

tiamo 2.1





Metrohm AG
CH-9101 Herisau
Switzerland
Phone +41 71 353 85 85
Fax +41 71 353 89 01
info@metrohm.com
www.metrohm.com

tiamo 2.1

Online Help

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

This documentation is protected by copyright. All rights reserved.

Although all the information given in this documentation has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please send us your comments using the address given above.

Table of contents

1	Introduction	1
1.1	Welcome to tiamo	1
1.2	Operation	2
1.3	Connecting devices	3
1.4	Method editor	4
1.5	Database	4
1.6	Communication	5
1.7	Conformity	6
1.8	Versions	7
1.9	Online help	8
1.10	What is new in tiamo 2.1?	9
1.10.1	New features	9
1.10.2	Fixed bugs and problems	9
2	General program functions	11
2.1	Program parts	11
2.1.1	Program parts	11
2.1.2	Workplace - Desktop	12
2.1.3	Database - Desktop	12
2.1.4	Method - Desktop	13
2.1.5	Configuration - Desktop	13
2.1.6	Manual control - Desktop	14
2.2	Login/password protection	14
2.2.1	General information on Login/Password protection	14
2.2.2	Login	15
2.2.3	Log out manually	16
2.2.4	Log out automatically	16
2.2.5	Changing password	16
2.3	Electronic signatures	17
2.3.1	Rules for electronic signatures	17
2.3.2	Procedure for electronic signatures	18
2.3.3	Signature Level 1	19
2.3.4	Signature Level 2	20
2.3.5	Delete Signature Level 2	22
2.4	Formula editor	23
2.4.1	Input field	23
2.4.2	Calculation algorithms	24
2.4.3	Variables	26
2.4.4	Operators/functions	44

3.8.3	Live display - Application note	168
3.8.4	Live display - Messages	168
3.8.5	Live display - Properties	168
3.9	Subwindow Report	175
3.9.1	Report - General	175
3.9.2	Latest report	175
3.9.3	Selected report	175
3.9.4	Report overview	176
3.9.5	Properties report overview	176
4	Database	177
4.1	Database - General	177
4.1.1	Database - Definition	177
4.1.2	Database - Desktop	177
4.1.3	Database - Menu bar	178
4.1.4	Database - Toolbar	182
4.1.5	Database - Subwindows	184
4.1.6	Database - Functions	184
4.1.7	Views	185
4.2	Database display	188
4.2.1	Opening database	188
4.2.2	Select database	189
4.2.3	Display single database	190
4.2.4	Display databases next to one another	190
4.2.5	Display databases one below the other	190
4.2.6	Closing database	190
4.3	Manage databases	191
4.3.1	Manage databases	191
4.3.2	Create new database	192
4.3.3	Rename database	192
4.3.4	Deleting database	193
4.3.5	Database properties	193
4.3.6	Backup database manually	196
4.3.7	Restore database	197
4.4	Templates	199
4.4.1	Report templates	199
4.4.2	Templates for control chart	234
4.4.3	Curve overlay templates	238
4.4.4	Export templates	244
4.5	Determination overview	276
4.5.1	Determination overview - General	276
4.5.2	Determination overview - Functions	282
4.6	Subwindow Information	326
4.6.1	Information - Overview	326
4.6.2	Information - Determination	327
4.6.3	Information - Method	330
4.6.4	Information - Sample	331

4.6.5	Information - Configuration	333
4.6.6	Information - Messages	339
4.6.7	Information - Determination comment	339
4.7	Subwindow Results	340
4.7.1	Results - General	340
4.7.2	Results - Results overview	340
4.7.3	Results - Raw data	342
4.7.4	Results - Calculation #	350
4.7.5	Results - Properties	352
4.8	Curves subwindow	353
4.8.1	Curves - General	353
4.8.2	Curves - Measuring point list	354
4.8.3	Curves - Monitoring report	355
4.8.4	Properties	356
5	Method	370
5.1	Method - General	370
5.1.1	Method - Definition	370
5.1.2	Method - Desktop	371
5.1.3	Method - Menu bar	371
5.1.4	Method - Toolbar	373
5.1.5	Method - Functions	375
5.2	Method editor	376
5.2.1	Creating new method	376
5.2.2	Opening method	376
5.2.3	Select method	378
5.2.4	Edit method	380
5.2.5	Checking method	385
5.2.6	Saving method	385
5.2.7	Modification comment on method	387
5.2.8	Print method report	388
5.2.9	Closing method	388
5.3	Managing methods	389
5.3.1	Managing methods	389
5.3.2	Renaming method	391
5.3.3	Copying method	391
5.3.4	Moving method	391
5.3.5	Deleting method	392
5.3.6	Sending method to	392
5.3.7	Exporting a method	393
5.3.8	Importing method	393
5.3.9	Renaming imported method	393
5.3.10	Signing methods	394
5.3.11	Showing method history	399
5.4	Method groups	400
5.4.1	Manage method groups	400
5.4.2	Edit method groups	401

5.5	Tracks	402
5.5.1	Tracks - General	402
5.5.2	Track types	403
5.5.3	Edit tracks	408
5.6	Commands	409
5.6.1	Commands - General	409
5.6.2	Track commands	413
5.6.3	Titration commands	427
5.6.4	Measuring commands	859
5.6.5	Calibration commands	992
5.6.6	Dosing commands	1034
5.6.7	Automation commands	1087
5.6.8	Result commands	1110
5.6.9	Communications commands	1126
5.6.10	Miscellaneous commands	1147
6	Configuration	1163
6.1	Configuration - General	1163
6.1.1	Configuration - Definition	1163
6.1.2	Configuration - Desktop	1163
6.1.3	Configuration - Menu bar	1164
6.1.4	Configuration - Toolbar	1166
6.1.5	Configuration - Subwindows	1166
6.1.6	Configuration - Functions	1167
6.1.7	Views	1168
6.2	Administration	1171
6.2.1	User administration	1171
6.2.2	Security settings	1180
6.2.3	Program administration	1190
6.3	Configuration data	1194
6.3.1	Export/Import	1194
6.3.2	Backup/Restore	1199
6.3.3	Templates	1202
6.3.4	Options	1209
6.4	Audit Trail	1212
6.4.1	Audit Trail - General	1212
6.4.2	Audit Trail table	1216
6.5	Subwindow Devices	1227
6.5.1	Configuration - Devices	1227
6.5.2	Device table	1228
6.5.3	Device properties	1232
6.6	Subwindow Titrants/Solutions	1233
6.6.1	Titants/Solutions - General	1233
6.6.2	Solution table	1234
6.6.3	Solution properties	1237

6.7	Subwindow Sensors	1256
6.7.1	Sensors - General	1256
6.7.2	Sensor table	1257
6.7.3	Sensor properties	1261
6.8	Common variables subwindow	1280
6.8.1	Configuration - Common variables	1280
6.8.2	Table of common variables	1280
6.8.3	Common variables properties	1283
6.9	Sample solutions (TC conductivity) subwindow	1289
6.9.1	Sample solutions (TC conductivity) - General	1289
6.9.2	Sample solutions (TC conductivity) table	1289
6.9.3	Sample solutions (TC conductivity) properties	1292
6.10	Rack data subwindow	1296
6.10.1	Configuration - Rack data	1296
6.10.2	Rack table	1296
6.10.3	Rack properties	1298

7 Devices 1305

7.1	Titrande	1305
7.1.1	Titrande - Overview	1305
7.1.2	Properties - General	1305
7.1.3	Properties - Measuring inputs	1306
7.1.4	Properties - MSB #	1307
7.1.5	Properties - GLP	1309
7.1.6	Load new program version	1310
7.2	Titrimetric	1311
7.2.1	Titrimetric - Overview	1311
7.2.2	Properties - General	1312
7.2.3	Properties - Int. Dosing device D0	1313
7.2.4	Properties - Ext. Dosing device D#	1314
7.2.5	Properties - RS-232	1315
7.2.6	Properties - GLP	1316
7.3	756/831 Coulometer	1318
7.3.1	756/831 Coulometer - Overview	1318
7.3.2	Properties - General	1318
7.3.3	Properties - RS-232	1319
7.3.4	Properties - GLP	1320
7.4	712 Conductometer	1322
7.4.1	712 Conductometer - Overview	1322
7.4.2	Properties - General	1322
7.4.3	Properties - RS-232	1323
7.4.4	Properties - GLP	1324
7.5	856 Conductivity Module	1326
7.5.1	856 Conductivity Module - Device	1326
7.5.2	Properties - General	1326
7.5.3	Properties - Measuring inputs	1327

7.5.4	Properties - MSB #	1328
7.5.5	Properties - GLP	1329
7.6	867 pH Module	1331
7.6.1	867 pH Module - Overview	1331
7.6.2	Properties - General	1332
7.6.3	Properties - Measuring inputs	1333
7.6.4	Properties - MSB #	1334
7.6.5	Properties - GLP	1335
7.7	846 Dosing Interface	1337
7.7.1	846 Dosing Interface - Overview	1337
7.7.2	Properties - General	1337
7.7.3	Properties - MSB #	1338
7.7.4	Properties - GLP	1339
7.8	730 Sample Changer	1341
7.8.1	730 Sample Changer - Overview	1341
7.8.2	Properties - General	1342
7.8.3	Properties - Tower	1343
7.8.4	Properties - Rack	1344
7.8.5	Properties - Dosing device	1344
7.8.6	Properties - RS-232	1345
7.8.7	Properties - GLP	1345
7.9	774 Oven Sample Processor	1347
7.9.1	774 Oven Sample Processor - Overview	1347
7.9.2	Properties - General	1348
7.9.3	Properties - Tower	1349
7.9.4	Properties - Rack	1349
7.9.5	Properties - Dosing device	1350
7.9.6	Properties - Oven	1351
7.9.7	Properties - Gas	1352
7.9.8	Properties - RS-232	1352
7.9.9	Properties - GLP	1353
7.10	778/789 Sample Processor	1355
7.10.1	778/789 Sample Processor - Overview	1355
7.10.2	Properties - General	1355
7.10.3	Properties - Tower #	1356
7.10.4	Properties - Rack	1358
7.10.5	Properties - MSB #	1359
7.10.6	Properties - RS-232	1360
7.10.7	Properties - GLP	1361
7.11	814/815 USB Sample Processor	1363
7.11.1	814/815 USB Sample Processor - Overview	1363
7.11.2	Properties - General	1363
7.11.3	Properties - Tower #	1364
7.11.4	Properties - Rack	1366
7.11.5	Properties - MSB #	1367
7.11.6	Properties - GLP	1368
7.11.7	Configuration Robotic arm	1370

7.11.8	External position	1371
7.12	855 Robotic Titrosampler	1372
7.12.1	855 Robotic Titrosampler - Overview	1372
7.12.2	Properties - General	1372
7.12.3	Properties - Measuring inputs	1373
7.12.4	Properties - Tower #	1374
7.12.5	Properties - Rack	1376
7.12.6	Properties - MSB #	1377
7.12.7	Properties - GLP	1378
7.13	864 Balance Sample Processor	1380
7.13.1	864 Balance Sample Processor - Overview	1380
7.13.2	Properties - General	1380
7.13.3	Properties - Tower #	1381
7.13.4	Properties - Rack	1383
7.13.5	Properties - MSB #	1384
7.13.6	Properties - GLP	1385
7.14	874 Oven Sample Processor	1387
7.14.1	874 Oven Sample Processor - Overview	1387
7.14.2	Properties - General	1388
7.14.3	Properties - Tower	1389
7.14.4	Properties - Rack	1389
7.14.5	Properties - MSB #	1390
7.14.6	Properties - Oven	1391
7.14.7	Properties - GLP	1392
7.15	Avantes Spectrometer	1394
7.15.1	Avantes Spectrometer - Overview	1394
7.15.2	Properties - General	1394
7.15.3	Properties - Settings	1395
7.15.4	Properties - Detector	1396
7.15.5	Properties - Calibration	1397
7.15.6	Properties - Dark spectrum	1397
7.15.7	Properties - Reference spectrum	1398
7.15.8	Properties - GLP	1399
7.16	RS-232 device	1401
7.16.1	RS-232 device - Overview	1401
7.16.2	Properties - General	1401
7.16.3	Properties - RS-232	1402
7.16.4	Properties - GLP	1404
7.16.5	Establish a connection to the RS-232 device	1406
7.17	Balances	1407
7.17.1	Balance - Overview	1407
7.17.2	Properties - General	1407
7.17.3	Properties - RS-232	1408
7.17.4	Properties - GLP	1409
7.17.5	Establish a connection to the balance	1411
7.18	Barcode reader	1412
7.18.1	Barcode reader - General	1412

7.18.2	Barcode reader - Overview	1413
7.18.3	Properties - General	1413
7.18.4	Properties - Settings	1414
7.18.5	Properties - GLP	1414
7.18.6	Establish a connection to the barcode reader	1416
8	Manual Control	1417
8.1	Manual Control - General	1417
8.2	Manual control - Desktop	1417
8.3	Manual Control - Device selection	1418
8.4	Manual Control - Functions	1418
8.4.1	Dosing	1418
8.4.2	Stirring	1424
8.4.3	Remote functions	1426
8.4.4	Sample changer functions	1428
8.4.5	Measure	1437
8.5	Manual Control - Graphical display	1441
9	How to proceed?	1442
9.1	Audit Trail	1442
9.1.1	Opening Audit Trail	1442
9.1.2	Filtering Audit Trail	1442
9.1.3	Exporting Audit Trail	1443
9.1.4	Archiving Audit Trail	1444
9.1.5	Deleting Audit Trail	1445
9.2	Backup	1446
9.2.1	Backing up database	1446
9.2.2	Restoring database	1448
9.2.3	Backing up configuration data	1449
9.2.4	Restoring configuration data	1450
9.2.5	Backing up methods	1451
9.2.6	Archive Audit Trail	1453
9.3	Determinations	1455
9.3.1	Starting single determination	1455
9.3.2	Starting determination series	1456
9.3.3	Searching for determinations	1458
9.3.4	Filtering determinations	1458
9.3.5	Signing determination	1460
9.3.6	Exporting determinations	1462
9.3.7	Importing determinations	1463
9.3.8	Deleting determinations	1464
9.3.9	Making the determination version current	1465
9.3.10	Reprocessing determinations	1466
9.3.11	Printing determination report	1470
9.3.12	Printing determination overview	1471

9.4	Databases	1472
9.4.1	Database in general	1472
9.4.2	Opening database	1473
9.4.3	Closing database	1473
9.4.4	Creating database	1474
9.4.5	Backing up database	1475
9.4.6	Restoring database	1476
9.4.7	Deleting database	1477
9.5	Configuration data	1478
9.5.1	Configuration data in general	1478
9.5.2	Exporting configuration data	1478
9.5.3	Importing configuration data	1479
9.5.4	Backing up configuration data	1479
9.5.5	Restoring configuration data	1480
9.6	Methods	1482
9.6.1	Open method	1482
9.6.2	Closing method	1482
9.6.3	Create method	1483
9.6.4	Save method	1483
9.6.5	Deleting method	1484
9.6.6	Exporting method	1485
9.6.7	Import methods	1485
9.6.8	Sign methods	1486
9.6.9	Making previous method version current	1487
9.6.10	Print method report	1488
9.6.11	Backup methods	1489
9.7	Method groups	1491
9.7.1	Creating method group	1491
9.7.2	Deleting method group	1491
9.8	Sample tables	1492
9.8.1	Create sample table	1492
9.8.2	Edit sample table	1493
9.8.3	Loading working sample table	1494
9.8.4	Edit working sample table	1495
9.9	Reports	1496
9.9.1	Creating report template	1496
9.9.2	Edit report template	1497
9.9.3	Printing determination report	1499
9.9.4	Printing determination overview	1500
		1502

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

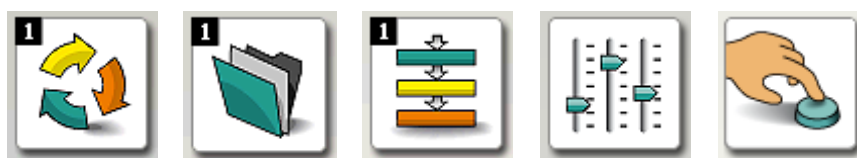
- *Program interface: easy to operate and configure*
- *Simple integration of devices and accessories*
- *Convenient method editor*

- 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 tiampo 2.1?

1.2 Operation

Introduction

The modern **user interface** makes it simple for the user to find his/her way around *ti amo*. 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 *ti amo*:



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 *tiamo*. A wide range of tried and tested methods allow any user to create new methods fast and simply and to use them immediately.

1.3 Connecting devices

Introduction

tiamo brings together the world of **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, 851, 852, 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 changer**
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. As a result, sample throughput is doubled!

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

Overview of functions

- Graphic method editor (*see Chapter 5.6.1.2, page 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 1151*)
- Loop functions (*see Chapter 5.6.10.4.1, page 1153*)

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 1190*).
- Layout manager for the database view (*see Chapter 3.1.7, page 87*).
- Quick filter (*see Chapter 4.5.2.4.3, page 286*).
- Efficient search functions (*see Chapter 4.5.2.3, page 282*).
- Access rights control for every database (*see Chapter 4.3.5.3, page 194*).
- Automatic database backup (*see Chapter 4.3.5.4, page 195*).
- Control cards (*see Chapter 4.5.2.16, page 323*).
- 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 and economically in existing laboratory information systems, central databases and long-term archiving systems.

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

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

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

Overview of functions

- Import of sample data (*see Chapter 3.3.1.6, page 99*).

- Various export formats , e.g. XML, CSV, SLK (*see Chapter 4.4.4.2.1, page 245*).
- Automatic data export, e.g. to NuGenesis SDMS, Scientific Software CyberLAB, etc. (*see Chapter 5.6.8.5.1, page 1125*).
- Report designer (*see Chapter 4.4.1.4.1.1, page 202*).
- E-mail functions for status messages, error messages or results (*see Chapter 2.6, page 81*).
- Importing external measured values (*see Chapter 5.6.3.10.2, page 858*).

