

Close

The dialog window **Manual Control** can be closed with **[Close]** or the Windows buttons for closing.



Note

The Manual Control can only be closed when no more manually triggered actions are running (except: Stirrer is on).

8.2 Manual control - Desktop

Program part: **Manual Control**

Manual Control symbol



If you click on the **Manual** symbol in the vertical bar on the left margin, the program part **Manual Control** will be opened in its own window, while the **Manual** symbol will be shown in color at the same time.

Elements

The desktop of the program part **Manual control** comprises the following elements:

- *Selecting device*
- *Functions/Parameters*
- *Graphic function*



8.3 Manual Control - Device selection

Program part: **Manual Control**

In the subwindow for the device selection, the devices or function units of devices can be selected, on which the functions are to be triggered manually. Therefore they are displayed in tree-form. Displayed are all devices configured in the device table with status "**ok**", device name and (in brackets) the device type number. The currently selected device is shown with a blue background. Devices, which are still running manually triggered actions, are shown with red lettering.

8.4 Manual Control - Functions

Program part: **Manual Control**

In the subwindow Functions/Parameters, the functions for the manual control of the selected device and the accompanying parameters can be selected. In addition, here the measured values for running actions and messages are displayed.

Depending on the device different functions are possible.

8.4.1 Dosing

8.4.1.1 Dosing - Overview

Program part: **Manual Control**

If in the subwindow for the device selection, the group **Dosing device** or a single **Dosing device** is selected, then the functions and parameters belonging to these dosing devices are displayed in the subwindow Functions/Parameters.

Dosing functions

The dosing functions for exchange and dosing units are displayed on the following tabs:

- *General*
- *Prepare*
- *Fill*
- *Empty*
- *Fixed volume*
- *Dosing*

Devices

The dosing functions can be carried out with dosing devices that are built in or connected to the following devices:

Titino: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 784, 785, 794, 795, 798, 799

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

pH/Ion - Meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robitic Titrosampler: 855

8.4.1.2 Dosing - General

Program part: **Manual Control**

Here information on the selected dosing device, the attached exchange/ dosing unit and the containing solution is displayed. This tab only appears if a single dosing device is selected.

Exchange/Dosing unit:

Name

Display of the designation for the exchange or dosing unit entered in the configuration. This field appears always for intelligent exchange/dosing units. With non-intelligent exchange/dosing units it is only displayed, if a solution has been selected for **Solution**.

Type

Display of the type of the exchange/dosing unit attached to the dosing device (**EU**, **IEU**, **DU**, **IDU**).

Cylinder volume

Display of the cylinder volume of the exchange/dosing unit attached to the dosing device.

Solution

Solution

Selection	Titrant/Solution not defined
Default value	not defined

not defined

Select the titrants and solutions for non-intelligent exchange/dosing units listed in the **Solution table**. For intelligent exchange/dosing units the name is only displayed.

Titer

Display of the titer of the solution put on. This field only appears for intelligent exchange/dosing units or if the solution for non-intelligent exchange/dosing units has been selected.

8.4.1.3 Dosing - Prepare

Program part: **Manual Control**

Here the preparing of exchange/dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices.



Note

This tab is not displayed for an internal dosing device on the **Titrimos 702, 716, 718, 719, 720, 721, 784, 785, 794, 795, 798**.

[Start]

Start preparing for the selected dosing device(s). The parameters defined for the exchange unit or dosing unit will be used.

[Stop]

Stop preparing for the selected dosing device(s).

8.4.1.4 Dosing - Fill

Program part: **Manual Control**

Here the filling of exchange/dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices.



Note

Before filling the dosing devices connected to Titrinos, ensure that the corresponding exchange or dosing units are attached. If the filling procedure is started nevertheless, the Titrino might not be actuated anymore and has to be switched off and on again.

[Start]

Start filling for the selected dosing device(s).

[Stop]

Stop filling for the selected dosing device(s).

Dosing - Empty

Program part: **Manual Control**

Here the emptying of dosing units can be started and stopped. This tab appears when selecting a single dosing device as well as with all dosing devices with dosing units.



Note

This tab is not displayed for external dosing devices on the **TitriNOS 736, 751, 758, 799**.

[Start]

Start emptying for the selected dosing device(s). The parameters defined for the dosing units will be used.

[Stop]

Stop emptying for the selected dosing device(s).

8.4.1.6 Dosing - Add fix volume

Program part: **Manual Control**

Here the dosing of a preset volume can be started and stopped. This tab only appears if a single dosing device is selected.

Volume

Fixed volume to be dosed.

Range	100 ... 99999.9 ml
Default value	100 ml

Dosing rate

The volume is dosed at this rate. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.



Note

For viscous liquids the dosing rate should be reduced.

Selection	maximum
Default value	maximum

Titrandos, 814, 815, 855

Range	0.01 ... 166.00 mL/min

730, 774, 778, 789

Range	0.01 ... 160.00 mL/min

Titrimo

Range	0.01 ... 150.00 mL/min

Filling rate

The buret is filled at this rate after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.



Note

For viscous liquids the filling rate should be reduced.

Selection	maximum
Default value	maximum

Titrandos, 814, 815, 855

Range	0.01 ... 166.00 mL/min

730, 774, 778, 789

Range	0.01 ... 160.00 mL/min

Titrimo

Range	0.01 ... 150.00 mL/min

Fill automatically

on | off (Default value: **on**)

This parameter is only visible for devices of the type Titrandro, Dosing Interface and USB Sample Processor.

If this option is enabled, the buret is filled automatically after dosing. During the filling procedure the volume display is reset to **0.0000 mL**. If this option is disabled, the added volume is displayed cumulatively.

[Start]

Start fixed volume dosing for the selected dosing device. The dosed volume is displayed live.



Start filling of the buret for the selected dosing device. This button is only available if **Fill automatically** is disabled. During the filling procedure, the volume display is set to **0.0000 mL**.

Stop fixed volume dosing for the selected dosing device. If the dosing has been stopped, it cannot be continued.

Program part: **Manual Control**

Rate at which dosing should take place. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered dosing rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.



The buret is filled at this rate after the dosing. The maximum filling rate depends on the cylinder volume of the exchange unit or dosing unit used. If the entered filling rate is too high for the selected dosing device, it will automatically be reduced during dosing to the largest possible value.



Note

For viscous liquids the filling rate should be reduced.

Selection	maximum
Default value	maximum

Titrandos, 814, 815, 855

Range	0.01 ... 166.00 mL/min

778, 789

Range	0.01 ... 160.00 mL/min

[Dosing]

Start manual dosing for the selected dosing device. Dosing will take place as long as the button is pressed down. The dosed volume is displayed live.



Note

Parameters modified after the start of the dosing are not valid until the next dosing procedure.

[Fill]

Start filling of the buret for the selected dosing device. During the filling procedure the volume display is set to **0.0000 mL**.