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 1171*).
- Detailed access rights (*see Chapter 6.2.1.2.2, page 1173*).
- Password protection under tiamo or Windows (*see Chapter 6.2.2.2, page 1181*).

- ## 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 2.1 light	tiamo 2.1 full	tiamo 2.1 multi
Product	6.6056.211	6.6056.212	6.6056.213
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 another help topic in which information is shown for the marked term.
Method	Dialog text Designation for names of parameters, menu items, tabs and dialog windows in the software.
100	Designation for parameter values in input fields.
File ► New	Menu or menu item; Path needed to reach a certain point in the program.
[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 23).
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 2.1?

Introduction

In this chapter the changes since tiamo 2.0 are described.

1.10.1 New features

New instruments

- Titrandos
 - 851
 - 852

New command

- **BRC**: Command for coulometric titration for determining the bromine consumption (bromine index/bromine number)

News in the program part Method

- Automatic start of the titration after adding sample for **KFC**
- Formula editor: Function Student t

1.10.2 Fixed bugs and problems

General

- The E-mail template in the report is always being checked, even if it is not used.

Devices

- 774: The heater is not being stopped in case of a defective temperature sensor.
- 778, 789, 888, 890: The remote box does not work.
- Titrino: The window evaluation does not work correctly.

2 General program functions

2.1 Program parts

2.1.1 Program parts

General program functions

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



Workplace program part

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



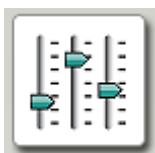
Database program part

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



Method program part

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



Configuration program part

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



Manual program part

- Manual control of devices



Note

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

2.1.2 Workplace - Desktop

Program part: **Workplace**

Workplace symbol



Clicking on the workplace symbol in the vertical bar on the left opens the program part **Workplace** while, at the same time, the workplace symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of workplaces currently opened (*see Chapter 3.2.3.1, page 91*).

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

Elements

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

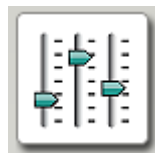
Program part: **Method**



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.

Program part: **Configuration**





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



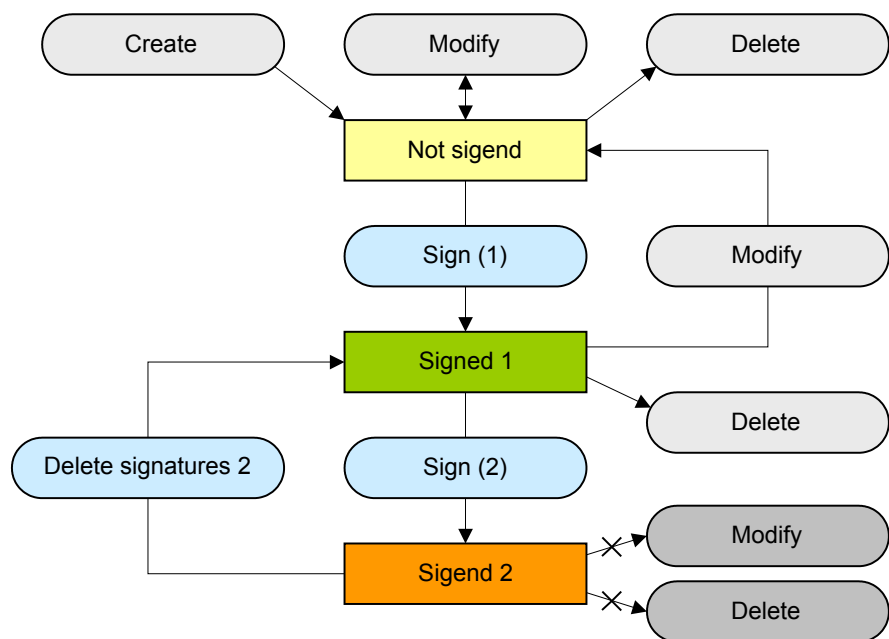
- **Different users**
The same user may only sign on either Level 1 or Level 2.
- **Reason and comment**
Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can also be entered.
- **Saved data**
The signature date, user name, full name, reason and 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 2 exists)	Signature 1 not possible (accessed by other client)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

Signature possible

The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)

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

Signature not possible (accessed by other client)

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comment on the signature.

Input	1000 characters

[Sign]

Sign method or determination. The window remains open.



Note

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

2.3.4 Signature Level 2

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

or

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

 **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.

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

Entry of the user name (short name).

Input **24 characters**

Entry of the user name (short name).

Input	24 characters

Password entry.

Input	24 characters

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

Selection	Selection from the Default reasons

Entry of comment on the signature.

Input	1000 characters

[Sign]

Sign method or determination. The window remains open.



Note

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

2.3.5 Delete Signature Level 2

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

or

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

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons
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
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
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

Comment

Entry of comment on the signature.

Input	1000 characters

[Delete]

Delete Signatures 2.



Note

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

2.4 Formula editor

Dialog window: **Formula editor**

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

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

- **Input field**
Entry of the calculation formula (*see Chapter 2.4.1, page 23*).
- **Function buttons**
Buttons for the rapid entry of operators and parentheses (*see Chapter 2.4.1, page 23*).
- **Variables**
Selection of the variables available for the calculation formula (*see Chapter 2.4.3, page 26*).
- **Operators/functions**
Selection of the operators and functions variables available for the calculation formula (*see Chapter 2.4.4.1, page 44*).
- **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**').

-2.38 yields -2.4

-2.45 yields -2.5

Statistics

The mean value, absolute and relative standard deviation of results R are calculated using the following formula:

Mean value

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

Absolute standard deviation

$$S_{abs_k} = \sqrt{\frac{\sum_{i=1}^n (R_{k,i} - \bar{x}_k)^2}{n-1}}$$

Relative standard deviation (in %)

$$S_{rel_k} = 100 \cdot \frac{S_{abs_k}}{\bar{x}_k}$$

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

It is not the number of decimal places which is decisive for the accuracy of the calculations, but rather the number of significant digits of the decimal numbers displayed. The binary 64 bit numerical format implemented on the basis of the IEEE 754 standard means that the decimal numerals resulting from this have 15 certain significant decimal places.

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

Example

The result displayed **1234.56789158763 mg/L** has 15 certain places. It should be rounded off to three decimal places according to the above rounding procedure:

1234.568 mg/L (7 significant places, 3 of them decimal places)

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

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

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



Note

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

2.4.3 Variables

2.4.3.1 Variables - Overview

Dialog window: **Formula editor**

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

Variable types

The following types of variables are differentiated:

Name	Syntax	Description
<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).

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

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

Identification	Description	Commands
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC
.EP{x}.MEP	Quantity of endpoints in the window x (1...9); 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift	DET, MET, SET, KFT
.EP.QTY	Measured value for the endpoint in µg	KFC, BRC
.EP{x}.TEM	Temperature for the endpoint x (1...9) in °C	DET, MET, SET, KFT, KFC, BRC
.EP{x}.TIM	Time in s until the endpoint x (1...9) is reached	DET, MET, SET, KFT, KFC, BRC
.EP{x}.UGE	Voltage at the generator electrode for endpoint # (1...9) in V. In case of measurements with 756, 831: 0 = not defined, 1 = <14V, 2 = 14...28V, 3 = >28V	KFC, BRC
.EP{x}.VOL	Volume for the endpoint x (1...9) in mL	DET, MET, SET, KFT
.EPP	Position after finishing the command. 0 = invalid position.	PORT
.ETE	End temperature (temperature following processing of the command) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.EVT	End volume (total dosed volume at the end of the command) in mL	DET, MET, SET, KFT, STAT, DOS
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended	All except START and END
.FP{x}.CNT	Intensity for the fixed endpoint x (1...9) in counts	MEAS Opt

Identifica- tion	Description	Commands
.FP{x}.DME	Measured value differential for the fixed endpoint x (1...9)	MET
.FP{x}.DVT	Drift for the fixed endpoint x (1...9) in µg/min	KFC, BRC
.FP{x}.ERC	ERC for the fixed endpoint x (1...9)	DET
.FP{x}.MEA	Measured value for the fixed end-point x (1...9) in mV	DET, MET, SET, KFT, STAT
.FP{x}.MEA	Measured value for the fixed end-point x (1...9) in the unit of the measured value	KFC, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.QTY	Measured value for the fixed end-point x (1...9) in µg	KFC, BRC
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Conc, Ref, Spec)
.FP{x}.TRN	Transmission for the fixed endpoint x (1...9) in %	MEAS Opt
FP{x}.UGE	Voltage at the generator electrode for the fixed endpoint # (1...9) in V. In case of measurements with 756, 831: 0 = not defined, 1 = <14V, 2 = 14...28V, 3 = >28V	KFC, BRC
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL	DET, MET, SET, KFT, STAT
.GMA	Maximum gas flow rate in mL/min	MEAS T/Flow
.GMI	Minimum gas flow rate in mL/min	MEAS T/Flow
.GMN	Average gas flow rate in mL/min	MEAS T/Flow
.GP.VOL	Volume for Gran endpoint in mL	DET, MET

Identification	Description	Commands
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value	DET, MET
.GP.TEM	Temperature for Gran endpoint in °C	DET, MET
.GP.TIM	Time for Gran endpoint in s	DET, MET
.HP{x}.MEA	Measured value for the HNP x (1...9) in mV (HNP = half neutralization potential)	DET, MET
.HP{x}.TEM	Temperature for the HNP x (1...9) in °C	DET, MET
.HP{x}.TIM	Time in s until the HNP x (1...9) is reached	DET, MET
.HP{x}.VOL	Volume for the HNP x (1...9) in mL	DET, MET
.IGF	Initial gas flow (measured value at the time of the start of the command) in mL/min	MEAS T/Flow
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL MEAS, STDADD, DOS
.ITE	Initial temperature (temperature before start conditions are processed) in °C	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.LCO	Loop counter = current quantity of completed runs, both of <i>Repeat loops</i> and of <i>While loops</i>	LOOP, CAL LOOP

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

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

Identification	Description	Commands
.MA.TEM	Temperature for the maximum measured value in °C	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MA.TIM	Time in s until the maximum measured value is reached	DET, MET, SET, KFT, STAT, MEAS (without Conc, Ref, Spec)
.MA.TRN	Transmission for maximum measured value in %	MEAS Opt
.MA.VOL	Volume 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
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range	STAT, DOS

Identification	Description	Commands
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min	STAT, DOS
.MR.MRT	Mean dosing rate for the whole range in mL/min.	STAT, DOS
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without T/Flow, Ref, Spec), CAL MEAS, STDADD, DOS
.NMP	Number of measuring points in the measuring point list	DET, MET, SET, KFT, KFC, BRC, STAT, MEAS (without Ref, Spec), CAL MEAS, DOS
.PK{x}.ABS	Absorbance of the peak x (1...9) in mAU	MEAS Spec
.PK{x}.TRN	Transmission of the peak x (1...9) in %	MEAS Spec
.PK{x}.CNT	Intensity of the peak x (1...9) in counts	MEAS Spec
.PK{x}.CNR	Intensity of the peak x (1...9) in the reference spectrum in counts	MEAS Spec
.PK{x}.CND	Intensity of the peak x (1...9) in the dark spectrum in counts	MEAS Spec
.PK{x}.WVL	Wavelength of the peak x (1...9) in nm	MEAS Spec
.PK{x}.SAT	Detector with peak x (1...9) saturated: 1 = saturated;0 = not saturated	MEAS Spec
.RAN	Current, absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when ending the command)	MOVE

Identification	Description	Commands
.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, BRC, STAT
.SPO	Current external position (entry when ending the command); 0 means invalid position	SWING
.STE	Start temperature (temperature after processing of the start conditions) in °C	DET, MET, SET, KFT, KFC, BRC, STAT

Identifica- tion	Description	Commands
.TC.MAX	Maximum temperature coefficient of the conductivity in %/°C	MEAS TC Cond
.TC.TSTART	Start temperature in °C	MEAS Cond, MEAS TC Cond
.TC.TSTOP	Stop temperature in °C	MEAS Cond, MEAS TC Cond
.TITER	Titer value of the solution used for the command	DET, MET, SET, KFT, STAT, STDADD dos, STDADD auto, ADD, DOS, LQH
.TOL	Tolerance within which a measured peak can be assigned to a calibration wavelength.	CAL Spec
.TOU	Timeout status: 1 = Timeout expired; 0 = Timeout not expired	RECEIVE, TRANS- FER, 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, DIG- ITAL OUT
.VAR	Variance of the calculated result of the standard addition in the selected unit	STDADD
.VOL	Dosed volume	STDADD, ADD, DOS, LQH

2.4.3.4 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.

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. They are assigned neither to individual commands nor to determinations. The **Variables** field of the Formula editor lists all **system variables** which are available for the current method.

Syntax

'SV.Variable name'

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

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

Available system variables

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

Variable name	Description	Data type
STO	Indication whether the determination has been stopped (manual stop, stop via SEND command, emergency stop) or terminated normally ; 1 = stopped, 0 = terminated normally	Number

2.4.3.7 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 (/) - Potentialiation (^)	Arithmetic: - Exponential function (Exp) - Natural logarithm (Ln) - Common logarithm (Log) - Square root (Sqrt) - Absolute value (Abs) - Fraction (Frac) - Integer (Int) - Round integer (Round) - Sign (Sign) - Quantiles of the Student's t-distribution (Tinv)
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
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.

2.4.4.2.3 Multiplication

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

Syntax

Operand1 * Operand2

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

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	1.2 * 3 = 3.6	-
Text	Text	Text	"Metrohm" * "AG" = invalid	This operation is not allowed.
Time	Time	Number	Time(1998;05;06) * Time(1902;02;03) = 27'478'004.545 (for UTC+1 or +2 for summer time)	Result: Number of days calculated from December 1899, dependent on the system time
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	2 * "Metrohm" = "MetrohmMetrohm"	-
Text	Number	Text	"Metrohm" * 2 = "MetrohmMetrohm"	-
Number	Time	Number	2.0 * Time(1999;10;7) = 72'879.833 (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	Time(1999;10;7) * 2.0 = 72'879.833 (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	"Metrohm" * Time(1999;10;7) = invalid	This operation is not allowed.
Time	Text	Text	Time(1999;10;7) * "Metrohm" = invalid	This operation is not allowed.

2.4.4.2.4 Division

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

Syntax

Operand1 / Operand2

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

Examples

Operand1	Operand2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	1.2 / 3 = 0.4	Operand2 must not be zero!
Text	Text	Text	"Metrohm" / "AG" = invalid	This operation is not allowed.
Time	Time	Number	Time(1998;04;06) / Time(1964;02;03) = 1.533 (for UTC +1 or +2 for summer time)	Result: Number of days calculated from December 1899, dependent on the system time

Operand1	Operand2	Result	Example	Remark
Operand of different type: The operand which does not correspond to the result type is converted to the relevant result type before the operation.				
Number	Text	Text	1.2 / "Metrohm" = invalid	This operation is not allowed.
Text	Number	Text	"Metrohm" / 1.2 = invalid	This operation is not allowed.
Number	Time	Number	10'000 / Time(1999;10;7) = 274 (for UTC+2)	Result: Number of days calculated from December 1899, dependent on the system time
Time	Number	Number	Time(1999;02;17) / 10'000 = 3.621 (for UTC+1)	Result: Number of days calculated from December 1899, dependent on the system time
Text	Time	Text	"Metrohm" / Time(1999;10;7) = invalid	This operation is not allowed.
Time	Text	Text	Time(1999;10;7) / "Metrohm" = invalid	This operation is not allowed.

2.4.4.2.5 Potentiation

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

Syntax

Operand1 ^ Operand2

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

Examples

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

Operand1	Operand2	Result	Example	Remark
Time	Number	Number	Time(1999;10;7) ^ 2.5 = 253479847878.04 (for UTC+2)	-
Text	Time	Text	"Metrohm" ^ Time(1999;10;7) = invalid	This operation is not allowed.
Time	Text	Text	Time(1999;10;7) ^ "Metrohm" = invalid	This operation is not allowed.

2.4.4.3 Logical operators

2.4.4.3.1 AND

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

Syntax

Operand1 AND Operand2

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

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

Examples

Oper-and1	Oper-and2	Result	Example	Remark
Operands of the same type:				
Number	Number	Number	5 AND 4 --> 1 4 AND 0 --> 0	Numbers greater than 0 are interpreted as 1 (true).
Text	Text	Number	"Metrohm" AND "AG" --> 1 "" AND "AG" --> 0	An empty character string ("") is interpreted as 0 (false), everything else as 1 (true). The first operation therefore corresponds to 1 AND 1 --> 1 .
Time	Time	Number	Time(1999;10;07) AND Time(1999;10;07) --> 1	Time() : see <i>Time(Date)</i>
Operands of a different type:				

Oper- and1	Oper- and2	Result	Example	Remark
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:				

Operand1	Operand2	Result	Example	Remark
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 <i>Time(Date)</i>
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 77). 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 65)
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 77).
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 70).
Time	Number	Number	Time(1999;10;7) = 2.0 --> 0	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" = Time(1999;10;07) --> 0	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC+2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 77).
Time	Text	Number	Time(1999;10;07) = "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 77). 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 65)
Operands of a different type:				
Number	Text	Number	1.2 >= "1.2" --> 1 1.2 >= "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 77).
Text	Number	Number	"Metrohm" >= 1.2 --> 1	The same rules apply here as for the previous operation.
Number	Time	Number	2.0 >= Time(1999;10;07) --> 0	Before the comparison, the operand is converted from the type Date/Time to a Number .
Time	Number	Number	Time(1999;10;07) >= 2.0 --> 1	The same rules apply here as for the previous operation.
Text	Time	Number	"Metrohm" >= Time(1999;10;07) --> 1	Before the operation, the operand is converted from the type Date/Time to Text (here thus: "1999-10-07 00:00:00 UTC +2"), afterwards the texts are compared according to ASCII value (see Chapter 2.4.4.10, page 77).
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 77</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 65</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 77</i>).
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 (<i>see Chapter 2.4.4.10, page 77</i>).
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 77). 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 65)
Operands of a different type:				
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 77).
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 77).
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 77</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 65</i>)
Operands of a different type:				
Number	Text	Number	1.2 <> "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 (<i>see Chapter 2.4.4.10, page 77</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) --> 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 (<i>see Chapter 2.4.4.10, page 77</i>).
Time	Text	Number	Time(1999;10;7) <> "Metrohm" --> 1	The same rules apply here as for the previous operation.

Absolute value

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

Syntax

y = Abs(number)

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

Parameters

Number

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

Examples

Abs(-55.3) = 55.3

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

Fraction

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

Syntax

y = Frac(number)

Gives the fraction of the entered number.



Note

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

Parameters

Number

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

Examples

Frac(-55.325) = 0.325

Frac('CV.AverageTemp') = Value of the common variable **CV.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 Rounding integer

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

Syntax

y = Round(number)

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



Note

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

Parameters

Number

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

Examples

Round(-55.5259) = -56

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

2.4.4.5.9 Sign

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

Syntax

y = Sign(number)

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

Parameters

Number

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

Examples

Sign(-55.3) = -1

Sign(26.115) = 1

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

2.4.4.5.10 Quantiles of the Student's t-distribution

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

Syntax

$t_s = \text{Tinv}(\text{Probability}; \text{Degrees of freedom})$

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

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

Parameters

Probability

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

Degrees of freedom

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

Examples

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

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

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

Mean value = 1.001

Standard deviation = 0.0111

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

Confidence interval of the titer = 1.001 ± 0.008

2.4.4.6 Date/time functions

2.4.4.6.1 Time()

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

Syntax

y = Time()

Gives the current date and the current time.

Parameters

none

Return value

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



Note

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

2.4.4.6.2 Time(Date)

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

Syntax

y = Time(year; month; day)

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

Parameters

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

month 1...12

day **1...31**

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



Note

Only the integral part is used for all parameters.

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

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

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

Return value

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



Note

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

Examples

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

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

2.4.4.6.3 Time(Date + Time)

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

Syntax

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

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

Parameters

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

month 1...12

day **1...31**

hour 0...23

minute 0...59

second 0...59

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



Note

Only the integral part is used for all parameters.

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

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

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

Return value

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



Note

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

Examples

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

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

2.4.4.7 Type Conversion functions

2.4.4.7.1 NumberToText

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

Syntax

y = NumberToText(number1)

Gives the entered number as **Text**.

Parameters

Number

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

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

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

2.4.4.7.4 TextToTime

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

Syntax

y = TextToTime(Text;Format)

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

Parameters

Text

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

Format

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

Characters	Significance
y	Year
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).

TimeToText

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

Syntax

y = TimeToText(Time)

Gives the time entered as **Text**.

y = TimeToText(Time;Format)

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

Parameters

Time

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

Format

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

Characters	Significance	Example
y	two-digit year number	03
yyyy	four-digit year number	1999
M	one or two-digit month number	4, 12
MM	two-digit month number	04, 12
MMM	Month name short form	Jul, Aug
MMMM	Month name	July, August
d	one or two-digit day number	2, 25
dd	two-digit day number	02, 25
h	one-digit or two-digit hour number (1...12 AM/PM)	5, 11
hh	two-digit hour number (1...12 AM/ PM)	05, 11
H	one-digit or two-digit hour number (0...23)	8, 17
HH	two-digit hour number (0...23)	08, 17
m	one or two-digit minute number	2, 25
mm	two-digit minute number	02, 25
s	one or two-digit second number	3, 55
ss	two-digit second number	03, 55

Characters	Significance	Example
E	Weekday short form	Mon, Tue, Wed
EEEE	Weekday	Monday, Tuesday
D	one, two or three-digit number of the day in the year	2, 35, 142
DD	two or three-digit number of the day in the year	02, 35, 142
DDD	three-digit number of the day in the year	002, 035, 142
F	one-digit number of the weekday in the month, e.g. the 2 nd Monday in May	2
w	one or two-digit number of the week in the year	5, 25
ww	two-digit number of the week in the year	05, 25
W	one-digit number of the week in the month	3
a	Format AM/PM	AM, PM
'	Inverted commas for entering any text	
"	Entry of '	'



Note

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

Examples

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

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

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

```
TimeToText(Time(2000;12;31);"EEEE', 'dd'. 'MMMM' 'yyyy")=Sun-  
day, December 31, 2000
```

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

2.4.4.8 Text functions

2.4.4.8.1 TextPosition

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

Syntax

y = TextPosition(Text ; sample text)

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

Parameters

Text

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

Sample text

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



Note

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

Example: **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.

Examples

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

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

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

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

TextPosition(3362.14;"6") = 3

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

ASCII value (dec)	Characters	ASCII value (dec)	Characters	ASCII value (dec)	Characters
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	Colon (:)	90	Z	122	z
59	Semi-colon (;)	91	Square parentheses (I)	123	Curly parentheses (I)
60	Less than (<)	92	Backslash (\)	124	Vertical stroke ()
61	Equals (=)	93	Square parentheses (I)	125	Curly parentheses (I)
62	Greater than (>)	94	Circumflex (^)	126	Tilde (~)
63	Question mark (?)	95	Underscore (_)		

2.4.5 Molar mass calculator

Dialog window: **Molar mass calculator**

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

Mode of operation

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

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

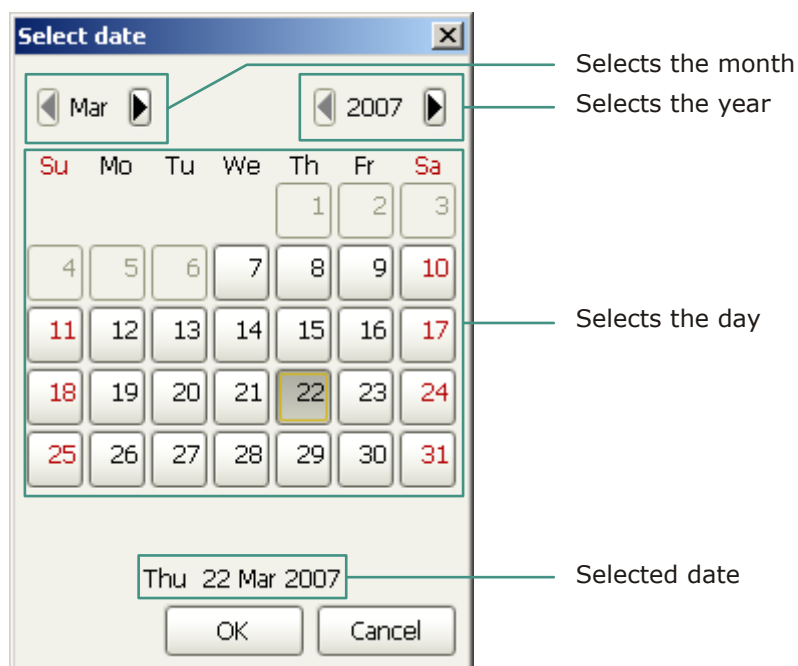
Examples

Molecular formula	Molar mass
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 81).



Open formula editor for entering calculation formulas .(see Chapter 2.4, page 23)



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 **TimeToText**(see Chapter 2.4.4.7.6, page 71) to **Text**.



Font size in pt.



Select font color.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.

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 91*).

Elements

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

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

3.1.3 Workplace - Menu bar

3.1.3.1 Workplace - Main menu

Program part: **Workplace**

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

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

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

3.1.3.2 Workplace - Menu File

Program part: **Workplace**

Workplace ►	
New...	Opens new workplace (<i>see Chapter 3.2.1, page 90</i>).
Properties...	Edits properties of the selected workplace (<i>see Chapter 3.2.2, page 90</i>).
Close	Closes the selected workplace (<i>see Chapter 3.2.4, page 92</i>).
Method ►	
Save	Saves the method with the modified live parameters (<i>see Chapter 3.7.3, page 165</i>).
Save as...	Saves the method with the modified live parameters under a new name (<i>see Chapter 3.7.3, page 165</i>).
 Logout...	Logs out user (<i>see Chapter 2.2.3, page 16</i>).
Exit	Ends program.

3.1.3.3 Workplace - Menu View

Program part: **Workplace**

 Change layout	Changes layout of the loaded workplace view (<i>see Chapter 3.1.7.2, page 88</i>).
 Load view	Loads a saved workplace view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view	Saves the current workplace view (<i>see Chapter 3.1.7.4, page 89</i>).
 Split vertically	Splits workplace window vertically and display two workplaces side by side (<i>see Chapter 3.2.3.3, page 92</i>).
 Split horizontally	Splits workplace window horizontally and display two workplaces below each other (<i>see Chapter 3.2.3.4, page 92</i>).
 Unsplit	Unsplits the workplace window (<i>see Chapter 3.2.3.2, page 92</i>).
 Properties ►	

 Change layout	Changes layout of the loaded workplace view (<i>see Chapter 3.1.7.2, page 88</i>).
 Load view	Loads a saved workplace view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view	Saves the current workplace view (<i>see Chapter 3.1.7.4, page 89</i>).
 Run test	Carries out run test for determination(s) (<i>see Chapter 3.6.2, page 117</i>).
 Split vertically	Splits workplace window vertically and display two workplaces side by side (<i>see Chapter 3.2.3.3, page 92</i>).
 Split horizontally	Splits workplace window horizontally and display two workplaces below each other (<i>see Chapter 3.2.3.4, page 92</i>).
 Unsplit	Unsplits the workplace window (<i>see Chapter 3.2.3.2, page 92</i>).
 Logout	Logout user (<i>see Chapter 2.2.3, page 16</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 determination running.
- *Live display 2*
Display of live curves, measured values and messages for the determination running.
- *Report*
Display of reports of recorded determinations.

Presentation

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

By clicking on the button  above at the right, the subwindows can be maximized so that only one subwindow is displayed in the main window.

The original view of all subwindows is restored when the button is clicked in the maximized subwindow again.

3.1.6 Workplace - Functions

Program part: **Workplace**

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

Views

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

Workplaces

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

Sample tables

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

Single determination

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

Determination series

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

Subwindow Method

- *Zoom*
- *Modify parameters live*
- *Interrupt commands*

Subwindow Report

- *Select a report*

Tools

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

3.1.7 Views

3.1.7.1 Views - General

Program 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.

Automatic load

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

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

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

Export/Import

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

3.1.7.2 Change layout

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

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

Select layout

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

Selection	Selection of the possible combinations

Available subwindows

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

Selection	Subwindow selection

Displayed subwindows

Displays the subwindows that are shown in the view.

Selection	Subwindow



Add the selected subwindow to the view.



Remove the selected subwindow from the view.



Move the selected subwindow upward (modifies sequence).



Move the selected subwindow downward (modifies sequence).

3.1.7.3 Load view

Dialog window: Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view

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

Name

Name of the view that should be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

3.1.7.4 Save view

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

Dialog window:Workplace / Database / Configuration ▶ View ▶ Save view... ▶ Save view

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

Name

Name under which the view is to be saved.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Save]

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

3.1.7.5 Rename view

Dialog window: Workplace / Database / Configuration ▶ View ▶ Rename view... ▶ Rename view

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

Rename view to

Enter a new name for the view.

Input	50 characters

3.1.7.6 Delete view

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

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

3.2 Workplaces

3.2.1 Create new workplace

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

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

Name

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

Input	50 characters

Color

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

Selection	green blue ochre brown
Default value	green

3.2.2 Edit workplace

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

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

Color

Input	50 characters

Selection	green blue ochre brown
Default value	green



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 110*).

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 selected sample table.

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

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

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

Sample data table

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

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

Window menus

[Edit] contains the following menu items:

 Edit line	Edits selected line.
 Insert new line	Inserts a new empty line above the line selected.
 Cut lines	Cuts selected lines and transfers them to the clipboard.
 Copy lines	Copies selected lines to the clipboard.
 Paste lines	Pastes lines from the clipboard above the selected line.
 Delete lines	Deletes the selected lines.
 Increment	Using the cursor, which takes on the form  , the region which is to be automatically incremented can be selected from a column in the table. The number standing at the end of the expression will thereby be automatically increased by 1 in the selected cells of a column, starting from the first selected cell. This works not only with pure numbers but also with strings which end with a number (e.g. ABC10 → ABC11 → ABC12...).
 Filling	Automatically fills selected lines.
 Duplicate	Duplicates selected line(s). The new lines are inserted underneath the selected range.
Mark lines	Marks selected lines with a red background for the line number. Before the start of such a line the corresponding actions defined under Properties on the tab Process (see Chapter 3.3.2.4, page 107) will be triggered.

Unmark lines	Removes the line marking for the selected lines.
Set lines inexecutable	Sets the selected lines to "inexecutable", i.e. these lines will not be carried out in the method run. Such lines are crossed through with a red line.
Set lines executable	Sets the selected lines to "executable", i.e. they will be carried out in the run.

[Sample table] contains the following menu items:

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

Moving lines with Drag&Drop

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

Copying lines with Drag&Drop

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

3.3.1.4 Editing sample data

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

Method

Entry or selection of the method from the current method group with which the determination is to be 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 115*).

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

Input	Number with a maximum of 10 digits
Default value	1.0

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

Zeile 5 von 5



5

■■■■■■■■ 97



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

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



Jump to the last line in the sample table.



Jump to a new, empty line.

Displaying application note

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

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

Functions

[Apply]

Applies 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]

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

3.3.1.5 Duplicate sample data

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

Number

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

Range	1 ... 999
Default value	1

3.3.1.6 Importing sample data

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

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

File name

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

Selection	File name

File type

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

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

[Open]

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



Note

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

3.3.1.7 Exporting sample data

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

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

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

File name

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

Selection	File name

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

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

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

List of sample tables

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 110).

Saving sample table

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

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



Sample data



Note

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

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

Sample position

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

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

Input	50 characters
Default value	Sample position

ID1 ... ID3

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

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

Input	50 characters
Default value	ID1...3

ID4 ... ID16

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

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

Input	50 characters
Default value	ID4...16

Sample size

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

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

Unit

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.

3.3.2.3 Properties - Edit

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

Apply data with

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

Lock editing in working sample table

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

Copy automatically into next line

Method

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

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

ID1 ... ID3

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

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

ID4 ... ID16

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

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

Sample size

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

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

Sample size unit

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

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

Sample position + 1

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

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



Stop series ([Stop])

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



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

3.3.2.5 Properties - Data import

Dialog window:Workplace ▶ Tools ▶ Sample

table ▶ New... ▶ [Sample table] ▶ Properties... ▶ Properties - Sample table 'Name'

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

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



Note

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

Importing from balance

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

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



Note

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

Balance

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

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

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.

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).

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.

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 1414*).

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

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).

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.

Comment on sample table

Input	1000 characters

3.3.3.1 Sample table manager

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

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

Name 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 110*).

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

Renames the selected sample table (see Chapter 3.3.3.2, page 112).

3.3.3.6 Importing sample table

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

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

3.3.3.7 Renaming imported sample tables

Rename imported sample table 'Name' to

Entry of the new name for the sample table.



Note

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

Input

50 characters

3.4 Sample assignment table

3.4.1 Sample assignment table

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

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



Note

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

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



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

Assignment ID

Identification on the basis of which the method is assigned.

Method

Method which is loaded for the Assignment ID.

[New]

Add new sample assignment.

[Properties]

Edit selected sample assignment.

[Delete]

Delete selected sample assignment.

3.4.2 Sample assignment

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

Assignment ID

Entry of an identification on the basis of which the method is assigned or selection of a defined text template. The assignment ID can contain any number of 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



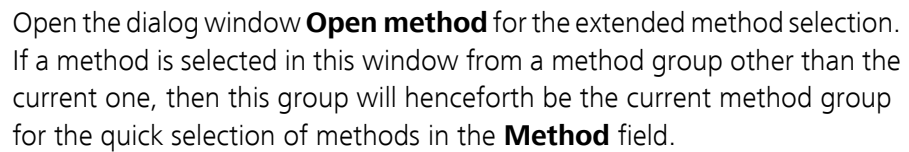
Note

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



3.4.3 Enter assignment ID

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

3.5 Text templates

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

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

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

Shows the text templates defined for the selected field.



[New]

Add new text template (see Chapter 3.5.2, page 116).

[Properties]

Edit selected text template (see Chapter 3.5.2, page 116).

[Delete]

Delete the selected text template.

3.5.2 Edit text template

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

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

Text

Text template entry.

Input	100 characters

3.6 Subwindow Run

3.6.1 Run - General

Subwindow: **Workplace**

Subwindow Run

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

Tabs

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

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



Note

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

Run test

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



Note

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

Single determination

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

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

Method

Displays the method for the single determination.

Determination series

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

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

Line

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

Status displays

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

Selection	Run test running... Run test error Run test finished without errors

Run test running...

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

|| Hold

► Cont

3.6.3.3 Single determination - Status display

Status

Selection	READY BUSY HOLD COND BUSY COND READY COND HOLD ERROR
READY	Ready for starting a determination or for conditioning.
BUSY	Determination running.
HOLD	Determination interrupted.
COND BUSY	Conditioning running (will be displayed only if no determination is running).
COND READY	Condition requirement fulfilled (will be displayed only if no determination is running).
COND HOLD	Conditioning interrupted (will be displayed only if no determination is running).

ERROR

Error.

3.6.3.4 Single determination - Determination parameters

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

User

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

Input	50 characters

Sample number

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

Range	0 ... 99999
Default value	0

Remark

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries (*see Chapter 3.5.1, page 115*).



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 123).

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** and **COND BUSY**).

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

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



Note

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

3.6.3.5 Single determination - Sample data

Tab:Workplace ▶ Run ▶ Single determination

Method

Entry or selection of the method from the current method group with which the determination is to be 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 115*).

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 123*). Generally speaking, no formula input is possible in these fields.