8.4.2 Stirring

8.4.2.1 Stirring - Overview

Program part: **Manual Control**

If in the subwindow for the device selection (*see Chapter 8.3, page 1396*), a **Stirrer** connected via MSB or stirrer connector is selected, then the functions and parameters belonging to the stirrers are displayed in the subwindow Functions/Parameters.

Stirrer functions

The stirrer functions are displayed on the following tabs:

- Switch on/off
- Continuous operation

Devices

The stirrer functions can be carried out with stirrers that are connected to the following devices:

Titrimo: 751, 758, 785, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 856

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

8.4.2.2 Stirring - Switch on/off

Program part: **Manual Control**

Here stirrers can be switched on and off. This tab appears when selecting a single stirrer as well as with all stirrers.

Stirring rate

Select the stirring rate. This parameter can also be modified live.

Range	-15 ... 15
Default value	8

[Start]

Start stirring for the selected stirrer.

[Stop]

Stop stirring for the selected stirrer.

8.4.2.3 Stirring - Continuous operation

Program part: **Manual Control**

Here stirrers can be switched on for a defined time. This tab only appears if a single stirrer is selected.

Stirring rate

Select the stirring rate. This parameter can also be modified live.

Range	-15 ... 15
Default value	8

Stirring time

Enter the time during which should be stirred. If this parameter is modified after the start of the stirrer, it is not valid until the next stirring procedure.

Range	1 ... 999999 s
Default value	60 s



[Start]

Start continuous operation for the selected stirrer. In the status display the remaining time is shown. The stirrer will be switched off automatically after the stirring time has elapsed

[Stop]

Stop stirring for the selected stirrer.

8.4.3 Remote functions

Program part: **Manual Control**

If in the subwindow for the device selection, a remote box or a remote interface is selected, then the functions and parameters belonging to these elements are displayed in the subwindow Functions/Parameters.

Devices

The remote functions can be carried out with the following devices:

Titrino: 702*, 716*, 718*, 719*, 720*, 721*, 736*, 751, 758, 784, 785, 794*, 795, 798, 799 (* devices with 3 output lines only)

Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample changer: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Spectrometer: Avantes

Input signal

Current status

Displays the current status of the 8 input lines.

Templates/Entry

If the current status corresponds to one of the defined templates for the inputs, the corresponding name is shown here.



Note

Only templates without asterisks * are recognized.



Note

We recommend masking the irrelevant output lines with an asterisk * so as not to modify these line conditions.



Note

For Titrinos with 3 output lines, only 3 characters can be entered. If signal pattern is selected, also only the first 3 characters will be used.

[Set]

Set the bit pattern defined under **Outputs**.

8.4.4 Sample changer functions

8.4.4.1 Sample changer - Overview

Program part: **Manual Control**

If in the subwindow for the device selection, a tower of a sample changer is selected, then the functions and parameters belonging to this sample changer are displayed in the subwindow Functions/Parameters.

Sample changer functions

The sample changer functions are displayed on the following tabs:

- General
- Move
- Assign position
- Pump
- Heater/Gas

Devices

The sample changer functions can be carried out with the following devices:

730, 774, 778, 789, 814, 815, 855, 864, 874

8.4.4.2 Sample changer - General

Program part: **Manual Control**

Here information on the rack attached is displayed. In addition, shift and lift rate for manual sample changer control can be set.

Rack name

Shows the name of the rack attached. If no rack is attached, ----- is displayed.

Rack code

Shows the number of positions on the rack attached. If no rack is attached, ----- is displayed.

Number of positions

Shows the number of positions on the rack attached. If no rack is attached, ----- is displayed.

Shift rate

Shift rate for manual control of the sample changer.

Range	5 ... 20 °/s
Default value	20 °/s

Lift rate

Lift rate for manual control on the selected tower.

Range	5 ... 25 mm/s
Default value	25 mm/s

Swing rate

Swing rate for manual control of the Swing Head on the sample changer.

Range	10 ... 55 °/s
Default value	55 °/s

[Initialize rack]

The rack in position is initialized.

**Note**

When initializing the rack, the following actions are carried out:

- Move rack in position to read out rack code.
- Transfer rack data for the rack code to sample changer.
- Move lifts upwards to 0 mm
- Move robotic arm back.

8.4.4.3 Sample changer - Move

Program part: **Manual Control**

Here the moving to desired rack, lift or robotic arm position can be triggered manually.

Rack position

Set rack position.

Current position

Shows the current rack position.

Target position

Select or enter the rack position to be moved to.

Range	1 ... n (depending on rack)
Default value	1
Selection	Special beaker 1...16

[Start]

Start moving to target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray) and **Move...** instead of **Ready** is displayed as status message.



Move to current rack position - 1.



Move to current rack position + 1.

Lift position

Set lift position for the selected tower.

Current position

Shows the current lift position in mm.

Target position

Enter or select the lift position that is to be moved to for the current rack position (normal beaker, special beaker, external position).

Range	0 ... 235 mm
Default value	0 mm
Selection	Home position Work position Shift position Rinse position Special position

- Shift position**
For normal beakers and external positions only.
- Rinse position**
For normal beakers and external positions only.
- Special position**
For normal beakers and external positions only.



Move lift downwards as long as this button is pressed.

Set the robotic arm position (angle) on the selected tower.

Displays the current position of the robotic arm in °.

Enter or select the robotic arm position to be moved to.

Range	0.0 ... 330.0 °
Default value	0.0 °
Selection	External 1...4

Move robotic arm to the right (toward **330°**) as long as this button is pressed.

Program part: **Manual Control**

Rack position

Assign current rack position to a specific special beaker.



Current position

Shows the current rack position.

Special beaker

Select the special beaker to be assigned to the current rack position.

Range	1 ... 16
Default value	1

[Assign]

Trigger assignment. During the assignment the cursor is displayed as hour-glass.

Lift position

Assign current lift position to a specific special position..

Current position

Shows the current lift position in mm.

Work position for

If this option is selected, the current lift position is assigned to the work position of the tower, of a special beaker or to an external position of the robotic arm.

all except 730

Selection	Tower 1 Tower 2 Special beaker 1...16 External 1...4
Default value	Tower 1

730 only

Selection	Tower 1+2 Special beaker 1...16 External 1...4
Default value	Tower 1+2

Rinse position for

If this option is selected, the current lift position is assigned to the rinse position of the tower.

all except 730

Selection	Tower 1 Tower 2 External position
Default value	Tower 1

730 only

Selection	Tower 1+2 External position
Default value	Tower 1+2

If this option is selected, the current lift position is assigned to the shift position of the tower.

Selection	Tower 1 Tower 2
Default value	Tower 1

Selection	Tower 1+2
Default value	Tower 1+2

If this option is selected, the current lift position is assigned to the special position of the tower.

Selection	Tower 1 Tower 2
Default value	Tower 1

Selection	Tower 1+2
Default value	Tower 1+2

If this option is selected, the current lift position is assigned to the swing position of the robotic arm.