Note

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

3.6.3.6 Modify remark

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

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

Remarks

Freely definable remarks concerning the determination, that are saved together with the determination. Prepared sample texts can also be selected instead of making manual entries (*see Chapter 3.5.1, page 115*).

Input	100 characters

3.6.3.7 Live modification

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

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

Sample position

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

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 115*).

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

Generally speaking, no formula input is possible in these fields.

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then a reason and a comment on the modification must be entered before saving (see Chapter 6.2.2.4, page 1186).

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 130), then the method defined in the sample assignment table will be loaded (see Chapter 3.4, page 113).

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.

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

3.6.3.10 Modification comment for sample data

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

Reason

Selection	Selection from default reasons
1. Selection 2. Selection from default reasons	1. Selection 2. Selection from default reasons

Comment

Input	1000 characters

3.6.4 Determination series

3.6.4.1 Determination series - Overview

Parameters and sample data for determination series can be edited and run functions can be triggered on the tab **Determination series** in the sub-window **Run**. It contains the following tools and functions:

- *Operating elements*
Buttons for starting, stopping, interrupting and resuming determinations and series.
- *Status display*
Shows the current status of the workplace.

- *Sample data*
Entry of sample data for the next determinations.
- *Properties*
Definition of the properties for the tab **Determination series**.

3.6.4.2 Determination series - Operating elements

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

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



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

Start of the first determination of a sample series. The button is present in the status **READY** (no determination started). If the start can be triggered, then it will be green, otherwise light gray. Conditioning will be started first for methods that have conditioning, afterwards automatically the determination (Status **COND READY**).



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

Immediate stop of the determination (or the conditioning) of a sample series that is currently running. This button is present in the status **BUSY** (determination is running), **COND READY** (condition requirement fulfilled) and **COND BUSY** (conditioning is running), 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 (will be displayed only if no determination is running).

COND READY

Condition requirement fulfilled (will be displayed only if no determination is running).

COND HOLD

Conditioning interrupted (will be displayed only if no determination is running).

ERROR

Error.

3.6.4.4 Determination series - Determination parameters

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

If the option **User name required** is enabled in the security settings, then the abbreviation of the currently registered user will be displayed in this field (*see Chapter 6.2.2.2, page 1181*). 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 115*).



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 123).

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**.

 **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

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

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

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

 **Note**

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

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

Window menus

[Edit] contains the following menu items:

Edit line	Edits selected line.
Insert new line	Inserts a new empty line above the line selected.
 Cut lines	Cuts selected lines and transfers them to the clipboard.
 Copy lines	Copies selected lines to the clipboard.
 Insert lines	Inserts lines from the clipboard above the selected line.
 Delete lines	Deletes the selected lines.
 Increment	Using the cursor, which takes on the form  , the region which is to be automatically incremented can be selected from a column in the table. The number standing at the end of the expression will thereby be automatically increased by 1 in the selected cells of a column, starting from the first selected cell. This works not only with pure numbers but also with text extracts which end with a number (e.g. ABC10 → ABC11 → ABC12...).
 Filling	Automatically fill selected lines.
 Duplicate	Duplicates selected line(s). The new lines are inserted underneath the selected range.
Mark lines	Marks selected lines with a red background for the line number. Before the start of such a line the corresponding actions defined under Properties on the tab Process (see Chapter 3.3.2.4, page 107) will be triggered.

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 115*).

Input	100 characters

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

The second field which can be edited after **Autostart** shows the total number of determinations per series that are still to be carried out (Setpoint counter).

Selection	1 ... 999 Sample table
Default value	Sample table

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 us 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 **[Hold]** and resumed with **[Cont]**. If an error occurs during conditioning, then neither the error track nor the exit track 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.

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.

3.6.4.9.1 Loading new working sample table

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.

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

List of sample tables

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

Name	Name of the sample table.
Saved	Date and time when the sample table was saved.
Saved by	Short name of the user who saved the sample table.
Lines	Number of lines in the sample table.
Comment	Comment on the sample table that was entered on the tab Comment as comment concerning the sample table (<i>see Chapter 3.3.2.6, page 110</i>).

Loading sample table

Name

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

Input	50 characters

[Load]

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

3.6.4.9.3 Editing sample data

Menu item: **Workplace ► Run ► Determination series ► [Edit] ► Edit line ► Edit line**
- Working sample table - Workplace 'Name'

The fields in this dialog window exhibit the same background colors as the lines in the working sample table:

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



Note

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

Method

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

or 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.

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 115*).

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.

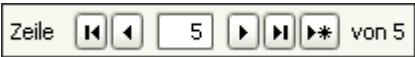
Input	16 characters
Selection	g mg µg mL µL pcs
Default value	g



Note

If data from the current sample data line is modified for the ongoing determination, then this is regarded as a live modification. If the option **Comment on modification of sample data (live)** is enabled in the security settings, then a reason and a comment on the modification must be entered before saving (*see Chapter 6.2.2.4, page 1186*).

Navigation



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



Jump to the first line in the working sample table.



Jump to the previous line in the working sample table.



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



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



Jump to the last line in the working sample table.



Jump to a new, empty line.

Displaying application note

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

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

Functions

[Apply]

Applies 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]

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

3.6.4.9.4 Duplicate sample data

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

Number

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

Range	1 ... 999
Default value	1

3.6.4.9.5 Importing sample data

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

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

File name

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

Selection	File name

File type

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

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

[Open]

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



Note

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

3.6.4.9.6 Exporting sample data

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

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

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

File name

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

Selection	File name

Prescribed format ***.CSV**.

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

The sample data will be written to the export file.

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.



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 117), which also checks the required hardware).

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

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

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.

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

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.

3.6.4.9.8 Save sample table

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

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

List of sample tables

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

Name

Name of the sample table.

Saved

Date and time when the sample table was saved.

Saved by

Short name of the user who saved the sample table.

Lines

Number of lines in the sample table.

Comment

Comment on the sample table that was entered on the tab **Comment** as comment concerning the sample table (see Chapter 3.3.2.6, page 110).

Saving sample table

Name

Name under which the sample table is to be saved.



Note

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

Input	50 characters

Save the sample table under the desired name.

Run test

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



Note

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

Single determination

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

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

Method

Displays the method for the single determination.

Determination series

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

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

Line

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

Status displays

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

Selection	Run test running...	Run test error	Run test finished without errors

- ### 3.6.4.10.2 Properties - Display

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

Operating elements



[Pause]/[Cont]

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

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

Note

■■■■■■■ 155

Sample number

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

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

User

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

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

Remarks

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

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

Statistics

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

Enable/disable the display of the statistics fields.

Sample data



Note

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

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

Sample position

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

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

Input	50 characters
Default value	Sample position

ID1 ... ID3

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

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



into the same line. This means that it is possible, for example, to fill a line first with sample identifications per barcode reader and then later to apply the sample size from a balance for the same line.

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

Lock editing in working sample table

on | off (Default value: off)

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

Copy automatically into next line

Method

on | off (Default value: on)

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

ID1 ... ID3

on | off (Default value: on)

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

ID4 ... ID16

on | off (Default value: off)

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

Sample size

on | off (Default value: off)

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

Sample size unit

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

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

Sample position + 1

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

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

3.6.4.10.4 Properties - Process

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

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

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

Delete processed lines

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

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

Method selection by assignment ID

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

If this option is enabled, then the selected sample identification will be used for the method selection in the working sample table. This identification receives the designation **Assignment ID**, which can then no longer be changed; if this ID matches one of the Assignment IDs from the sample assignment table (*see Chapter 3.4.1, page 113*), then the respective method from this table will be entered in the field **Method**.

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

Request assignment ID

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

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

Actions for marked sample table lines

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

Pause series ([Pause]) and show message

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

Stop series ([Stop])

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



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

3.6.4.10.5 Properties - Data import

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

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

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



Note

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

Importing from balance

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

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



Note

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

Balance

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

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

Always accept data

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

Accept data only for active window

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

Confirmation necessary to accept data during determination.

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

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

Importing from barcode reader

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

If this option is enabled, then external data from the selected barcode reading device will be imported into the opened sample table. The device properties of the barcode reader will define the field into which the data is imported (*see Chapter 7.18.4, page 1414*).

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.

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

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.

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

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

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

If the option **Comment on modification of sample data (live)** is enabled in the security settings, then this window must be opened before saving. A reason and a comment on the modification must be entered here (see *Chapter 6.2.2.4, page 1186*).

Selection from the standard reasons for the category **Modifications of sample data** (see Chapter 6.2.2.6, page 1188) that are defined in the security settings.

Selection	Selection from default reasons

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

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

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

Tabs

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

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

3.8.2 Live display - Tracks

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

In the subwindow **Live window** the main track of the method loaded (**START command**) is always displayed, further tracks are only displayed if the live display is activated in the accompanying command **TRACK**. A tab is displayed for each track which is lettered with the name of the track.

At the start of the determination the content of the track tabs is deleted. Afterwards the messages, curves and measured value displays defined by the active commands will appear in the track tabs. The tab titles of the active tracks will be displayed in red. Additionally the command type and command name of the active command are displayed in the window title of the sub-window **Live display**.

After stopping the track **Track finished** is displayed in each track except for the main track. After finishing the determination and depending on the determination run the following is displayed in the main track:

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 168</i>).

3.8.3 Live display - Application note

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

On the tab **Application note** the application note of the method loaded and which is defined in the **START** command is displayed. This tab is opened by default in the subwindow **Live display** when loading the method.

3.8.4 Live display - Messages

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

On the tab **Messages** there is a scrollable message field which contains all messages concerning events 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]**. In this way all messages of the last single determination or determination series can be viewed.

The label of the tab changes to **red** as soon as a new message has been entered. The label of the **Messages** tab changes to **black** again after having shown the messages and the tab is changed anew.

3.8.5 Live display - Properties

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

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

Command type

Select the command type for which the properties in the live display are to be defined. The curve properties defined for each command type are saved per live display window and per client.

Selection	DET MET SET KFT KFC / BRC STAT MEAS MEAS T/Flow MEAS TC Cond MEAS Opt DOS
Default value	DET

Measured value display

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

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

Measured value 1...3

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

DET

Selection	off Measured value time Temperature Volume Calculated 1...3 External 1...3
Default value	off

MET

Selection	off Measured value time Temperature Volume Calculated 1...3 External 1...3
Default value	off

SET

Selection	off Measured value time Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	off

KFT

Selection	off Measured value time Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	off

KFC / BRC

Selection	off Measured value amount time drift Charge Ugen Igen Calculated 1...3 External 1...3
Default value	off

STAT

Selection	off Measured value time Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	off

MEAS

Selection	off Measured value time Temperature dMW/dt Calculated 1...3 External 1...3
Default value	off

MEAS T/Flow

Selection	off Measured value time Flow Calculated 1...3 External 1...3
Default value	off

Selection	time Measured value amount drift Charge dV/dt Ugen Igen 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

Selection	time Measured value Temperature dMW/ dt Calculated 1...3 External 1...3
Default value	time

Selection	time Measured value Flow Calculated 1...3 External 1...3
Default value	time

Selection	Temperature Measured value time Calculated 1...3 External 1...3
Default value	Temperature

Selection	time Measured value Intensity Transmission Saturated pixels
Default value	time

Selection	time Measured value Temperature Volume dV/dt Calculated 1...3 External 1...3
Default value	time

Selection of the quantity to be shown on the y1 axis (left y axis).

Selection	Measured value Volume time Temperature ERC Calculated 1...3 External 1...3
Default value	Measured value

MET

Selection	Measured value Volume time Temperature dMW Calculated 1...3 External 1...3
Default value	Measured value

SET

Selection	Volume Measured value Temperature time dV/dt Calculated 1...3 External 1...3
Default value	Volume

KFT

Selection	Volume Measured value Temperature time dV/dt Calculated 1...3 External 1...3
Default value	Volume

KFC / BRC

Selection	amount Measured value time drift Charge dV/dt Ugen Igen Calculated 1...3 External 1...3
Default value	amount

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

Color

Selection	Volume Measured value Temperature time dV/dt Calculated 1...3 External 1...3
Default value	Volume

Selection of the curve color for the quantity to be shown on the y1 axis.

Selection	Color selection blue
Default value	blue

y2 axis

Selection of the quantity to be shown on the y2 axis (right y axis).

Selection	off Measured value Volume time Temperature ERC Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value Volume time Temperature dMW Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value Volume Temperature time dV/dt Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value Volume Temperature time dV/dt Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value time amount drift Charge dV/dt Ugen Igen Calculated 1...3 External 1...3
Default value	off

Selection	off Measured value Volume Temperature time dV/dt Calculated 1...3 External 1...3
Default value	off

4 Database

4.1 Database - General

4.1.1 Database - Definition

Program part: **Database**

Definition

The term **Database** is used in **tiamo** to refer to the program part in which the determinations saved in the databases can be displayed, managed, evaluated, reprocessed and printed out. The **Determination databases** are also referred to as **Databases**; they can, in contrast to the **Configuration database**, be generated by the user and contain the determination data. Included among such determination data is the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

Organization

In **Local Server Systems (tiamo light, tiamo full)** the databases are stored on the drives administered by the computer and are only available to those users registered on that computer who have the appropriate access rights.

In **Client Server Systems (tiamo multi)** the databases are stored on the disk drives managed centrally by the server and are globally available in the whole client/server system, i.e. all users with the appropriate access rights can use these databases.

4.1.2 Database - Desktop

Program part: **Database**

Database symbol



Clicking on the database symbol in the vertical bar on the left opens the program part **Database** while, at the same time the database symbol is shown in color. The upper left corner of the symbol contains a black field displaying the number of databases currently opened (see Chapter 4.2.2, page 189).



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*
Opens 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 188</i>).
Close all	Close all open databases (<i>see Chapter 4.2.6, page 190</i>).
 Close	Close database (<i>see Chapter 4.2.6, page 190</i>).
 Database manager...	Manage determination databases (<i>see Chapter 4.3.1, page 191</i>).
Print ►	
Determination overview...	PDF file output of the determination overview (<i>see Chapter 4.5.2.11, page 319</i>).

 Report...	PDF file output of the report (<i>see Chapter 4.5.2.12, page 320</i>).
 Logout...	Logout user (<i>see Chapter 2.2.3, page 16</i>).
Exit	End program.

4.1.3.3 Database - Editing menu

Program part: **Database**

 Copy	Copy the selected lines in the determination overview to the clipboard.
Select all	Select all lines in the current set of determinations in the determination overview.

4.1.3.4 Database - Menu View

Program part: **Database**

 Update	Update determination overview.
 Change layout...	Modify layout of loaded database view (<i>see Chapter 3.1.7.2, page 88</i>).
 Load view...	Load a saved database view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view...	Save the loaded database view (<i>see Chapter 3.1.7.4, page 89</i>).
 Split vertically	Split database window vertically and display two databases side by side (<i>see Chapter 4.2.4, page 190</i>).
 Split horizontally	Split database window horizontally and display two databases, one above the other (<i>see Chapter 4.2.5, page 190</i>).
 Unsplit	Undo the splitting of the database window (<i>see Chapter 4.2.3, page 190</i>).
 Properties ►	
Column display	Define column display for the Determination overview table (<i>see Chapter 4.5.1.3, page 277</i>).
Properties Curves 1...5	Set properties for the subwindow Curves 1...5 (<i>see Chapter 4.8.4.1, page 356</i>).
Properties Results	Set properties for the subwindow Results (<i>see Chapter 4.7, page 340</i>).
 Toolbar	Switch toolbar display on/off.

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 282</i>).
 Search	Open the window Search for searching for determinations (<i>see Chapter 4.5.2.3, page 282</i>).
Filter ►	
 Last filter	Use last quick or special filter again (<i>see Chapter 4.5.2.4.2, page 285</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 286</i>).
 All statistics records	Display all related statistics records of the focused determination (<i>see Chapter 4.5.2.4.5, page 287</i>).
 Remove filter	Removes current filter (<i>see Chapter 4.5.2.4.6, page 287</i>).
Sign ►	
 Signature 1...	Sign selected determinations on level 1 (<i>see Chapter 2.3.3, page 19</i>).
 Signature 2...	Sign selected determinations on level 2 (<i>see Chapter 2.3.4, page 20</i>).
Show signatures...	Show all signatures for the focused determination (<i>see Chapter 4.5.2.5.4, page 294</i>).
Delete signatures 2...	Delete signatures at level 2 of the focused determination (<i>see Chapter 2.3.5, page 22</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 317</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 322</i>).
 Control chart...	Display control chart and statistical evaluation of the selected determination (<i>see Chapter 4.5.2.16, page 323</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 318</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 201</i>).
Tabular report	Open then window Report template with an empty tabular report (<i>see Chapter 4.4.1.3, page 201</i>).
 Open...	Open report template to edit (<i>see Chapter 4.4.1.3, page 201</i>).
Manager...	Manage report templates (<i>see Chapter 4.4.1.1.1, page 199</i>).
Templates ►	
Control chart templates...	Manage templates for control charts (<i>see Chapter 4.4.2, page 234</i>).
Curve overlay templates...	Manage curve overlay templates (<i>see Chapter 4.4.3.1, page 238</i>).
Export templates...	Manage export templates (<i>see Chapter 4.4.4.1, page 244</i>).

4.1.3.7 Help Menu

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

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

4.1.4 Database - Toolbar

Program part: **Database**

 Open...	Open database (<i>see Chapter 4.2.1, page 188</i>).
 Close	Close database (<i>see Chapter 4.2.6, page 190</i>).
 Database manager...	Manage determination databases (<i>see Chapter 4.3.1, page 191</i>).
 Logout...	Logout user (<i>see Chapter 2.2.3, page 16</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 88</i>).
 Load view...	Load a saved database view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view...	Save loaded database view (<i>see Chapter 3.1.7.4, page 89</i>).
 Split vertically	Split database window vertically and display two databases side by side (<i>see Chapter 4.2.4, page 190</i>).
 Split horizontally	Split database window horizontally and display two databases, one above the other (<i>see Chapter 4.2.5, page 190</i>).
 Unsplit	Undo the splitting of the database view (<i>see Chapter 4.2.3, page 190</i>).
 Comment	Enter comment on the selected determination (<i>see Chapter 4.5.2.2, page 282</i>).
 Search	Open the window Search for searching determinations (<i>see Chapter 4.5.2.3, page 282</i>).
 Filter/Last filter	Use last quick or special filter again (<i>see Chapter 4.5.2.4.2, page 285</i>).