Selection	Tower 1 Tower 2
Default value	Tower 1

Selection	Tower 1+2
Default value	Tower 1+2

Trigger assignment. During the assignment the cursor is displayed as hourglass.

Assign current rack position to a specific external robotic arm position.

Displays the current position of the robotic arm in °.



External position

Select the external position to which the current robotic arm position is to be assigned.

Range	1 ... 4
Default value	1

[Assign]

Trigger assignment. During the assignment the cursor is displayed as hourglass.

8.4.4.5 Sample changer - Pump

Program part: **Manual Control**

Here the pumps connected to the tower can be switched on and off.

Pump 1

Manually control pump 1 or valve 1 on the selected tower.

Operation

Select whether the pump or valve should be switched on/off manually or whether they should be switched on for a defined time and then automatically be switched off.

Selection	On/Off Duration
Default value	On/Off

Duration

Enter the duration during which the pump/valve should remain switched on.
This field only appears for **Operation = Duration**.

Range	1 ... 999999 s
Default value	60 s

[Start]

Start pump 1. In the status display the running time since start is shown.

[Stop]

Stop pump 1.

Pump 2

Manually control pump 2 or valve 2 on the selected tower.

Operation

Select whether the pump or valve should be switched on/off manually or whether they should be switched on for a defined time and then automatically be switched off.

Selection	On/Off Duration
Default value	On/Off

Duration

Enter the duration during which the pump/valve should remain switched on. This field only appears for **Operation = Duration**.

Range	1 ... 999999 s
Default value	60 s

[Start]

Start pump 2. In the status display the running time since start is shown.

[Stop]

Stop pump 2-

8.4.4.6 Sample changer - Heater/Gas

Program part: **Manual Control**

Here the heater and gas flow on the 774 and 874 Oven Sample Processor can be switched on and off.

Heater

Heat the oven up to the desired temperature during the defined heating up time.

Temperature

Temperature up to which heating should take place. With **Init** it is heated up to the initial temperature set on the device.

Range	50 ... 250 °C
Default value	50 °C

Selection	Init

Heating up time

Duration of the heating up period until reaching the desired temperature.

Range	1 ... 999 min
Selection	off
Default value	off

[Start]

Start heater. In the status display the current temperature is shown.

[Stop]

Stop heater.

Gas flow

Inlet

Select the inlet of the carrier gas.

Selection	Pump Valve
Default value	Pump

Pump

Use of ambient air as carrier gas.

Valve

Use of gas out of a compressed gas cylinder.

Flow rate

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Range	10 ... 150 mL/min
Default value	50 mL/min

Gas type

Gas type of the carrier gas.

Selection	Air Nitrogen Other gas
Default value	Air

Gas flow factor

Factor for the correct determination of the gas flow. This parameter is only displayed for **Gas type = Other gas**. The values for frequently used carrier gases are listed in the manual of the 774 and 874 Oven Sample Processor.

Range	1 ... 9.999
Default value	1.000

[Start]

Switch on gas flow. In the status display the running time since start is shown.

[Stop]

Switch off gas flow.

Gas flow pump

Switch the gas flow pump on the Oven Sample Processor on/off.

[Start]

Switch on gas flow pump. In the status display the running time since start is shown.

[Stop]

Switch off gas flow pump.

Inert gas valve

Switch the inert gas valve on the Oven Sample Processor on/off.

[Start]

Switch on inert gas valve. In the status display the running time since start is shown.

[Stop]

Switch off inert gas valve.

8.4.5 Measure**8.4.5.1 Measure - Overview**

Program part: **Manual Control**

If in the subwindow for the device selection, a **measuring input** for a device is selected, then the functions and parameters belonging to this device are displayed in the subwindow Functions/Parameters.

Measuring functions

The measuring functions are displayed on the following tabs:

- *Measure*
- *Intensity*
- *Sample spectrum*

Devices

The measuring functions can be carried out with the following devices:

Titrimo: 702, 716, 718, 719, 720, 721, 736, 751, 758, 785, 784, 785, 794, 795, 798, 799

Titrando: 808, 809, 835, 836, 841, 842, 857, 888, 890, 901, 902, 904, 905, 906, 907

Dosing Interface: 846

Conductometer: 712, 856

pH/Ion - Meter: 867

Robotic Titrosampler : 855

Spectrometer: Avantes

8.4.5.2 Measure - Measure

Program part: **Manual Control**

Here the measuring can be started and stopped.

Measured quantity

The selectable measured quantities depend on the device whose measuring input has been selected in the device selection.

Selection	pH	U	Ipol	Upol	Temperature	Conc	Cond



Note

Which other parameters are displayed depends on the selected measured quantity.

Sensor

Select the sensor, the ones of the sensor table are available. Depending on the measured quantity only specific sensor types can be selected.



Note

If an intelligent sensor is connected to the measuring input it is displayed.

Measurement temperature

Temperature, which can be entered manually. If a temperature sensor is connected, the temperature is measured continuously and the value entered will be ignored. The value is used for the temperature correction of the measurement.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Titrimo

Range	-170.0 ... 500.0 °C
Default value	25.0 °C

I(pol)

The polarization voltage is the voltage applied to the polarizable electrode during an amperometric measurement.

Titrandu, 855

Range	-125.0 ... 125.0 μA (Increment: 2.5)
Default value	5.0 μA

Range	-127 ... 127 μA (Increment: 1)
Default value	5 μA

The polarization voltage is the potential applied to the polarized electrode during an amperometric measurement.

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

Range	-1270 ... 1270 mV (Increment: 10)
Default value	400 mV

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).

Range	-170.0 ... 500.0 °C
Default value	20.0

Range	-20.0 ... 150.0 °C
Default value	20.0

off

The conductivity at the measuring temperature is displayed.

Selection	Temperature coefficient Sample solution
Default value	Temperature coefficient

Manually enter a constant temperature coefficient.

Select a function for the temperature coefficient from the table **Sample solutions (TC conductivity)**.

Range	0.00 ... 9.99 %/°C



Sample solution

Select name from the table **Sample solution (TC conductivity)**.

Selection	DIN Entries of the table
Default value	DIN

[Start]

Start measuring.

[Stop]

Stop measuring.

8.4.5.3 Measure - Intensity

Program part: **Manual Control**

Here the intensity of an uncorrected spectrum can be measured and displayed.

Start wavelength

Lower limit of the spectrum.

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

End wavelength

Upper limit of the spectrum.

Range	200.0 ... 1100.0 nm
Default value	1000.0 nm

Integration time

Integration time for spectrum recording.

Range	0.01 ... 600000 ms
Default value	6 ms

Averaged spectra

The number of spectra that are recorded and averaged.

Range	1 ... 10000
Default value	10

Smoothing

Number of neighboring pixels with which the value for each measurement pixel is determined.

Range	0 ... 100 Pixels
Default value	0 Pixels

Start measuring of the intensity. The parameters defined will be used.

8.4.5.4 Measure - Sample spectrum

Program part: **Manual Control**

Here a sample spectrum can be measured and displayed.



Note

Before a sample spectrum can be measured, a reference spectrum has to be recorded in a determination by a spectrometer.

The parameters **Start wavelength**, **End wavelength**, **Integration time**, **Averaged spectra** and **Smoothing** are read out of the reference spectrum and displayed, they cannot be modified.

[Measure]

Start measuring of the sample spectrum. The parameters defined will be used. Only active, if a reference spectrum is available.

8.5 Manual Control - Graphical display

Program window:Manual control

In the subwindow for the graphical display all running, manually triggered functions are displayed graphically.

Double click on the desired field with the left-hand mouse key.



The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

- 1 Click on the symbol or menu item **Filter** ► **Special filter**.

2 Use the **Edit ► Edit line** menu to open the dialog window **Edit filter criterion New filter**.

4 In the **Special filter** dialog window, click on **[Apply filter]**.

Using special filter

The table will be filtered.

How to proceed?

2 Click on the symbol  or the menu item **Tools ► Audit Trail....**

The dialog window **Audit Trail** opens.

- 3 If desired, filter Audit Trail table.
- 4 If desired, select Audit Trail entries to be exported.
- 5 Click on the menu item **File ► Export....**

The dialog window **Export Audit Trail** opens.

- 6 Enter or select directory and file name for saving the export file in the field **Save file as**.
- 7 In the field **Selection** select the desired option (**All records** or **Selected records**).
- 8 Click on **[OK]**.

The entries selected in the Audit Trail table will be exported.



Note

Audit Trail entries are exported in text format. They cannot be imported back into the Audit Trail table.

9.1.4 Archiving Audit Trail

How to proceed?



Note

Audit Trail entries can be backed up and restored together with the configuration data.

- 1 Select program part **Configuration**.
- 2 Click on the symbol  or the menu item **Tools ► Audit Trail...**
The dialog window **Audit Trail** opens.
- 3 With menu item **File ► Archive...** the dialog window **Archive Audit Trail** opens.

- The entries selected in the Audit Trail table will be archived as a text file.



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.

How to proceed?



2 Click on the symbol  or the menu item **Tools ► Audit Trail....**

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- 3 Archive desired Audit Trail entries.
- 4 With the menu item **File ► Delete** the dialog window **Delete Audit Trail** opens.
- 5 Under **Selection**, select the desired option (**All archived records** or **Archived records until** including date selection).
- 6 User 1: Enter **User name** and **Password**.
- 7 User 2: Enter **User name** and **Password**.
- 8 Click on **[OK]**.

The archived entries selected in the Audit Trail table will be deleted.

9.2 Backup

9.2.1 Backing up database

How to proceed?

General

In **tiamo**, **determination databases** that in contrast to the **configuration database** can be generated by the user and contain the determination data are referred to as databases. Among such determination data the method data is used for the determination, the measuring data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**) the databases are stored on the drives administered by the computer and are only available to those users registered at that computer who have the appropriate access rights. In Client/Server systems (**tiamo multi**) the databases are stored on drives administered centrally by the server and are available globally throughout the entire Client/Server system, i.e. all users with the appropriate access rights can use these databases.



Note

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files be copied to an external directory or to a CD/DVD.

Backup database manually

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager...**.
The dialog window **Database manager** opens.
- 3 Select database.
- 4 Click on **[Backup]** in the dialog window **Database manager**.
The dialog window **Backup database 'Database name'** is opened.
- 5 Select the directory for the backup in the field **Backup directory**.
- 6 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive the backup date should be added manually to the **Backup name** field because the backup date information is not available when restoring.

- 7** Click on **[Start]**.
- The manual backup of the database is started and the database is backed up to the selected directory.

Backup database automatically

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The dialog window **Database manager** opens.
- 3 Select desired database and click on **[Properties]**.
The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.

- 4 On the tab **General** enter a comment on the database in the field **Comment**.
- 5 On the tab **Backup** enable the check box **Backup monitoring**.
- 6 Enter **Interval** for backup monitoring or date for the next backup in the field **Next backup**.
- 7 Activate the **Start backup automatically** check box.
- 8 Select the directory for the backup in the field **Backup directory**.
- 9 Click on **[OK]**.

The dialog window **Properties - Database** is closed and the database will be backed up to the selected directory at the desired time.

9.2.2 Restoring database

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The window **Database manager** opens.
- 3 Click on **[Restore]** in the **Database manager** dialog window.
The **Restore databases** dialog window opens.
- 4 Select the directory in the **Backup directory** in which the desired database was backed up.
- 5 Select or enter the name for the desired backup file in the **Backup name** list box.
- 6 Enter the name under **Save as** under which the database is to be restored.
- 7 Click on **[Start]**.

The database restoring is started.



Note

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

9.2.3 Backing up configuration data

How to proceed?

General

The configuration data in **tiamo** is saved in the **Configuration database**. Configuration data includes all cross-method settings for devices, titrants/solutions, sensors, common variables and rack data as well as **Methods**, **Security settings** (see Chapter 6.2.2.1, page 1161), **User administration** (see Chapter 6.2.1.1, page 1152), **Program administration** (see Chapter 6.2.3.1, page 1170), templates and **Audit Trail** (see Chapter 6.4, page 1192).

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder of the computer on which the program has been installed. In Client/Server systems (**tiamo multi**) the configuration database is stored centrally on the server and saves and contains all the configuration data of all computers (clients) that are connected to this server.



Note

It is strongly recommended that the configuration database be backed up periodically.

Manual configuration data backup

- 1 Select program part **Configuration**.
- 2 Click on the menu item **File ► Backup ► Manually**.
The dialog window **Backup configuration data manually** opens.
- 3 Select the directory for the backup in the field **Backup directory**.
- 4 Select or enter a new name for the backup file in the **Backup name** list box. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive the backup date should be added manually to the **Backup name** because the backup date information is not available when restoring.

- 5** Click on **[Start]**.

The manual backup is started and the configuration database is backed up to the selected directory.

Automatic configuration data backup

- 1** Select program part **Configuration**.

- 2** Click on menu item **File ▶ Backup ▶ Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the next backup in the field **Next backup**.

- 5 Select the directory for the backup in the field **Backup directory**.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed and the configuration database will be backed up to the selected directory at the desired time.

9.2.4 Restoring configuration data

How to proceed?

tiamolight, tiamo full

- 1** Exit **tiamo**.

- 2 Start the file **ConfigRestore.exe** in the program directory ...**tiamo** \bin.

The dialog window **Restore configuration data** opens.

- 3 Select the directory in the **Backup directory** field in which the desired database was backed up.
- 4 Select or enter the name for the desired backup file in the **Backup name** list box.
- 5 Click on **[Start]**.