 Filter/Quick filter	Use quick filter with the content of the selected table cell (<i>see Chapter 4.5.2.4.3, page 286</i>).
 Filter/Special filter...	Open the window Special filter for the definition of user-specific filters (<i>see Chapter 4.5.2.4.4, page 286</i>).
 Filter/All statistics records	Display all related statistics data sets of the focused determination (<i>see Chapter 4.5.2.4.5, page 287</i>).
 Filter/Remove filter	Remove current filter (<i>see Chapter 4.5.2.4.6, page 287</i>).
 Sign/Signature 1...	Sign selected determinations on level 1 (<i>see Chapter 2.3.3, page 19</i>).
 Sign/Signature 2...	Sign selected determinations on level 2 (<i>see Chapter 2.3.4, page 20</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 the current version again (<i>see "Make old version current", page 322</i>).
 Display calibration curve...	Display the calibration curve for the focused determination (<i>see Chapter 4.5.2.15, page 322</i>).
 Control chart...	Display control chart and statistical evaluation of the selected determination (<i>see Chapter 4.5.2.16, page 323</i>).
 Overlay curves...	Overlay curves of the selected determination (<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 318</i>).
 Report template/ Open...	Open report template to edit (<i>see Chapter 4.4.1.3, page 201</i>).
 Report template/ Open...	Open report template to edit (<i>see Chapter 4.4.1.3, page 201</i>).
 Tiamo Help	Open tiamo Help.

Determinations

- *Overview of functions*

Templates

- *Edit report templates*
- *Edit control chart templates*
- *Edit curve overlay templates*
- *Edit export templates*

4.1.7 Views

4.1.7.1 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.

Automatic load

The standard procedure is that the view saved when the program is terminated will be loaded automatically the next time that the program is opened.

As an alternative a standard view can be defined for each user group that is loaded automatically the first time that the program part is opened.

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

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

Export/Import

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

4.1.7.2 Change layout

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

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

Select layout

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

Selection	Selection of the possible combinations

Available subwindows

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

Selection	Subwindow selection
Figure 6. Selection of the subwindow.	Figure 7. Subwindow selection.

Displayed subwindows

Displays the subwindows that are shown in the view.

Selection	Subwindow



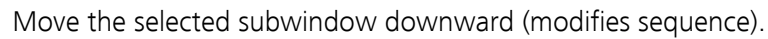
Add the selected subwindow to the view.



Remove the selected subwindow from the view.



Move the selected subwindow upward (modifies sequence).



Dialog window:Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view

4.1.7.5 Rename view

Dialog window: Workplace / Database / Configuration ▶ View ▶ Rename view... ▶ Rename view

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

Rename view to

Enter a new name for the view.

Input	50 characters

4.1.7.6 Delete view

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

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

4.2 Database display

4.2.1 Opening database

Dialog window: **Database ► File ► Open... ► Open database**

The symbol  or the menu item **File ► Open...** is used to open the **Open database** window, in which one of the databases available on the server (or on the local server) that is to be opened can be selected.

Database table

The database table contains information concerning all determination databases. The table cannot be edited. With a click on the column title (Columns **Name**, **Number of records**, **Size**, **Last backup**, **Next backup**, **Comment**), the table can be sorted according to the selected column in increasing or decreasing sequence.

Name

Name of the database.

Number of records

Shows the number of data sets in the database.

Size

Shows the size of the database in KB.

Shows whether or not the database can be edited by the user currently logged in.

Shows remarks about the database.

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

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.

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.

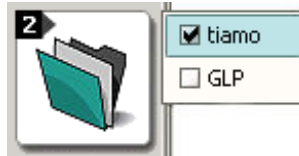
The number of the currently opened databases is displayed in the left upper corner of the database symbol. If 2 or more databases are opened, then these databases, which can be displayed either next to one another or one below the other, can be selected with the aid of the database symbol.

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**

Closing 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**.

4.3.1 Manage databases



[Properties]

Opens the window **Database manager** for editing the database selected in the table (see Chapter 4.3.5.1, page 193).

[Backup]

Opens the window **Backup the database** for backing up the database selected in the table (see *Chapter 4.3.6, page 196*).

[Restore:]

Opens the window **Restoration of databases** for restoring backed-up databases (see *Chapter 4.3.7, page 197*).

[Exit]

Closes the window **Database manager**.

4.3.2 Create new database

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Edit]** ▶ **New...** ▶ **New database**

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

Name

Name of the new database.

Input	50 characters
Default value	New database #



Note

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

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

4.3.3 Rename database

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Edit]** ▶ **Rename...** ▶ **Rename database**

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

Rename database 'Name' to

Entry of the new database name.

Input	50 characters



tem.

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.



1

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 in the database.

Database properties - Backup

Dialog window: **Database** ▶ **File** ▶ **Database manager...** ▶ **Database manager** ▶ **[Properties]** ▶ **Properties - Database** ▶ **Backup**

Definition of backup monitoring and automatic backups.

Backup monitoring

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

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

Last backup

Shows the date and time of the last database backup.

Next backup

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

Input	Date selection
Default value	Last backup + 1 month

Interval

Entry of the interval for the backup monitoring. After each automatically or manually triggered backup, the interval entered here will be added automatically to the **Last backup** and the field **Next backup** will be automatically adjusted accordingly.

Range	1 ... 999
Default value	1
Selection	Days Weeks Months Years
Default value	Months

Start backup automatically

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

Automatic start of the backup for the database in the defined **Backup directory**.

Backup directory

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

Selection	Selection of the backup directory Standard backup directory
Default value	Standard backup directory



Note

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

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 check box is activated then the field **Size** in the Database table will be shown in **red** when the limit value has been exceeded. A corresponding message also appears when the database is opened.

Maximum size

Maximum permitted database size in MB.

Range	1 ... 2147483647 MB
Default value	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 check box is activated then the field **Number** in the Database table will be shown in **red** when the limit value has been exceeded. A corresponding message also appears when the database is opened.

Maximum number

Maximum permitted number of data sets for database.

Range	1 ... 2147483647
Default value	1000

4.3.6 Backup database manually

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

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



Backup name

Selection of a backup file.

Selection	Select backup files

Backup date

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

Database name

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

Number of records

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

Size

Shows the size of the database in KB.

Save as

Name under which the database is to be restored.

Input	50 characters
Default value	New database ##

[Start]

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



Note

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

4.4.1.1.2 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 Creating 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 Opening report template

Dialog window: **Database ► Tools ► Report templates ► Open... ► Open report template**

With the symbol  or the menu item **Tools ► Report templates ► Open...** the window **Open report template** opens in which one of the globally available report templates can be selected and opened.

List of report templates

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

Name

Name of report template.

Saved

Date and time when the report template was saved.

Saved by

Short name of the user who saved the report template.

Comment

Comment on the report template.

Open report template

Name

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

Input	50 characters

[Open]

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

4.4.1.4 Editing report template

4.4.1.4.1 Report template - General

4.4.1.4.1.1 Report template - Overview

Program window: **Database ► Report template**

Which determination data and which other items (e.g. text fields, images, graphics elements) are to be produced in a report are defined in report templates. The templates can be created or edited in their own program window and then saved globally under a unique name. They are used for the automatic production of reports in determinations or for manual report production from the database.

There are two basically different types of report template:

- **Form report**

In the Form report the report section always includes the whole area between the header and the footer. This means that for each determination at least one page will always be produced.

- **Tabular report**

In the Tabular report the report section can be set with the mouse. For each data set one such report section will be filled with data and placed on the page row by row. In this way tabular reports can be created from several determinations.

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*

Report template - Menu bar

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.

Report template - Menu File

Program window: **Database** ► **Report template**

 Save	Save an opened report template (see Chapter 4.4.1.4.2.11, page 215).
Save as	Save an opened report template under a new name (see Chapter 4.4.1.4.2.11, page 215).
Page setup...	Set up the layout for the report template (see Chapter 4.4.1.4.2.2, page 207).
 Page preview	Page preview of the report template with the data of the currently selected determination (see Chapter 4.4.1.4.2.8, page 213).

 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 211</i>).
 Copy	Copy the selected items to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Insert	Insert out the marked items from the clipboard (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Delete	Delete the marked items (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Comment	Enter comments on the report template (<i>see Chapter 4.4.1.4.2.9, page 214</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 210</i>).
Previous page	Show the previous page of the report template (<i>see Chapter 4.4.1.4.2.4, page 210</i>).
Next page	Show the next page of the report template (<i>see Chapter 4.4.1.4.2.4, page 210</i>).
Last page	Shows the last page of the report template (<i>see Chapter 4.4.1.4.2.4, page 210</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 210</i>).
Page after	Inserts a new page after the shown page (<i>see Chapter 4.4.1.4.2.4, page 210</i>).

4.4.1.4.1.3.6 Report template - Menu Tools

Program window: **Database ▶ Report template**

 Options...	Set options for the report template (<i>see Chapter 4.4.1.4.2.10, page 214</i>).

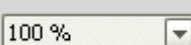
4.4.1.4.1.3.7 Report template - Menu Help

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 215</i>).
 Page preview	Page preview of the report template with the data of the currently selected determination (<i>see Chapter 4.4.1.4.2.8, page 213</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 211</i>).
 Copy	Copy the selected items to the clipboard (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Insert	Insert out the marked items from the clipboard (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Delete	Delete the marked items (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 100 %	Select zoom level (<i>see Chapter 4.4.1.4.2.7, page 212</i>).
 Grid	Switch the grid display on and off (<i>see Chapter 4.4.1.4.2.10, page 214</i>).
 Snap to grid	Switch snap at grid on and off (<i>see Chapter 4.4.1.4.2.10, page 214</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 206*).

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 (<i>see Chapter 4.4.1.4.2.6, page 211</i>).
 Text field	If this option is switched on then text fields can be inserted in the report template (<i>see Chapter 4.4.1.4.3.1, page 216</i>).
 Data field	If this option is switched on then data fields can be inserted in the report template (<i>see Chapter 4.4.1.4.3.2, page 217</i>).
 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 (<i>see Chapter 4.4.1.4.3.3, page 219</i>).
 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 (<i>see Chapter 4.4.1.4.3.4, page 221</i>).
 Page number	If this option is switched on then fields can be inserted in the report template in which the page number is entered (<i>see Chapter 4.4.1.4.3.5, page 223</i>).
 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 (<i>see Chapter 4.4.1.4.3.6, page 224</i>).
 Fixed report	If this option is switched on then fixed reports can be inserted in the report template (<i>see Chapter 4.4.1.4.3.7, page 226</i>).
 Group field	If this option is switched on then group fields can be inserted in the report template (<i>see Chapter 4.4.1.4.3.8, page 227</i>).
 Image	If this option is switched on then images can be inserted in the report template (<i>see Chapter 4.4.1.4.3.9, page 228</i>).

 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 229).
 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 231).
 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 232).
 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 233).

4.4.1.4.2 **Report template - Functions**

4.4.1.4.2.1 **Report template - Function overview**

Program window: **Database ▶ Report template**

In the program window **Report template** the following functions can be executed:

- *Page setup*
- *Define sections in main window*
- *Insert report pages*
- *Insert modules*
- *Edit modules*
- *Zooming*
- *Show page preview*
- *Enter comment on report template*
- *Define options for report template*
- *Save report template*

4.4.1.4.2.2 **Report template - Page setup**

Dialog window: **Report template ▶ File ▶ Page setup... ▶ Page setup**

With the menu item **File ▶ Page setup...** in the window **Report template** the dialog window **Page setup** opens in which the report format settings can be made.

General

only for form report

Settings

Selection	Apply to current page Apply to all pages
Default value	Apply to current page

Apply to current page

The page settings are only applied for the currently selected report page.

Apply to all pages

The page settings are applied for all report pages.

Page format

Page format

Selection of the page format. The width and height of the paper can be defined with **User-defined**.

Selection	A4 Letter Legal User-defined
Default value	A4

Width

Width of the page format. This parameter can only be edited for **Page format= User-defined**

Range	0.0 ... 499.0 mm
Default value	210.0 mm

Height

Height of the page format. This parameter can only be edited for **Page format= User-defined**

Range	0.0 ... 499.0 mm
Default value	297.0 mm

Orientation

Selection of the page format.

Selection	Portrait Landscape
Default value	Portrait

Page margins

Top

Upper page margin.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Bottom

Lower page margin.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Left

Left-hand page margin.

Range	0.0 ... 499.0 mm
Default value	20.0 mm

Right

Right-hand page margin.

Range	0.0 ... 499.0 mm
Default value	20.0 mm

Layout

Header

Height of header.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Footer

Height of footer.

Range	0.0 ... 499.0 mm
Default value	15.0 mm

Determination height

Height of the section for a single determination on a tabular report.

only for tabular report

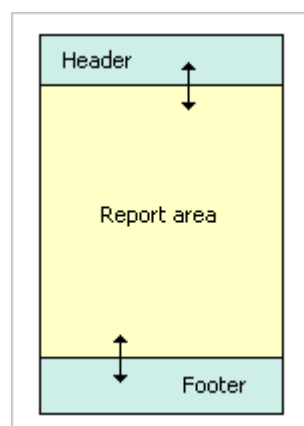
Range	0.0 ... 499.0 mm
Default value	25.0 mm

4.4.1.4.2.3 Report template - Define sections

Program window: **Database ► Report template**

Define sections for form report

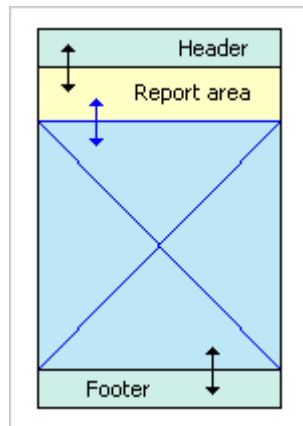
The header, footer and report sections can be enlarged and reduced with the left mouse button.





Defining sections for tabular report

The header, footer and report sections can be enlarged and reduced with the left mouse button.



4.4.1.4.2.4 Report template - Insert pages

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

Note

It is not possible to insert pages in templates for tabular reports.

Inserting page before

With the menu item **Insert ► Page before** in the program window **Report template** a new empty report report page is inserted before the report page shown.

Insert page after

With the menu item **Insert ► Page after** in the program window **Report template** a new empty report report page is inserted after the report page shown.

Navigating

In report templates with several pages the navigation bar can be used to switch to the required page.



Jumps to first page.



[Jumps to previous page.](#)



Jumps to next page.



Report template - Insert modules

Program window: **Database** ► **Report template**

In order to insert a module in a report template the corresponding symbol must be selected on the module bar and then placed on the report template by creating a field with the left mouse button. The Properties window of the corresponding module then opens automatically.

Form report

The following modules can be inserted in a form report:

- **Header**
Text field, Data field, Date field, Time field, Page number, Number of pages, Image, Line, 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

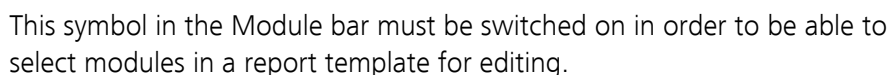
The following modules can be inserted in a tabular report:

- **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

Report template - Edit modules

Program window: **Database** ► **Report template**

Enable selection





Select a single module

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

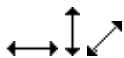
Select several modules

Several modules are selected by drawing a frame around the required modules with the left mouse button.

Moving, reducing, enlarging modules



When this cursor symbol appears then the selected modules can be moved about on the report template with the left mouse button pressed down.



When one of these cursor symbols appears then the selected modules can be reduced and enlarged respectively on the report template with the left mouse button pressed down.

Cutting, copying, pasting, deleting modules



Cut the selected modules and copy them to the clipboard.



Copy the selected modules to the clipboard.



Paste modules from the clipboard.



Delete the selected module.

Edit module properties



Open the properties window for the selected module. Alternatively the properties can also be edited directly below the toolbar.

4.4.1.4.2.7 Report template - Zoom

Program window: **Database ► Report template**



With this list box on the toolbar the required zoom step for showing the report template can be selected in steps of **25%** from **25%** to **400%**.

4.4.1.4.2.8 Report template - Page preview

Preview window: **Report template** ▶ **File** ▶ **Page preview** ▶ **Report preview**

With the symbol  or the menu item **File** ▶ **Page preview** in the program window **Report template** the window **Report preview** opens in which a page preview of the report template is shown with the data of the determinations selected in the determination overview.

Functions



Produces displayed report as PDF-file.



Selects the required zoom step for displaying the report preview, range **25%** to **400%** in steps of **25%**.

Select report page

In report templates with several pages the navigation bar **Page** can be used to switch to the required page.



Jumps to first page.



Jumps to previous page.



Jumps to next page.



Jumps to last page.

Selecting determination

If several determinations have been selected for the report display then the navigation bar **Determination** can be used to switch to the required determination.



Jumps to first determination.



Jumps to previous determination.



Jumps to next determination.



Jumps to last determination.

4.4.1.4.2.9 **Report template - Comment**

Dialog window: **Report template ▶ Edit ▶ Comment ▶ Comment**

With the symbol  or the menu item **Edit ▶ Comment** in the program window **Report template** the window **Comment on report template** opens in which comments on the opened report template can be entered.

Comment

Enter comment on the report template that is shown in the List of report templates.

Input	1000 characters

4.4.1.4.2.10 **Report template - Options**

Dialog window: **Report template ▶ Tools ▶ Options...**

With the menu item **Tools, Options** in the program window **Report template** the window **Options for report templates** opens in which various settings for the report template can be defined.

Unit

Unit

Select the size unit for the report template.

Selection	mm cm inch
Default value	mm

Grid

X distance

Grid distance in X-direction.