The restoring of the configuration database is started.

tiamoMulti

- 1 Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.
- 2 Start the file **ConfigRestore.exe** in the program directory **...\tiamo\bin** on the server.

The dialog window **Restore configuration data** opens.

- 3 Select the directory in the **Backup directory** field in which the configuration database was backed up.
- 4 Select or enter the name for the desired backup file in the **Backup name** list box.
- 5 Click on **[Start]**.

The restoring of the configuration database is started.

9.2.5 Backup methods

How to proceed?

General

Methods are stored in the configuration database and globally accessible for all clients. This means that in order to save methods the configuration data must be saved manually or automatically. A further possible way is to export the methods and then to save these files externally from **tiamo**.

Manual configuration data backup

- 1** Select program part **Configuration**.

- 2** Click on the menu item **File** ► **Backup** ► **Manually**.

The dialog window **Backup configuration data manually** opens.

- 3** Select the directory for the backup in the field **Backup directory**.

- 4** Select or enter the name for the desired backup file in the **Backup name** list box. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive the backup date should be added manually to the **Backup name** because the backup date information is not available when restoring.

- 5** Click on **[Start]**.

The manual backup of the configuration database is started.

Automatic configuration data backup

- 1** Select program part **Configuration**.

- 2** Click on menu item **File ▶ Backup ▶ Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the **Next backup**.

- 5** Select the directory for the backup in the field **Backup directory**.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed.

1 Select program part **Method**.

The dialog window **Method manager** opens.

4 Select desired methods.

The dialog window **Select directory for export** opens.

The selected methods are each exported as files named '**Method name**'.mnet.



The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

How to proceed?



1 Select program part **Configuration**.

The dialog window **Audit Trail** opens.



- 3** Click on the menu item **File ► Archive...**

The dialog window **Archive Audit Trail** opens.

- 4** Enter or select directory and file name for saving the archive file in the field **Save file as**.

- 5** In the field **Selection** select the desired option (**All records** or **Records until** including date selection).

- 6** Click on **[OK]**.

The entries selected in the Audit Trail table will be archived as a text file.



Note

Archiving Audit Trail entries is identical to export, i.e. the Audit Trail entries are stored in text format. They cannot be imported back into the Audit Trail table. The difference between this and exporting is that the archived entries can be marked in the column **Archive** and then deleted.



Note

The text files generated by archiving are no longer protected and can be manipulated. If you want to ensure that these files are archived in an unaltered condition you must use a suitable external backup or archiving program.



Note

In order to calculate statistical calculations for results, the **Statistics** option must be enabled in the **START** command of the method and, in addition, the **Statistics** option must be enabled in the **CALC** command for each desired result.

- 5 Activate the **Statistics** check box.
- 6 If desired, modify number of single determinations.
- 7 Enter **sample data**.
- 8 Click on **[Start]**.

The single determination will be started. The subwindow **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.



Note

If the method contains a **DATABASE** command, then it is mandatory that this command be executed in all statistically linked determinations. If this is not done, then the statistical results will be displayed incorrectly and the determinations cannot be reprocessed.

9.3.2 Starting determination series

How to proceed?

Determination series without statistics

- 1 Select program part **Workplace**.
- 2 Use the **Run** subwindow to select the **Determination series** tab.
- 3 If desired, enter **Determination parameters**.
- 4 Load existing sample table or enter sample data directly into the working sample table.

The subwindow **Method** shows the method loaded in the first line.

- 6** Click on **[Start]**.

Determination series with statistics

- 2 Use the **Run** subwindow to select the **Determination series** tab.

- 4** Load existing sample table or enter sample data directly into the working sample table.



6 If desired, modify number of single determinations.

- The first determination of a sample series will be started. The sub-window **Method** shows active tracks and commands, the subwindow **Live display** live curves, measured values and messages.



Note

If the method contains a **DATABASE** command, then it is mandatory that this command be executed in all statistically linked determinations. If this is not done, then the statistical results will be displayed incorrectly and the determinations cannot be reprocessed.

9.3.3 Searching for determinations

How to proceed?

- 1** Select program part **Database**.

- 2 Click on the symbol or the menu item **File ▶ Open...**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

- 5 Click on the symbol  or the menu item **Determination ► Find...**

The dialog window **Search - Database 'Database name'** is opened.

- 6** Enter or select desired search terms and search options.

- 7** Click on **[Search next]**.

The next determination containing the search term is marked in the **Determination overview**.

9.3.4 Filter determinations

How to proceed?

Opening the database

- 1** Select program part **Database**.

- 2 Click on the symbol or the menu item **File ▶ Open...**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

Filtering can now be done via quick filter or special filter in the **Determination overview** window:

Quick filter

- 1 Click on the symbol or on **Filter ► Quick filter** in the context menu.

After this function has been selected, the field in which the cursor is located will have a yellow background when navigating in the determination table.

- 2** Double click on the desired field with the left-hand mouse key.

The contents of the field selected in the table will be set as a filter condition and this filter will be applied directly to the table.



Note

The quick filter can be used again within the filtered table, so that the number of entries can be limited step by step.

Defining and using special filter

- 1 Click on the symbol  or on **Filter** ► **Special filter** in the context menu

The dialog window **Special filter** opens for defining user-specific filters.

- 2** Use the **Edit ► Edit line** menu item to open the dialog window **Edit filter criterion New filter**.

- ### 3 Define filter criteria.

- Click on **[Save filter]**.
- Click on **[Apply filter]**.
The table will be filtered.

Using special filter

- 1 In the list box **Filter**, select the desired special filter.
The table will be filtered.

9.3.5 Sign determination

How to proceed?

Select determination

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open....**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.
The selected database opens and its data sets are displayed in the **Determination overview**.
- 5 Select desired determination.

Signature 1



Determinations can only be signed at level 1 if the user belongs to a user group with the corresponding authorization (see *Chapter 6.2.1.2.3, page 1155*).

- 1** Click on the symbol  or menu item **Determinations ► Sign ► Signature 1...**

The window **Signature Level 1** opens. If the selected determination can be signed, **Signature possible** is displayed in the field **Info**.

- 2** Enter or select **User**, **Password**, **Reason** and **Comment**.

- 3** Click on **[Sign]**.

The selected determination will be signed on level 1.



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.

Signature 2



Determinations can only be signed at level 2 if the user belongs to a user group with the corresponding authorization (*see Chapter 6.2.1.2.3, page 1155*).

- 1** Click on the symbol  or menu item **Determinations ► Sign ► Signature 2...**

The window **Signature Level 2** opens; if a signature is possible for the selected determination, then in the field **Info** will appear **Signature possible**.

- 2** Enter or select **User**, **Password**, **Reason** and **Comment** and click on **[Sign]**.

The selected determination will be signed on level 2.



Note

Determinations that can be signed at level 2 are **blocked**, i.e. they can neither be reprocessed nor deleted. In order to be able to edit such determinations again the signatures at level 2 must first be deleted .

9.3.6 Exporting determinations

How to proceed?

Defining export template

- 1 Select program part **Database**.
- 2 Click on menu item **Tools ► Templates ► Export templates...**

The window **Export templates** opens.

- 3** Click on **[New]**.

The window **Export templates – 'New file'** opens.

- #### 4 Define the properties of the new export template.

- 5** Click on **[OK]**.

The dialog window is closed.

- 6** Click on **[Close]**.

The dialog window **Export templates** is closed.

Select determinations

- 1** Select program part **Database**.

- The dialog window **Open database** opens.

Exporting determinations

- The window **Export determinations** opens.

9.3.7 Importing determinations

How to proceed?

- The dialog window **Open database** opens.

- 5** Click on the menu item **Determinations ► Import....**

The window **Import determinations** opens.

- 6** Select desired determinations.

- 7** Click on **[Open]**.

The selected determinations are imported into the open database.



Note

Exported determinations can only be imported in the file format **MDET**.

9.3.8 Deleting determinations

How to proceed?

- 1 Select program part **Database**.

- 2 Click on the symbol or the menu item **File ▶ Open...**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

- 5** Select desired determinations.

- 6 Click on the symbol or the menu item **Determination ► Delete**.

- 7** Confirm deleting.

The selected determinations with all **Determination versions** are deleted.



saved.

9.3.9 Making current the determination version

How to proceed?

- 1** Select program part **Database**.

- 2 Click on the symbol or the menu item **File ► Open...**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

- 5** Select desired determination.

- 6 Click on the symbol  or menu item **Determinations ▶ Show history...**

Only the currently selected determination in the **determination table** as well as all the previous versions of this determination will be shown.

- 7** Select desired determination that is to be made current.

- 8** Click on the symbol  or the menu item **Determination ► Make current.**

The determination version selected in the determination table will again be made the current determination version. This creates a new determination, the version number of which is increased by **+1** compared with the last version to have been saved.

 **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).

- Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive for as long as the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Note

The method can only be modified if the method is identical for all the determinations that have been selected.

- The dialog window **Method editor** opens.

- Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands.

- 5** Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

- 6** If desired, save the modified method with **[Save as...]** under the same name or under a new name.

If the modified method is saved under the name of an existing method then all the earlier method versions will be deleted and a new version with the number **1** will be generated.

- 7** In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Modify statistics



Note

The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.

- 1 Change to the **Statistics** tab.
- 2 In the field **Result name**, select the result whose **Result value** is to be displayed.
- 3 Select desired determination whose result value(s) should be switched on or off for the statistics.
- 4 If only the selected result of the determination has to be switched on or off for the statistics, click on **[Result on/off]**.

If the result is switched off, an asterisk (*) appears behind the result value, is it switched on again, the asterisk disappears.
- 5 If all results of the selected determination have to be switched on or off for the statistics, click on **[Determination on/off]**.

Note

If the results of a determination are switched off, the statistics for these results will be switched off when this determination is recalculated, i.e. no data for the mean value and standard deviations will be shown. However, the determinations remain statistically linked to each other so that the results can also be switched on again.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the dialog window **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

Note

The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

2 In the field **Command name**, select the command whose curve is to be displayed.

The dialog window **Curve evaluation** opens for manually reprocessing the curve evaluation.



- #### 4 Modify curve evaluation manually.

- 5** Then close the window with **[OK]**.

- 6** Click on **[Recalculate]**.

The selected determinations are recalculated. The results of this recalculation are entered automatically in the subwindow **Result display**.

- 7** In the dialog window **Reprocessing** click on **[OK]**.

Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1** and the subwindow **Reprocessing** will be closed. This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

9.3.11 Printing determination report

How to proceed?

- 1** Select program part **Database**.

- 2 Click on the symbol  or the menu item **File ▶ Open...**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

- 5** Select desired determinations.

The dialog window **Report output** opens.

Under **Selection**, select desired determinations.

Under **Report type**, select the option **Original report** or **Report template**.

Under **Output target**, enable the check box **Printer** and/or select **PDF file**.

If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

The reports of the selected determination are put out.

The dialog window **Open database** opens.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

- 5 Select desired determinations.
- 6 Click on menu item **File ► Print ► Determination overview....**
The dialog window **Print determination overview (PDF)** opens.
- 7 Under **Selection**, select desired determinations for the report output.
- 8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.
- 9 Click on **[OK]**.
The determination overview is opened as PDF file.

9.4 Databases

9.4.1 Open database

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open...**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

9.4.2 Closing database

How to proceed?

Close single database

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Print...**
The selected database will be closed.

Closing all databases

- 1 Select program part **Database**.
- 2 Click on menu item **File ► Close all...**
All opened databases will be closed.

9.4.3 Creating database

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The dialog window **Database manager** opens.
- 3 Click on the menu item **Edit ► New....**
The dialog window **New database** opens.
- 4 Enter a name for the new database.
- 5 Click on **[OK]**.



The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.



Note

The database name must be unambiguous in the whole Client/Server system.

- 6 On the tab **General** enter a comment on the database in the field **Comment**.
- 7 On tab **Access rights**, define access rights for reading and editing the new database for the different user groups.
- 8 On tab **Backup**, define backup monitoring and automatic backup for the new database.
- 9 On tab **Monitoring**, define monitoring of size and number of data sets.

9.4.4 Backing up database

How to proceed?

General

In **tiamo**, **determination databases** that in contrast to the **configuration database** can be generated by the user and contain the determination data are referred to as databases. Among such determination data is the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**) the databases are stored on the drives administered by the computer and are only available to those users registered at that computer who have the appropriate access rights. In Client/Server systems (**tiamo multi**) the databases are stored on drives administered centrally by the server and are available globally throughout the entire Client/Server system, i.e. all users with the appropriate access rights can use these databases.



Note

Each determination database has to be backed up separately. Afterwards, it is recommended that all backed-up files be copied to an external directory or to a CD/DVD.

Backup database manually

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The window **Database manager** opens.
- 3 Click on **[Backup]**.
The window **Backup database** opens.
- 4 Select the directory for the backup in the field **Backup directory**.
- 5 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.



If the backup directory is on a network drive the backup date should be added manually to the **Backup name** because the backup date information is not available when restoring.

- 6** Click on **[Start]**.
- The manual backup is started and the database is backed up to the selected directory.

Backup database automatically

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The dialog window **Database manager** opens.
- 3 Select desired database.
- 4 Click on **[Properties]**.
The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.



9.4.6

How to proceed?

- 1

2

- 3

- 4

The selected database is deleted.



9.5

9.5.1

How to proceed?

- 1

- 2

The dialog window **Export configuration data** opens.

- 3

- 4

The dialog window **Export configuration data** is closed and the dialog window **Save** opened.