Range	1.0 ... 100.0 mm
Default value	5.0 mm

Y distance

Grid distance in Y-direction.

Range	1.0 ... 100.0 mm
Default value	5.0 mm

Display grid

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

Enable/Disable the grid display on the report template.

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

Selection	Arial Windows fonts
Default value	Arial

Input	50 characters



Note

The name of the report template must be unambiguous in the whole Client/Server system.

[Save]

Save the report template under the required name.

4.4.1.4.3 Report template - Modules

4.4.1.4.3.1 Report template - Text field

Program window: **Database** ► **Report template**

Text fields are used for showing any texts in the report.

Insert



In order to insert a text field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of image field.

Range	0.0000 ... (max. page width) mm

Height

Height of image field.

Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Switches line break on/off for multi-line text fields.



Fills the field with dots.

Text

Entry of text for the text field.

4.4.1.4.3.2 Report template - Data field

Program window: **Database ► Report template**

Data fields are used for showing determination data in a report.



Insert

In order to insert a data field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of data field.

Range	0.0000 ... (max. page width) mm

Height

Height of data field.

Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Switches line break on/off for multi-line data fields.



Fills the field with dots.

Prefix

Text placed in front of the data field contents.

Input	50 characters

Data field

Shows path and name of selected data field (the field cannot be edited directly). With  a window opens for selecting the data field in which all the available fields for the determination overview are shown in a tree structure. With a double-click on the required field the path and name of the data field are entered.

Suffix

Text placed after the data field contents.

Input	50 characters

Preview

Shows a formatted example of text.

4.4.1.4.3.3 Report template - Date field

Program window: **Database ▶ Report template**

Date fields are used for showing the current date in a report.



Insert

In order to insert a date field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of date field.

Range	0.0000 ... (max. page width) mm

Height

Height of date field.

Range	0.0000 ... (max. page height) mm



Selection of the available Windows fonts.



Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the date field contents.

Input	50 characters

Suffix

Text placed after the date field contents.

Input	50 characters

Sample

Shows the formatted date.

4.4.1.4.3.4 Report template - Time field

Program window: **Database ► Report template**

Time fields are used for showing the actual time in the report.

Insert



In order to insert a time field in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Width

Range	0.0000 ... (max. page height) mm

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

Input	50 characters

Shows the formatted time.

The actual page number in the report is produced in a page number field.

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

Font size in pt.



Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the page number field.

Input	50 characters

Suffix

Text placed after the page number field.

Input	50 characters

Preview

Shows the formatted page number.

4.4.1.4.3.6 Report template - Number of pages

Program window: Database ▶ Report template

This field shows the total number of pages in the report.



Insert

In order to insert a number of pages field into a report template, the corresponding symbol must be selected on the Module bar and then placed in the header or footer of the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of the field.

Range	0.0000 ... (max. page width) mm

Height

Height of the field.

Range	0.0000 ... (max. page height) mm

Arial

Selection of the available Windows fonts.

9

Font size in pt.

Color selection.



Bold.



Italic.



Underlined.



Left-justified.



Centered.



Right-justified.



Fills the field with dots.

Prefix

Text placed in front of the field contents.

Input	50 characters

Suffix

Text placed after the field contents.

Input	50 characters

Preview

Shows the formatted number of pages.

4.4.1.4.3.7 Report template - Fixed report

Program window: Database ▶ Report template

Fixed reports are used for producing predefined part-reports of the determination in the report.

Insert



In order to insert a fixed report in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left-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.



Note

The following fields, which do not permit page break controls, cannot be inserted into a group field.

- Fixed report
- Curve
- Calibration curve



Insert

In order to insert group field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

Shows the predefined x-position for the field.

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Shows the predefined width of the fixed report.

Height

Height of the field

Range	0.0000 ... (max. page height) mm

4.4.1.4.3.9 Report template - Image

Program window: Database ▶ Report template

An image field is used for including any external graphics on the report template. The file formats *.jpg and *.gif are supported.

Insert



In order to insert an image into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

X pos.

Range	0.0000 ... (max. page width) mm

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width of image field.

Range	0.0000 ... (max. page width) mm

Height of image field.

Range	0.0000 ... (max. page height) mm

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.

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.

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.

Report template - Rectangle

Program window: **Database ► Report template**

Any rectangle can be inserted in the report template.

Insert



In order to insert a rectangle into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of the rectangle.

Range	0.0000 ... (max. page width) mm

Height

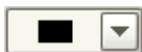
Height of the rectangle.

Range	0.0000 ... (max. page height) mm

Thickness

Thickness of the line for the rectangle.

Range	0.1 ... 10.0 mm
Default value	0.5 mm



Selection of the line color.



Selection of the type of line for the rectangle.



Switches the fill color on and off.



Selection of the fill color.

4.4.1.4.3.12 Report template - Curve field

Program window: Database ▶ Report template

Curve fields are used for showing determination curves in the report.

Insert



In order to insert a curve in a report template the corresponding symbol must be selected on the Module bar and then placed on the report template by creating a field with the left mouse button.

Properties



Note

The properties are saved individually for each curve field. This means that it is possible, e.g., to show several different curves for the same measuring command beside one another in several curve fields.

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

Y position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of curve field.

Range	0.0000 ... (max. page width) mm

Height

Height of curve field.

Range	0.0000 ... (max. page height) mm

Command type

Shows the command type for which a curve is to be produced.



Insert

In order to insert calibration curve field into a report template the corresponding symbol must be selected on the Module bar and placed on the report template by creating a field with the left-hand mouse key.

Properties

X pos.

x-position within the permitted section.

Range	0.0000 ... (max. page width) mm

Y pos.

y-position within the permitted section.

Range	0.0000 ... (max. page height) mm

Width

Width of calibration curve field.

Range	0.0000 ... (max. page width) mm

Height

Height of calibration curve field.

Range	0.0000 ... (max. page height) mm

Command name

Entry of the name of the command for which the calibration curve is to be produced. With **not defined** the first calibration curve present in the determination with the selected **Command type** will be produced as default.

Selection	not defined 50 characters
Default value	not defined

4.4.2 Templates for control chart

4.4.2.1 Managing control chart templates

Menu item: **Database ▶ Tools ▶ Templates ▶ Control chart templates... ▶ Control chart templates**

With the menu item **Tools ► Templates ► Control chart templates...**, the dialog window **Control chart templates** opens in which the globally available templates for control charts can be managed.

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

Shows the name of the template.

Shows the result for which the template can be used.

Shows the comments about the template.

[New]

Create new template. The dialog window **Properties - Control chart template** opens in which the properties for the new template can be defined.

The dialog window **Properties - Control chart template** opens, in which the properties of the template selected in the table can be edited.

Delete template.

Copies the template and saves it under the name **Copy of....**

4.4.2.2.1 Control chart template - Properties

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

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

Input	50 characters

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

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

4.4.2.2.2 Control chart template - Graphical parameters

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ 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

Selection of the color for the measuring point symbol.

Selection	Color selection blue
Default value	blue

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

If this check box is activated, then the measured value points will be joined by a line.

Dialog window: **Database ► Tools ► Templates ► Control chart templates ► Properties**

Definition of warning and intervention limits to be shown on the control chart.

Warning limits are always in **orange** on the control chart.

Lower warning limit.

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

Upper warning limit.

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

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

Lower intervention limit.

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

Upper intervention limit.

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

4.4.2.2.4 Control chart template - Statistics

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

Definition of the display of statistics data on the control chart.

Show the statistics data

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

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

Draw in mean value

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

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

Draw in standard deviation

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

If this check box is activated then the two values **Mean value + Absolute standard deviation** and **Mean value - Absolute standard deviation** will be shown on the control chart as dotted lines in the color of the measured value.

4.4.2.2.5 Control chart template - Comment

Dialog window: **Database ▶ Tools ▶ Templates ▶ Control chart templates ▶ Properties**

Entry of comment on the control chart template.

Comment

Comment on control chart.

Input	1000 characters

4.4.3 Curve overlay templates

4.4.3.1 Manage curve overlay templates

Menu item: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates**

With the menu item **Tools, Templates, Curve overlay templates** the dialog window **Curve overlay templates** opens in which the globally available templates for curve overlay can be managed.

Template table

The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

Shows the name of the template.

Shows the command type for which the template can be used.

Shows the comments about the template.

	Functions
[New]	Generates a new template. The dialog window Properties - Overlay curves opens in which the properties for the new template can be defined.
[Properties]	Open the dialog window Properties - Overlay curves in which the properties of the template selected in the table can be edited.
[Delete]	Delete the template selected in the table.
[Copy]	Copy the template selected in the table and save it under the name Copy of....

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

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties**

Name for the curve overlay template which is saved in the configuration database per client.

Input	50 characters

Selection of the command type from which curves are to be overlaid.

Initial value for scaling the x axis.

End value for scaling the x axis.

Parameters for the graphical display of the overlaid curves on the y axis.

Selection of the quantity to be shown on the y axis.

Freely definable axis label for the y axis. With **auto** the designation from the field **Size** will be used.

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

If this check box is activated then the individual measuring points will be shown on the curve.



With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Scaling

Start value

Initial value for scaling the y-axis.

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

End value

End value for scaling the y-axis.

Range	-1.0 E12 ... 1.0 E12
Default value	1000.0

4.4.3.2.4 Curve overlay - Options

Dialog window: **Database ▶ Tools ▶ Templates ▶ Curve overlay templates ▶ Properties**

Options for the graphical display of the overlaid curves.

Display grid

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

If this check box is activated then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Selection	Select line type

Grid color

Selection of the grid line color.

Selection	Color selection gray
Default value	gray

Show endpoints

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

If this check box is activated then the endpoints found will be indicated on the curve by the symbol  and labeled with **EP#** (potentiometric endpoints), **BP#** (break point) or **FP#** (fixed endpoint).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	Color selection black
Default value	black

Selects the color for manually set endpoints.

Selection of the color for the curve background.

Display of the data field, which is shown in the legend to identify the curves.



***.csv (measuring point list)**

Data exchange format for the measuring point list with unformatted text, which can be imported into corresponding PC programs. The text file contains a document header with date/time of the determination and the determination ID, then the measuring point lists of the separate commands are listed one after the other. The command name is listed first for each measuring point list, followed by a header with the designations and the units of the measured values of the command. This is followed by the list of the measuring points, each measuring point is listed in a separate line and consists of a time indication and all measured values generated by the command.

[Select fields]

Opens the dialog window **Select fields** in which the required fields for export can be selected, arranged in the required sequence and renamed.



Note

Field selection is only possible for the file types ***.csv** and ***.slk**. With ***.mdet** and ***.xml** always all fields will be exported.

[Options]

Opens the dialog window **Options**, in which the separators can be defined.



Note

The options can only be set for the data types ***.csv (comma separated)** and ***.csv (measuring point list)**.

File name

One of the following options can be selected for the definition of the name of the export file:

Selection	Determination ID Sample identification Request on each export Fixed file name (append data)
Default value	Determination ID

Determination ID

If this option is selected then the name of the export file will be formed from the unambiguous **Determination ID**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format.

Sample identification

If this option is selected then the name of the export file will be formed from the selected sample identification **ID1...ID16**, the **Computer name**, the date stamp **-YYYYMMDD-HHMMSS** and the suffix for the format. If the generated name already exists in the folder then a version number will additionally be appended to the date.

Request on each export

If this option is selected then the name of the export file will be requested at each export. In addition to the entered name the **Computer name** and the date stamp **-YYYYMMDD-HHMMSS** will be added automatically.

Fixed file name (append data)

If this option is selected then the name of the export file will be formed from the name entered here and the suffix for the format. If the file is already present in the folder then the data will be appended to this file.



Note

The option **Fixed file name** can only be selected for the file type ***.csv (comma separated)** or ***.slk (SLK format)**.

4.4.4.2.2 Export template - Selecting fields

Dialog window: **Database ▶ Tools ▶ Templates ▶ Export templates... ▶ Export templates ▶ [Properties] ▶ Export template ▶ [Select fields] ▶ Select fields**

With **[Select fields]** in the Properties window for export templates the dialog window **Select fields** opens in which the fields for data export for the file types ***.csv** and ***.slk** can be selected.

Available fields

Shows all the fields that can be exported.

Selected fields

Shows all the fields that will be exported.

Default name

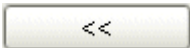
Non-editable name of the field to be exported.

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.

Field separator

Selection of the field separator.

Selection	; , Tab
Default value	;

4.4.4.3 XML export

XML export

General

An XML export file with all determination data can be created when an XML report template is used at the export of the determinations.

Structure

An XML export file is constructed as follows:

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
```

–<DeterminationReport>	Determination report
<xmlCreator val="" />	Program name
<xmlCreatorVersion val="" />	Program version
<xmlCreatorBuildNo val="" />	Build number
<subtype val="" />	
+ <Determination>	Determination data
+ <Method>	Method data
+ <Sample>	Sample data
+ <Results dynamic="">	Results overview
+ <ResultaSingle="">	Single results
+ <Command Data dynamic="">	Command variables
+ <Comvars dynamic="">	Common variables
+ <usedDevices dynamic="">	Device data
+ <usedSensors dynamic="">	Sensor data
+ <TcSampleSolutions dynamic="">	Sample solutions (TC conductivity)
+ <Method params dynamic="">	Method parameters
+ <Statistics>	Statistical data
–<System>	System data
<userName val="" />	User name (abbreviation)

<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.

<code><status val="original"/></code>	Determination status:
	original
	Determination data unaltered.
	modified
	Determination data altered.
<code><recalcDate val=""/></code>	Date and time when the reprocessed determination version was saved.
<code><recalcedBy val=""/></code>	Short name of user logged in when determination was reprocessed.
<code><recalcedByuserFull val=""/></code>	Full name of user logged in when determination was reprocessed.
<code><recalcReason val=""/></code>	Reason for the determination modification.
<code><changeComment val=""/></code>	User comment on the determination modification.
<code></Version></code>	
– <code><Miscellaneous></code>	Different determination data.
<code><deterComment val=""/></code>	Comment, which has been entered on the determination.
– <code><runMessages dynamic=""></code>	Messages
– <code><data></code>	Message
<code><subtype val=""/></code>	
<code><msgSource val=""/></code>	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.
<code><msgText val=""/></code>	Message text.
<code><msgTime val=""/></code>	Time at which the message was created in the run (date, time, UTC in the format JJJJ-MM-TT hh:mm:ss UTC....).
<code><msgTitle val=""/></code>	Message title and number.
<code></data></code>	
<code></runMessages></code>	
– <code><DetermVars dynamic=""></code>	Determination variables
– <code><data></code>	Determination variable

<vt val=""/>

Variable type:

TX = Text

NR = Number

DT = Date/Time

NA = Unknown

<vn val=""/>

Variable identification

<vr val=""/>

Variable value.

</data>

</DetermVars>

– <SystemVars dynamic="">

System variables

– <data>

System variable

<vt val=""/>

Variable type:

TX = Text

NR = Number

DT = Date/Time

NA = Unknown

<vn val=""/>

Variable identification

<vr val=""/>

Variable value.

</data>

</SystemVars>

</Miscellaneous>

– <signOff dynamic="">

Signatures

– <data>

Signature

<subtype val=""/>

– <signature>

<vr val=""/>

Shows at which level the determination has been signed
(**Level 1** or **Level 2**).

</signature>

– <signDate>...</signDate>

Date and time at which the determination was signed.

– <userName>...</userName>

Short name of the user who signed the determination.

– <userNameFull>...</userNameFull>

Full name of the user who signed the determination.

– <reason>...</reason>

Reason for signature.



- **<comment>...</comment>** Comment on the signature.

</data>

</signOff>

</Determination>

4.4.4.3.2 XML export - Method data

XML export

- <Method>	Method data
- <Identification>	Information about the identification of the method.
<methodName val=""/>	Name of the method.
<methodGroup val=""/>	Name of method group to which the method belonged when the determination was carried out.
<methodID val=""/>>	Method ID: Unambiguous and unmistakable identification for the method.
<methodComment val=""/>	Method comment (Command comment on START command).
</Identification>	
- <Version>	Information about method version.
<signOffState val=""/>	Signature status no Method not signed. Level 1 Method signed at level 1. Level 2 Method signed at level 2.
<version val=""/>	Version of the method.
<status val="original"/>	Method status: original Determination method unaltered. modified (live) Determination method has been modified live. modified (reprocessed) Determination method 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

– <code><Sample></code>	Sample data
– <code><Smpl.Data></code>	Sample data
– <code><SmplPos></code>	Sample position.
– <code><data></code>	
<code><vr val=""/></code>	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.