- 5** Select or enter name and directory for the export file. If an existing export file is selected it will be overwritten.

- 6** Click on **[Save]**.

The export of the configuration data is started.

The selected configuration data is then saved in a file with the extension **.mcfg**.

9.5.2 Importing configuration data

How to proceed?

- 1** Select program part **Configuration**.

- 2** Click on the menu item **Determinations ► Import....**

The dialog window **Open** opens.

- 3** Select or enter a new name and directory for the import file **MCFG**.

- 4** Click on **[Open]**.

The dialog window **Import configuration data** opens.

- 5** Select desired configuration data.



Note

Data that is not present in the export file cannot be selected.

- 6** Click on **[OK]**.

The import is started and the selected configuration data is imported.

9.5.3 Backing up configuration data

How to proceed?

General

The configuration data in **tiamo** is saved in the **Configuration database**. Configuration data includes all cross-method settings for devices, titrants/solutions, sensors, common variables and rack data as well as **Methods**, **Security settings** (see Chapter 6.2.2.1, page 1161), **User administration** (see Chapter 6.2.1.1, page 1152), **Program administra-**

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder of the computer on which the program has been installed. In Client/Server systems (**tiamo multi**) the configuration database is stored centrally on the server and saves and contains all the configuration data of all computers (clients) that are connected to this server.



Note

It is strongly recommended that the configuration database be backed up periodically.

Manual configuration data backup

- 1 Select program part **Configuration**.
- 2 Click on the menu item **File ► Backup ► Manually**.
The dialog window **Backup configuration data manually** opens.
- 3 Select the directory for the backup in the field **Backup directory**.
- 4 Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive the backup date should be added manually to the **Backup name** because the backup date information is not available when restoring.

- 5** Click on **[Start]**.
- The manual backup is started and the configuration database is backed up to the selected directory.

Automatic configuration data backup

- 1** Select program part **Configuration**.



- 2 Click on menu item **File** ► **Backup** ► **Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the **Next backup**.

- 5** In the field **Backup directory** select a directory for the backup.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed.

The configuration database is automatically saved in the selected directory at the desired time.

9.5.4 Restoring configuration data

How to proceed?

tiamo light, tiamo full

- 1** Exit **tiamo**.

- 2 Start the file **ConfigRestore.exe** in the program directory ...**tiamo** \bin.

The dialog window **Restore configuration data** opens.

- 3 Select the directory in the **Backup directory** field in which the configuration database was backed up.

- 4** Select or enter the name for the desired **Backup file**.

- 5** Click on **[Start]**.

The restoring of the configuration database is started.

tiamo multi

- 1 Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.

- The dialog window **Restore configuration data** opens.

- 4** Select or enter the name for the desired **Backup file**.

- The restoring of the configuration database is started.

- 6

How to proceed?

- The dialog window **Open method** opens.

- 5** Click on **[Open]**.

The selected method is opened in the main window in the place of a method that is already opened. The method name is displayed in the title bar of the program; the number of currently opened methods is displayed in the left upper corner of the method symbol.

Note

A maximum of 9 methods can be opened, but only 2 can be displayed at the same time.

The existing, selected method is newly saved under its name. A new **Method version** with a new method identification is created.

If the check box **Comment on modification of methods** is activated in the **Security settings**, the dialog window **Modification comment method** is displayed before the method is saved.

Saving method under a new name

- 1 Click on the menu item **File ► Save as....**

The dialog window **Save method** opens.

- 2 In the list box **Method group** select the desired method group.

- 3 Select the desired method from the table or enter a name in the field **Method name**.

- 4 Click on **[Save]**.

The selected method is saved under the desired method name in the selected method group as method version **1**.

If the check box **Comment on modification of methods** is activated in the **Security settings**, the window **Modification comment method** is displayed before the method is saved.

9.6.5 Deleting method

How to proceed?

- 1 Select program part **Method**.

- 2 Click on the symbol  or menu item **File ► Method manager....**

The dialog window **Method manager** opens.

- 3 In the list box **Method group** select the desired method group.

- 4 Select the desired method from the table or enter a name in the field **Method name**.

- 5 Click on the menu item **Edit ► Delete....**

The selected methods with all its **Method versions** are deleted.

If the check box **Comment on modification of methods** is activated in the **Security settings**(see Chapter 6.2.2.3, page 1166), the window **Modification comment method** is displayed first when deleting methods.. In this window, a reason and a comment on deleting can be entered, which is logged in the **Audit Trail**.



Note

Locked methods cannot be deleted.

9.6.6 Exporting method

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**
The dialog window **Method manager** opens.
- 3 In the list box **Method group** select the desired method group.
- 4 Select the desired method from the table or enter a name in the field **Method name**.
- 5 Click on the menu item **File ► Export....**
The dialog window **Select directory for export** opens.
- 6 Select the directory for the export files.
- 7 Click on **[OK]**.

The selected methods are each exported as files named '**Method name**'.mmet.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

Import methods

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**
The dialog window **Method manager** opens.
- 3 In the list box **Method group** select the desired method group.
- 4 Click on the menu item **Edit ► Import....**
The dialog window **Select files to import** opens.
- 5 Select desired import files named as '**Method name**'.**mmet** in the desired directory.
- 6 Click on **[OK]**.
The selected methods are imported in the currently opened method group.

Sign methods

How to proceed?

Select method

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager...**.
The window **Method manager** opens.
- 3 Select desired **Method group**.
- 4 Select desired method.

Signature 1



Note

Methods can only be signed at level 1 if the user belongs to a user group with the corresponding authorization (see *Chapter 6.2.1.2.3, page 1155*).

- 1** Click on the menu item **Sign ► Signature 1....**

The dialog window **Signature Level 1** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

- 2** Enter or select **User**, **Password**, **Reason** and **Comment**.

- 3** Click on **[Sign]**.

The selected method will be signed on level 1.



Note

Methods can be signed more than once at level 1 and can also be edited and deleted. If the method is edited and saved again, a new version is created and all the signatures will be deleted i.e. the method must be signed again.

Signature 2



Note

Methods can only be signed at level 2 if the user belongs to a user group with the corresponding authorization (*see Chapter 6.2.1.2.3, page 1155*).

- 1** Click on the menu item **Sign ► Signature 2....**

The dialog window **Signature Level 2** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

- 2** Enter or select **User**, **Password**, **Reason** and **Comment**.

- The selected method will be signed on level 2.



9.6.9 Making previous method version current

The dialog window **Method manager** opens.

- The selected method version is set as the current method version. The method will be saved, the version number is increased by **+1** compared to the last method version that was saved.

2 Click on the symbol or the menu item **File ► Open...**

The dialog window **Open method** opens.

- 3** In the list box **Method group** select the desired method group.

- 4** Select desired method or enter name in the field **Method name**.

- 5** Click on **[Open]**.

The selected method is opened in the main window in the place of a method that is already opened. The method name is displayed in the title bar of the program; the number of currently opened methods is displayed in the left upper corner of the method symbol.