```

</SmplData>
- <Identification>           Sample identifications.
- <ID__01>                   Sample identification ID1.
- <data>...</data>           see above
</ID__01>
...
- <ID__02>...<ID__16>       see above
</Identification>
</Sample>

```

4.4.4.3.4 XML export - Results overview

XML export

```

- <Results dynamic="">      Results overview
- <data>
<subtype val="" />
<vr val="" />               Result value with the number of decimal places defined in
                             the CALC command.
<vf val="" />               Result value with full precision.
<vs val=""/>                Result status:
                             OK = The value is ok and has not been monitored.
                             OKL = The value is ok and has been monitored.
                             LE = The value exceeded the limit and has not been monitored.
                             LEL = The value exceeded the limit and has been monitored..
                             NV = The value is invalid and has not been monitored.
                             NVL = The value is invalid and has been monitored.
<vt val=""/>                Result type:
                             TX = Text
                             NR = Number
                             DT = Date/Time
                             NA = Unknown
<vn val=""/>                Result name.

```


<code><vs val="" /></code>	Variable status (<i>see above</i>).
<code></data></code>	
<code><rel></code>	
<code><n val="" /></code>	Number of the result among the statistically evaluated results.
<code><nmax val="" /></code>	Maximum number of statistically evaluated results.
<code></data></code>	
<code></Results></code>	

4.4.4.3.5 XML export - Single results

XML export

– <code><ResultsSingle></code>	Single results
– <code><RS01></code>	1. single result
– <code><data></code>	
<code><vr val="" /></code>	Result value with the number of decimal places defined in the CALC command.
<code><vf val="" /></code>	Result value with full precision.
<code><vs val="" /></code>	Result status: OK = The value is ok and has not been monitored. OKL = The value is ok and has been monitored. LE = The value exceeded the limit and has not been monitored. LEL = The value exceeded the limit and has been monitored.. NV = The value is invalid and has not been monitored. NVL = The value is invalid and has been monitored.
<code><vt val="" /></code>	Result type: TX = Text NR = Number DT = Date/Time NA = Unknown
<code><vn val="" /></code>	Result name.
<code><<pr val="" />></code>	Name of the CALC command the result has been generated with.

- <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.

– <conc> ... </conc>	Concentration.
– <concUnit> ... </concUnit>	Concentration unit.
– <solCreationTime> ... </solCreationTime>	Production date.
– <titer> ... </titer>	Titer value.
– <titerUnit> ... </titerUnit>	Titer unit.
– <titerCreationTime> ... </titerCreationTime>	Date and time of the last titer determination.
– <titerMethod> ... </titerMethod>	Name of the method the last titer determination was carried out with.
</Solution>	
</exchDosUnit>	
– <stirrerPortName> ... </stirrerPortName>	Number of the MSB connector the remote box was connected to.
– <stirrerType> ... </stirrerType>	Stirrer type.
– <serialStirrer> ... </serialStirrer>	Serial number
– <remotePortName> ... </remotePortName>	Number of the MSB connector the remote box was connected to.
– <remoteType> ... </remoteType>	Type of remote box.
</Port>	
</devicePorts>	
– <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.

<sensorC val="" />	Blank value of the ISE sensor.
<resultUnit val="" />	Concentration unit of calibration.
<variance val="" />	Variance of calibration.
<sensorCalTemp val="" />	Calibration temperature.
<sensorCalTempType val="" />	Calibration mode.
<sensorCalDate val="" />	Calibration date.
<sensorCalMethod val="" />	Calibration method.
– <CalibrationTable>	Calibration solutions.
– <header>	Column headers.
<<RowDesc val="" />	Column header for buffers/standards.
<NominalVal val="" />	Column header for nominal value.
<MeasVal val="" />	Column header for measured value.
<CalTemp val="" />	Column header for calibration temperature.
<CalDur val="" />	Column header for measuring time.
<header>	
– <body dynamic="">	
– <data>	
<RowDesc> ... </RowDesc>	Buffer/Standard.
<NominalVal> ... </NominalVal>	Nominal value.
<MeasVal> ... </MeasVal>	Measured value.
<CalTemp> ... </CalTemp>	Calibration temperature.
<CalDur> ... </CalDur>	Measuring time in s.
</data>	
</body>	
</CalibrationTable>	
</CalibData>	
– <StdAddData>	Standard addition data
<slope val="" />	Calculated slope of the standard addition curve.
<e0 val="" />	Calculated axis intercept of the standard addition curve.
<ion val="" />	Ion (Valency).
<conc val="" />	Calculated valency.
<concUnit val="" />	Concentration unit.

</tableBody>	
</MeasPoints>	
– <EndPoints dynamic="">	Endpoints
– <data>	
<ept val="" />	Designation of the endpoint
<epvx val="12.1835" />	X value of the endpoint.
<epux val="mL" />	Unit of the x value of the endpoint.
<epvy val="518.5" />	Y value of the endpoint.
<epuy val="mV" />	Unit of the y value of the endpoint.
</data>	
</EndPoints>	
– <Monitoring dynamic="">	Monitoring data
– <Monitoring>	Data on monitoring.
<subtype val="" />	Monitoring type.
<monType val="" />	Monitored value.
– <MonitorTable>	Event during monitoring.
– <header>	Column headers.
<time val="" />	Column header for time.
<limit val="" />	Column header for limit value type.
<limitVal val="" />	Column header for limit value.
<monVal val="" />	Column header for measured value.
<volume val="" />	Column header for volume.
<otherVal val="" />	Column header for temperature, measured value pH or measured value mV.
<action val="" />	Column header for action.
</header>	
– <body dynamic="">	
– <data>	
<time> ... </time>	Time in s.
<limit> ... </limit>	Limit value type.
<limitVal> ... </limitVal>	Limit value.
<monVal> ... </monVal>	Measured value.



```
</volume> ... </volume>
<otherVal> ... </otherVal>
<action> ... </action> ...
</data>
</body>
</MonitorTable>
</Monitoring>
</Monitoring>
</Command>
</CommandData>
```

Volume in mL.

Temperature, measured value pH or measured value mV.

Action.

4.4.4.3.7 XML export - Common Variables

XML export

- <Comvars dynamic>

Common variables

- **<data>**

<subtype val="" />

<vr val="" />

Variable value.

<vs val="" />

Variable status:

OK = The value is ok and has not been monitored.

OKL = The value is ok and has been monitored.

LE = The value 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

<vn val="" />

Variable name.