- 6** Click on the menu item **File ► Print (PDF)...**

The dialog window **Print method reports (PDF)** opens.

- 7** Select desired report and orientation and click on **[OK]**.

The desired report is opened as PDF file.

9.6.11 Backup methods

How to proceed?

General

Methods are stored in the configuration database and globally accessible for all clients. This means that in order to save methods the configuration data must be saved manually or automatically. A further possible way is to export the methods and then to save these files externally from **tiamo**.

Manual configuration data backup

- 1** Select program part **Configuration**.

- 2** Click on the menu item **File** ► **Backup** ► **Manually**.

The dialog window **Backup configuration data manually** opens.

- 3** In the field **Backup directory** select a directory for the backup.

- 4** Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.



- Click on **[Start]**.
- The manual backup of the configuration database is started.

- 1 Select program part **Configuration**.
- 2 Click on menu item **File ► Backup ► Automatically**.
The dialog window **Backup configuration data automatically** opens.
- 3 Activate the **Automatic backup** check box.
- 4 Enter an interval for backup monitoring in the field **Interval** or a date for the next backup in the field **Next backup**.
- 5 In the field **Backup directory** select a directory for the backup.
- 6 Click on **[OK]**.
The dialog window **Backup configuration data automatically** is closed.

- 1 Select program part **Method**.
- 2 Click on the symbol or menu item **File ► Method manager....**
The dialog window **Method manager** opens.
- 3 Select desired **Method group**.



- 4 Select desired methods.
- 5 Click on the menu item **File ► Export...**
The dialog window **Select directory for export** opens.
- 6 Select the directory for the export files.
- 7 Click on **[OK]**.
The selected methods are each exported as files named '**name'.mnet**'.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

9.7 Method groups

9.7.1 Creating method group

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or the menu item **File ► Method groups....**
The dialog window **Method groups** opens.
- 3 Click on **[New]**.
The dialog window **Properties - Method group - New Group** opens.
- 4 On the tab **General** in the field **Name**, enter a new name for the method group and in the field **Comment** enter a comment.
- 5 On tab **Access rights**, assign access rights for method groups and their methods per **User group**.



- The dialog window **Properties - Method group - New Group** is closed.

How to proceed?

- The dialog window **Method groups** opens.

- The selected method group is deleted.

How to proceed?

- The dialog window **Sample table 'New sample table'** with an empty sample table opens.

- The dialog window **Properties - Sample table 'New sample table'** opens.

- 4 Edit properties of the new sample table.
- 5 Click on **[OK]**.
The dialog window **Properties - Sample table 'New sample table'** is closed.
- 6 In the dialog window **Sample table 'New sample table'**, click on the menu item **Edit ► Edit line**.
The dialog window **Edit line - Sample table 'New sample table'** opens.
- 7 In the list box **Method**, select the desired method and enter sample data.
- 8 Click on **[Apply]**.
The sample data entered will be applied in the respective line of the sample table.
- 9 Repeat step 6 for each desired determination.
- 10 Click on **[Close]**.
The dialog window **Edit line - Sample table 'New sample table'** is closed.
- 11 In the dialog window **Sample table 'New sample table'** click on the menu item **Sample table ► Save as....**
The dialog window **Save sample table** opens.
- 12 In the field **Name** enter the desired name.
- 13 Click on **[Save]**.
The sample table will be saved under the name that was entered.

9.8.2 Edit sample table

How to proceed?

- 1** Select program part **Workplace**.

- The dialog window **Open sample table** opens.

- The dialog window with the selected sample table opens.

- The dialog window **Properties - Sample table** opens.

- 8 Select the line to be modified in the dialog window **Sample table**.

- The dialog window **Edit line** opens.

- The sample data entered will be applied in the respective line of the sample table.

- 12** Close the dialog window **Edit line** with **[Close]**.

- The dialog window **Save sample table** opens.

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- 15** Click on **[Save]**.

The edited sample table is saved.

9.8.3 Loading working sample table

How to proceed?

- 1** Select program part **Workplace**.

- 2** In subwindow **Run**, click on the **Determination series** tab.

- 3 Click on the menu item **Sample table** ► **Load...**

The dialog window **Load sample table** opens.

- 4** Select desired sample table.

- 5** Click on **[Load]**.

The data of the selected sample table is loaded into the working sample table.

9.8.4 Edit working sample table

How to proceed?

- 1** Select program part **Workplace**.

- 2** In subwindow **Run**, click on the **Determination series** tab.

- 3** If desired, load existing sample table into working sample table.

- 4** If desired, click on the menu item **Sample table ► Properties...** in the subwindow **Run**.

The dialog window **Properties - Determination series** opens.

- 5** Define the properties for the determination series.

- 6** Click on **[OK]**.

The dialog window **Properties - Determination series** is closed.

- 7** Select line to be modified in the subwindow **Run**.

9.9.2 Edit report template

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or on the menu item **Tools ► Report templates ► Open....**
The program window **Open report template** opens.
- 3 Open desired report template.
- 4 Click on **[Open]**.
The program window with the selected report template opens.
- 5 Click on the menu item **File ► Page setup....**
The dialog window **Page setup** opens.
- 6 Define desired settings for the report format.
- 7 Close the dialog window with **[OK]**.
- 8 In the program window **Report template**, click on the menu item **Tools ► Options....**
The dialog window **Options for report templates** opens.
- 9 Define desired settings for the report template.
- 10 Close the window with **[OK]**.

Editing existing modules

- 1 Select the symbol  on the module bar and double-click on the desired module in the report template.
The properties window of the selected module opens automatically.
- 2 Enter desired settings for the module.
- 3 Close the properties window with **[OK]**.

- 4** Repeat steps **1** and **2** for each desired module.

Creating new modules

- 1 Select desired module symbol on the Module bar and place it on the report template by creating a field with the left-hand mouse key.
The properties window for the corresponding module opens automatically.
- 2 Define desired settings for the module.
- 3 Close the properties window with **[OK]**.
- 4 Repeat steps **1** and **2** for each desired new module.
- 5 Click on the symbol  or the menu item **File ► Save**.
The report template is saved.

9.9.3 Printing determination report

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open....**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



5 Select desired determinations.

The dialog window **Report output** opens.

8 Under **Report type**, select the option **Original report** or **Report template**.

Note

10 In the dialog window **Report output**, click on **[OK]**.

The reports of the selected determinations are put out.

9.9.4 Printing determination overview

- 1 Select program part **Database**.

The dialog window **Open database** opens.

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4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on menu item **File ▶ Print ▶ Determination overview...**

The dialog window **Print determination overview (PDF)** opens.

7 Under **Selection**, select desired determinations.

8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.

9 Click on **[OK]**.

The determination overview is opened as PDF file.

9.10 No Help available



Note

There is unfortunately no Help available for this topic.

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