```
<un val="" />
```

Unit of the variable.

<code><am val="" /></code>	Assignment method.
<code><at val="" /></code>	Assignment date.
<code></data></code>	
<code></Comvars dynamic></code>	

4.4.4.3.8 XML export - Device data

XML export

<code>- <usedDevices dynamic=""></code>	Device data
<code>- <Device></code>	Data on device.
<code><subtype val="" /></code>	
<code>- <deviceType></code>	Device type.
<code><vn val="" /></code>	Parameter name.
<code><vr val="" /></code>	Parameter value.
<code></deviceType></code>	
<code>- <deviceName> ... </device-Name></code>	Device name.
<code>- <instrNo> ... </instrNo></code>	Device serial number.
<code>- <deviceProgNo> ... </device-ProgNo></code>	Device program number.
<code>- <rackName> ... </rackName></code>	Rack name.
<code>- <rackCode> ... </rackCode></code>	Rack code.
<code>- <towerNoOne> ... </tower-NoOne></code>	Tower number.
<code>- <swingHeadOneType> ... </swingHeadOneType></code>	Type of Swing Head on tower 1.
<code>- <swingHeadOneSerial> ... </swingHeadOneSerial></code>	Serial number of Swing Head on tower 1.
<code>- <towerNoTwo> ... </tower-NoTwo></code>	Tower number.
<code>- <swingHeadTwoType> ... </swingHeadTwoType></code>	Type of Swing Head on tower 2.
<code>- <swingHeadTwoSerial> ... </swingHeadTwoSerial></code>	Serial number of Swing Head on tower 2.
<code>- <spectroData></code>	
<code>- <detectorType> ... </detector-Type></code>	Detector type of spectrometer.

– <Solution>	Data on solution.
– <solTitle> ... </solTitle>	Solution title.
– <solutionName> ... </solutionName>	Solution name.
– <conc> ... </conc>	Concentration.
– <concUnit> ... </concUnit>	Concentration unit.
– <solCreationTime> ... </solCreationTime>	Production date.
– <titer> ... </titer>	Titer value.
– <titerUnit> ... </titerUnit>	Titer unit.
– <titerCreationTime> ... </titerCreationTime>	Date and time of the last titer determination.
– <titerMethod> ... </titerMethod>	Name of the method with which the last titer determination was carried out.
</Solution>	
</exchDosUnit>	
– <stirrerPortName> ... </stirrerPortName>	Number of the MSB connector the stirrer was connected to.
– <stirrerType> ... </stirrerType>	Type of stirrer.
– <serialStirrer> ... </serialStirrer>	Serial number.
– <remotePortName> ... </remotePortName>	Number of the MSB connector the remote box was connected to.
– <remoteType> ... </remoteType>	Type of remote box.
</Port>	
</devicePorts>	
</Device>	
</usedDevices>	

4.4.4.3.9 XML export - Sensor data

XML export

– <usedSensors dynamic="">	Sensor data
– <Sensor>	Data on sensor.
<subtype val="" />	Type of sensor:
	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.

<code><sensorCalMethod val="" /></code>	Calibration method.
<code><sensorCalMeasInput val="" /></code>	Measuring input at calibration.
<code></sensorData></code>	
<code></Sensor></code>	
<code></usedSensors></code>	

4.4.4.3.10 XML export - Sample solutions (TC conductivity)

XML export

<code>- <TcSampleSolutions dynamic=""></code>	Sample solutions (TC conductivity)
<code>- <TcSampleSolution></code>	Data on sample solution (TC conductivity).
<code>- <tcSolutionName> ... </tcSolutionName></code>	Name of the sample solution (TC conductivity).
<code>- <tcAssignDate> ... </tcAssignDate></code>	Assignment date for sample solution (TC conductivity).
<code>- <tcAssignMethod> ... </tcAssignMethod></code>	Assignment method for sample solution (TC conductivity).
<code>- <tcStartTemp> ... </tcStartTemp></code>	Start temperature of the sample solution (TC conductivity).
<code>- <tcStopTemp> ... </tcStopTemp></code>	Stop temperature of the sample solution (TC conductivity).
<code>- <c0> ... </c0></code>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
<code>- <c1> ... </c1></code>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
<code>- <c2> ... </c2></code>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
<code>- <c3> ... </c3></code>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
<code>- <c4> ... </c4></code>	Coefficient of the Chebyshev polynomial of the sample solution (TC conductivity).
<code>- <tcUserName> ... </tcUserName></code>	User name during determination of the TC data.
<code>- <tcMeasInput> ... </tcMeasInput></code>	Measuring input during determination of the TC data.
<code>- <DeterID> ... </tcDeterID></code>	Determination ID during determination of the TC data.

- <sme> ... </sme>	Mean value of the result.
- <un> ... </un>	Result unit.
- <abs> ... </abs>	Absolute standard deviation of the result.
- <rel> ... </rel> ...	Relative standard deviation of the result.
</data>	
- <min> ... </min> ...	Minimum value of the result.
- <max> ... </max> ...	Maximum value of the result.
</StatisticsShort>	
- <StatisticsOverview content-Type="table">	Statistical data overview
<subtype val="" />	
- <tableHeader>	Column headers (dynamic).
- <th>	
<vr val="" />	Column header.
</th>	
</tableHeader>	
- <tableBody>	Table content (dynamic).
- <td>	
<vr val="" />	Field content.
</td>	
</tableBody>	
</StatisticsOverview>	
</Statistics>	

4.5 Determination overview

4.5.1 Determination overview - General

4.5.1.1 Determination overview - Overview

Subwindow: **Database ▶ Determination overview**

General

The subwindow **Determination overview** shows selected data for the determinations contained in the open database in tabular form. It is always shown in the program part **Database**, i.e. it cannot be removed from the Database view. The subwindow can be enlarged and reduced as required; it can also be maximized.

Elements

The subwindow **Determination overview** includes the following tools:

- *Determination table*
- *Filter selection*
- *Navigation bar*

4.5.1.2 Determination overview - Table

Subwindow: **Database ▶ Determination overview**

Data display

In the determination table the information about the determinations defined under **Column display** is shown. If the contents of a field is larger than the column width then the whole contents will be shown as a **tooltip** if the mouse cursor is kept on the field.

If the value of a result is monitored and lies within the limits defined, then it will be shown in **green**. If it is outside these limits then the value will be shown in **red**.



Note

Lines that contain red entries will also show the line number with a red background.

Updating

As long as the program part **Database** remains open 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.

Table view

With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the border between column titles:**
Sets the column width.
- **Double-click on the border between column titles**
Sets the optimal column width.
- **Drag the column title**
Moves the column to the required location.

Data record selection and table navigation

The determinations selected in the table are shown in **turquoise**, the focused determination whose data is shown in the other Subwindows is indicated by an arrow in front of the line number. There are various opportunities for data set selection in the table.

In the determination table it is not possible to show more than 200 determinations at once. If more than 200 data sets are present in the database then the Navigation bar must be used to switch to further sets of determinations.

4.5.1.3 Determination overview - Column display

Dialog window: **Database ▶ View ▶ Properties ▶ Column display... ▶ Column display**

View ► Properties ► Column display... opens the dialog window **Column display**. Here you can define the columns that are to be shown in the determination table.

Available columns

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

Displayed columns

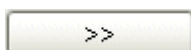
Shows all the fields that will be shown as columns in the determination table.

Default name

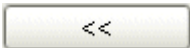
Non-editable name of the field that is displayed as column.

Displayed name

Editable name (by double click) of the column displayed in the determination overview.



Adds the selected column to the table.



Removes the selected column from the table.



Move selected column upwards.



Move selected column downwards.

4.5.1.4 **Determination overview - Filter selection**

Subwindow: **Database ▶ Determination overview**

Filter

Selection of the filter according to which the Determination table is to be filtered:

Selection	All determinations All statistics records Quick filter Temporary filter Filter name
Default value	All determinations

- All determinations**
The table is shown unfiltered.
- All statistics records**
The table is filtered so that all determinations are shown that are linked statistically with the selected determination.
- Quick filter**
The table is filtered according to the last defined **Quick filter**
- Temporary filter**
The table is filtered according to the last defined, not saved **Special filter**.
- Filter name**
The table is filtered according to the selected and saved **Special filter**.

Statistics

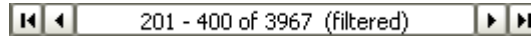
With the statistics filter selected here the determinations shown in the Determination table can be additionally filtered according to the statistical data generated by the method independently of any other filters that may have been used.

Selection	All Last

- All**
All determinations are shown for all statistics series.
- Last**
Only the last determination is shown for all statistics series.

4.5.1.5 Determination overview - Navigation bar

Subwindow: **Database ▶ Determination overview**



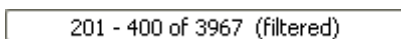
The navigation bar shown below the determination table is used for navigation in extensive tables in which all the determinations cannot be shown at once. It contains the following tools:



Jump to the first set of determinations in the table.



Jump back to the previous set of determinations in the table.



Display the selected set **#### - ####** of determinations in the table. If the table has not been filtered then the total number of all determinations will be shown. If the table has been filtered the total number of filtered determinations is shown with **(filtered)**.



Jump further to the next set of determination in the table.



Jump to the last set of determinations in the table.

4.5.1.6 Determination overview - Table navigation

Subwindow: **Database ▶ Determination overview**

In the determination table navigation can be carried out with the mouse and the vertical and horizontal scroll bars. The following possibilities are also provided by the keyboard:

[↑]

Moves the line cursor up by one field.

[↓]

Moves the line cursor down by one field.

[Ctrl] [End]

Jumps to the last determination in the current set.

[Ctrl] [Home]

Jumps to the first determination in the current set.

- **Several determinations not in sequence**

In order to select several determinations not in sequence the individual determinations must be selected with the **Ctrl key** and the left mouse button. The last determination to be selected receives the focus.

- **All determinations**

With **[Ctrl] [A]** or by clicking on the uppermost left-hand table field all the filtered determinations within the current set of determinations are selected. The focus is retained.

4.5.1.8 Determination overview - Functions

Subwindow: **Database ► Determination overview**

With the determinations selected in the Determination table the following functions can be carried out:

Editing determinations

- *Update determination overview*
- *Enter determination comment*
- *Sign determinations*
- *Export determinations*
- *Import determinations*
- *Send determinations to*
- *Reprocess determinations*
- *Delete determinations*

Search and filter determinations

- *Search determinations*
- *Filter determinations*

Other functions

- *Print determination overview*
- *Determinations - Print report*
- *Display determinations method*
- *Determinations - Display history*
- *Determinations - Display calibration curve*
- *Determinations - Control chart*
- *Determinations - Overlay curves*
- *Print overlaid curves*
- *Print control chart*

Type

Details

Search options

Selection	Text Date Number
Default value	Text

Selection of the relational operator for the search condition.

Selection	= <> empty not empty
Default value	=

Selection	= <> < <= > >= empty not empty invalid outside limits Today
Default value	=

It is being searched for values with the entry **invalid**.

It is being searched for values which exceed the limit values defined for the selected fields (values presented in red).

It is being searched for the current date. In addition, a range of days can also be defined in the field **Search word** in which, starting from the current date, the search is to be carried out.

Selection	= <> < <= > >= empty not empty invalid outside limits
Default value	=

It is being searched for values with the entry **invalid**.

Total
It is being searched down to the end of the database and then again from above down to the selected data record.

Downward
It is being searched to the end of the database.

Upward
It is being searched to the beginning of the database.

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

Search for whole word only

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

[Search next]

4.5.2.4 Filter determinations

Subwindow: **Database ▶ Determination overview**

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

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



Table view

The overview table shows all the defined filter criteria and cannot be directly edited. The filter conditions will be numbered automatically in sequence. The table view can be adapted with the left-hand mouse button as follows:

- **Drag the border between column titles:**
Sets the column width
- **Double-click on the border between column titles**
Sets the optimal column width

If the contents of a field is larger than the column width then the whole contents will be shown as a **tooltip** if the mouse cursor is kept on the field.

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

Functions

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

Edit line	Open the dialog window Edit filter criterion in which the filter criterion of the line selected in the table can be edited.
Insert new line	Inserts a new empty line above the line selected in the table. The dialog window Edit filter criterion opens automatically.
Zeilen ausschneiden	Transfer selected lines to clipboard.
Zeilen kopieren	Copies selected lines to the clipboard.
Zeilen einfügen	Insert lines from the clipboard above the selected line.
Zeilen löschen	Deletes the selected lines.

[Apply filter]

Applies filter criteria to Determination table.

4.5.2.4.5 Determinations - All statistics data sets

Menu item: **Database ▶ Determinations ▶ Filter ▶ All statistics records**

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.

Filter name

Name under which the special filter is to be saved.

Input	50 characters

[Save]

Saves filter under given name.



Note

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

4.5.2.4.8 Determinations - Edit filter condition

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

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

Link

Selection of the logic operator with the previous filter criterion.

Selection **AND | OR**

Default value **AND**

AND

Logical "AND" link

OR

Logical "OR" link

Field

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

[Other...]

Details

Condition

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.

Operator

Only for fields of the type = text

Only for fields of the type = date

Today

For fields of the type = number

invalid

■■■■■■■■ 289

4.5.2.5 Signing determinations

4.5.2.5.1 Rules for electronic signatures

Program parts: **Method / Database**

In ti amo, 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		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

Signature possible

The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)

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

Signature not possible (accessed by other client)

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comment on the signature.

Input	1000 characters

Sign method or determination. The window remains open.



Note

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

4.5.2.5.3 Signature Level 2

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

or

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

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



Note

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

Info

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

Selection	Signature possible Signature 2 not possible (signature 1 missing) Signature not possible (accessed by other client)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
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).

Password	Input	24 characters
	Password entry.	
Reason	Input	24 characters
	Selection from the Default reasons defined in the Security Settings dialog window for the category Signature level 2 .	
Comment	Selection	Selection from the Default reasons
	Entry of comment on the signature.	
[Sign]	Input	1000 characters
	Sign method or determination. The window remains open.	



Note

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

4.5.2.5.4 Display determination signatures

Dialog window: **Database ▶ Determinations ▶ Sign ▶ Display signatures... ▶ Signatures - Determination 'Determination ID'**

With the menu item **Determinations ▶ Sign ▶ Show signatures...** the window **Signatures - Determination 'Determination ID'** opens with a table in which information about all the signatures for the selected determination is shown.

Signature	Shows at which level the determination has been signed (Level 1 or Level 2).
Signature date	Date and time at which the determination was signed.
User	Short name of the user who signed the determination.
Full name	Full name of the user who signed the determination.

Reason for signature.

Comment on the signature.

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

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

Entry of the user name (short name).

Input	24 characters

Password entry.

Input	24 characters

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

Selection	Selection from the Default reasons

Entry of comment on the signature.

Input	1000 characters

Delete Signatures 2.

Note

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

4.5.2.6 Determinations - Reprocessing

4.5.2.6.1 Reprocessing - General

Dialog window: **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**.

A progress bar appears during the recalculating, the recalculating can be canceled with  next to the bar. The results of this recalculation are entered automatically in the subwindow **Result view**.

This button is inactive until modifications have actually been made. After the recalculation further data can be modified and then recalculation triggered again.

[Reset]

Reset all modifications made and unsaved during reprocessing to the original data and results.

This button is inactive for as long as no modifications have been made or when the recalculation has not yet been triggered.

[OK]

Close the dialog window **Reprocessing**. Each determination that has been modified by reprocessing will be saved as a new version with a version number increased by **+1**.

This button is inactive when the recalculation has not yet been triggered and if not all the selected determinations could be reprocessed.

[Cancel] or

Close the dialog window **Reprocessing**. The result of the reprocessing made since the last saving will not be saved.



Note

If the option **Comment on modification of determinations** is enabled under **Configuration ► Tools ► Security settings ► Audit Trail/Modifications**, the dialog window **Modification comment determination** is displayed before saving.

- **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 1234*) 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** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Modifications**

In the subwindow **Modifications** of the dialog window **Reprocessing** modifications can be made on the following 4 tabs:

- *Variables*
Modification of the variables used in the selected determination.
- *Method*
Modification of the method used in the selected determination.
- *Statistics*
Modification of statistics data.
The tab **Statistics** will only be shown when the last determination (and only this one) is selected from a set of determinations which, because of the statistics defined in the method, belong together.
- *Curve evaluation*
Manual modification of the curve evaluation.
The tab **Curve evaluation** is only shown when a single determination is selected that contains curves that can be evaluated.

4.5.2.6.4.2 Modifications - Variables

Tab: **Database** ▶ **Determination overview** ▶ **Determinations** ▶ **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 order.

Variable

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

Value

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

[Modify]

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

**Note**

If a variable is modified, then with **[Recalculate]** all the selected determinations will be recalculated with the new value. If one variable is not modified then when several determinations are recalculated the original value of the variable will be used (i.e. variables with the same name but different values will not be overwritten until they are deliberately altered).

4.5.2.6.4.3 Modifications - Method

Tab: **Database** ▶ **Determination overview** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocess** ▶ **Modifications** ▶ **Method**

On the tab **Method** the method used in the selected determination and its tracks and commands is displayed. A precondition is that the method is identical for all the selected determinations. The method structure can be modified as required for the recalculation, i.e. all the functions of the Method editor are available.

Method name:

Shows the method name.

Version:

Shows the version of the method. For original methods the additional text **(original)** appears after the version number. As soon as the method has been modified the additional text **(modified)** appears after the version number. This information is saved in the determination data when saving the recalculated determination.

Saved:

Shows the date and time when the method version was saved.

[Save as]

Saves the modified method under the same name or under a new name. If the modified method is saved under the name of an existing method then all the earlier method versions will be deleted and a new version with the number **1** will be generated.

[Modify method]

Open the dialog window **Method editor**. Here it is possible to modify parameters from existing commands as well as to insert and delete tracks and commands; however, the modified method cannot be directly saved there. If the dialog window is closed with **[OK]**, the method will be checked

(see Chapter 5.2.5, page 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 single results

For the result selected above the following data for the individual determinations is shown:

Determination start

Shows the date and time at which the determination was started.

Version

Shows the version number of the determination.

Sample size

Shows the sample size.

Result value

Shows the result value. The statistics data (mean value, standard deviations, etc.) for the selected determination are listed in the subwindow **Result view** (see Chapter 4.5.2.6.5, page 314).

[Determination on/off]

All single results of the selected determination for statistical calculations can be switched off or on. If the determination is switched off then an asterisk (*) appears behind all result values in the table and the line is shown as inactive (gray); if it is switched on again then the asterisks will disappear. However, updating the statistics data always only takes place with **[Recalculate]**.

[Result on/off]

Switch the selected single result for the statistical calculations off or on. If the result is switched off, an asterisk (*) appears behind the result value, is it switched on again, the asterisk disappears. However, updating the statistics data always only takes place with **[Recalculate]**.



Note

If the results of a determination are switched off, the statistics for these results will be switched off when this determination is recalculated, i.e. no data for the mean value and standard deviations will be shown. However, the determinations remain statistically linked to each other so that the results can also be switched on again.

4.5.2.6.4.5 Modify variable

Dialog window: **Reprocessing** ► **Modifications** ► **Variables** ► **[Modify]** ► **Modifiy variable**

In the dialog window **Modify variable** the value of the selected variable is modified.

Variable

Shows the name of the variable.

Value

Value of the variables. With variables of the type **Date** the date must be entered in the dialog window (see Chapter 2.5.1, page 79).

Range	-1.0 E+99 ... 1.0 E+99 (for Type = Number)
Input	100 characters (for Type = Text)
Selection	'Date' (for Type = Date/Time)

4.5.2.6.4.6 Curve evaluation

4.5.2.6.4.6.1 Modifications - Curve evaluation

Tab: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Modifications ▶ Curve evaluation**

On the tab **Curve evaluation** the curves that can be manually evaluated are displayed.

Command name

Selection of the measuring command (**command name.index - command type**) for which the curve is to be shown for reprocessing.

Selection	Command name

[Edit]

The dialog window **Curve evaluation** opens for manually reprocessing the curve evaluation.

4.5.2.6.4.6.2 Edit curve evaluation

Dialog window: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Modifications ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation**

Command name

Selection	Command name

Command name

Selection of the measuring command for which the curve is to be shown for reprocessing.

Toolbar

The toolbar above the curve contains symbols for the following functions for re-evaluation of the curve:



Set EP manually

By moving the mouse a point on the curve is selected. The current X and Y values are shown graphically with a blue cross hair and numerically above the curve in the fields **X** and **Y**. A new endpoint can be set by clicking with the left mouse button. This function is activated as standard when the window **Curve evaluation** is opened.



Set EP with intersection lines

By moving the mouse a point on the curve is selected to which the tangent is automatically applied. The first tangent is set by clicking the left mouse button. The mouse is then used to select a second point to which the second tangent is to be applied. The second tangent is set with clicking the left mouse button and at the same time a new endpoint is set at the point where both tangents intersect.



Set EP with parallel tangents

By moving the mouse a point on the curve is selected to which the tangent is automatically applied. At the same time a tangent parallel to it is applied to the other leg of the curve. The two tangents are set with a click of the left mouse button and at the same time a new endpoint is set at the intersection of the middle line of the two tangents with the curve.



Note

If new endpoints are set manually or by intersection or tangent evaluation or if existing endpoints are deleted then the endpoints will always be renumbered from left to right. During recalculation the automatic evaluations will generally no longer be used for curves, i.e. the endpoints defined in the curve evaluation are retained.



Set horizontal auxiliary lines

By moving the mouse a horizontal auxiliary line is drawn in the graph; this can be set by clicking the left mouse button. This function is only active when under **Curve evaluation ► Properties ► Properties - Curves 1 ► Options** the option **Show evaluation lines** is 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 mouse button. 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 mouse button the selected area can be zoomed.



Reset zoom

The graph will be reset to zoom level 100%.



Copy to clipboard

The content of the curve window is copied to the clipboard.



Define properties for the graph display

The dialog window **Properties - Curves #** is opened for graph display. The curve properties defined for each command type are saved for the reprocessing window per client.



Show EP list

The dialog window **Endpoints** is opened in which all endpoints of the selected curve are displayed in a table. If an endpoint is added to or deleted from the curve then the table will be updated automatically.

Show coordinates

The current coordinates of the cursor are shown in the coordinate display:

X:

X-coordinate.

Y:

Y-coordinate.

4.5.2.6.4.6.3 Curve evaluation - Endpoint list

Dialog window: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Modifications ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Show EP list ▶ Endpoints**

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

Designation of the endpoint with number. The following names are possible:

Selection	EP#

EP#

Endpoint that has been determined automatically by potentiometric evaluation or set manually by using the intersection or tangent method.

Selection	BP#

BP#

Endpoint that has been determined by automatic break point evaluation.

Selection	FP#

FP#

Endpoint that has been determined by automatic fixed point evaluation.

Volume

Volume value in mL for endpoint.

Measured value

Measured value (pH) for endpoint.

ERC

ERC value for the endpoint.

Time

Time for the endpoint.

Temperature

Temperature for the endpoint.

**Note**

Manually set endpoints only have two measured quantities, for the other measured quantities **invalid** is entered.

[Delete]

Delete selected endpoint.

[Exit]

Close dialog window.

4.5.2.6.4.6.4 Curve evaluation - Properties**4.5.2.6.4.6.4.1 Properties curve evaluation - Overview**

Dialog window: **Database ▶ Determinations ▶ Reprocess... ▶ Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ 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.

4.5.2.6.4.6.4.2

Properties curve evaluation - x axis

Tab: **Database ▶ Determinations ▶ Reprocess...** ▶ **Reprocessing ▶ Curve evaluation ▶ [Edit] ▶ Curve evaluation ▶ Properties ▶ x axis**

On the tab **x axis** the parameters for the graphical 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

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).

4.5.2.6.4.6.4.4

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.

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.

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.

If this option is enabled then a grid will be shown against the background.

Selection	5 line types

Selection	13 colors gray
Default value	gray

Selection	13 colors white
Default value	white

Result view - Results overview

Tab: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Result display** ▶ **Result overview**

In the subwindow **Result view** of the dialog window **Reprocessing** the results calculated during the **CALC** commands and the variables used for are displayed and updated with each recalculation.

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

Title

Name of the calculation command.

Result

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

Statistical evaluations

Results of the statistical evaluation (mean value, absolute and relative standard deviations, number of measured values used for the statistics and statistics set counter).

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between showing the results of the individual determinations:



Jump to first determination.



Jump to previous determination.



Jump to next determination.



Jump to last determination.



Note

If a result value is monitored and lies inside the limits defined in the **CALC** command then the text will be shown in **green**, if it lies outside the limits the value will be shown in **red**.

4.5.2.6.5.2 Result view - Raw data

Tab: **Database** ▶ **Determinations** ▶ **Reprocess...** ▶ **Reprocessing** ▶ **Result display** ▶ **Raw data**

On the tab **Raw data** of the subwindow **Result view** the raw data generated in commands with evaluations will be shown and updated at each recalculation.

If several determinations are selected for reprocessing then the navigation buttons can be used to switch between showing the results of the individual determinations:



Jump to first determination.



Jump to previous determination.



Jump to next determination.



Jump to last determination.

4.5.2.6.6 Modification comment for determinations

Dialog window: **Database ► Determinations ► Delete/Reprocess...**

If the option **Comment on modification of determinations** is switched on in the security settings, then before the modified sample data is accepted the **Modification comment determination** window 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
1	1000
2	1000
3	1000
4	1000
5	1000
6	1000
7	1000
8	1000
9	1000
10	1000
11	1000
12	1000
13	1000
14	1000
15	1000
16	1000
17	1000
18	1000
19	1000
20	1000
21	1000
22	1000
23	1000
24	1000
25	1000
26	1000
27	1000
28	1000
29	1000
30	1000
31	1000
32	1000
33	1000
34	1000
35	1000
36	1000
37	1000
38	1000
39	1000
40	1000
41	1000
42	1000
43	1000
44	1000
45	1000
46	1000
47	1000
48	1000
49	1000
50	1000
51	1000
52	1000
53	1000
54	1000
55	1000
56	1000
57	1000
58	1000
59	1000
60	1000
61	1000
62	1000
63	1000
64	1000
65	1000
66	1000
67	1000
68	1000
69	1000
70	1000
71	1000
72	1000
73	1000
74	1000
75	1000
76	1000
77	1000
78	1000
79	1000
80	1000
81	1000
82	1000
83	1000
84	1000
85	1000
86	1000
87	1000
88	1000
89	1000
90	1000
91	1000
92	1000
93	1000
94	1000
95	1000
96	1000
97	1000
98	1000
99	1000
100	1000

4.5.2.7 Sending determinations to

Dialog window: **Database ► Determinations ► Send to...**

The menu item **Determinations** ► **Send to...** opens the dialog window

Send determinations per E-mail

Selection	Determination ID Sample identification Name
Default value	Determination ID

Determination ID

The name of the export file is formed out of an unambiguous determination ID, the computer name, the date stamp -YYYYMMDD-

HHMMSS and the suffix for the format.

Sample identification

Selection of the sample identification. The name of the export file is formed out of this ID, the computer name, the date stamp **YYYYMMDD-HHMMSS** and the suffix for the format. If the created name exists already in the directory, a version number will be appended additionally to the date.

Name

Name under which the export file of a determination is saved as an attachment to the E-mail message. If more than one determination is selected, then a sequential number will be added to this name for each determination.

After each confirmation of the file name with **[OK]** every determination is exported to a separate ***.idet** file. The standard Windows E-mail Client will open with an empty message and the export files will automatically be added as an attachment.

4.5.2.8 Exporting determinations

Dialog window: **Database ► Determinations ► Export... ► Export determinations**

Click on menu item **Determinations ► Export...** to open the dialog window **Export determinations** for exporting the selected determinations.

Selection

Selection of determinations for export.

Selection	All selected data records All filtered data records
Default value	All selected data records

All selected data records

All those determinations are exported that have been selected (marked) in the determination table.

All filtered data records

All those determinations from the whole determination table are exported that correspond to the set filter.

Export template

Selection of the Export template for data export.

Selection	'Export template'

4.5.2.9 Import determinations

Dialog window: **Database ▶ Determinations ▶ Importing... ▶ Importing determina-**
tions

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



Note

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



Note

Examples of determinations which can be imported into an open database can be found in the program directory under **...\tiamo\examples\determinations\...**

4.5.2.10 Deleting determinations

Menu item: **Database ► Determinations ► Delete**

With the symbol  or the menu item **Determinations ► Delete**, the selected determinations are deleted after the confirmation request.



Note

If a database is opened simultaneously on several clients and if determinations are deleted on a client then these will still be shown in the determination table of the other clients until the table is updated. All the fields of these determinations will then have the entry **deleted**.



 **Note**

If the check box **Comment on modification of determinations** in the **Security settings** is activated, then the window **Modification comment determination** will appear before the modification is saved.

4.5.2.11 Determination overview - Print

Dialog window: **Database ▶ File ▶ Print ▶ Determination overview... ▶ Print determination overview (PDF)**

The Menu item **File ► Print ► Determination overview...** opens the dialog window **Print determination overview (PDF)**.

Selection

Selection	Selected determinations All filtered determinations
Default value	Selected determinations

Selected determinations

If this option is selected, then a list with all determinations that are selected (marked) in the determination table will be produced.

All filtered determinations

If this option is selected, then a list with all the determinations in the determination table that meet the filter criterion will be produced.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

If this option is selected then the determination table will be produced in portrait format.

Landscape

If this option is selected then the determination table will be produced in landscape format.

[OK]

The determination table is produced in the required format as a PDF file and opened directly with Acrobat Reader; it can then be printed out and/or saved.

4.5.2.12 Determinations - Print report

Dialog window: **Database ▶ File ▶ Print ▶ Report... ▶ Report output**

The menu item **File ▶ Print ▶ Report...** opens the dialog window **Report output**.

Selection

Selection	Selected determinations All filtered determinations
Default value	Selected determinations

Selected determinations

If this option is selected, then the reports will be produced for all determinations that are selected (marked) in the determination table.

All filtered determinations

If this option is selected, then the reports will be produced for all the determinations in the determination table that meet the filter criterion.

Report type

Selection	Original report(s) Report template
Default value	Original report(s)

Original report(s)

If this option is selected then the reports produced during the determination will appear at the **Output target** defined below.

Report template

If this option is selected then reports according to the selected Report template will be produced at the **Output target** defined below.



Note

Original report is used to refer to a report, which has been automatically generated at the creation of the **determination version**. If a determination is being reprocessed, a new determination version and therefore also a new original report is created.

In order to print the report of the non-reprocessed determination the determination 1 must be selected.

Output target

Printer

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

If this check box is activated, the reports are printed on the selected printer.

4.5.2.14 Determinations - Displaying history

Menu item: **Database ▶ Determinations ▶ Show history**

Switch history view on/off

With the menu item **Determinations ► Display history...** or the symbol  only the currently focused determination in the determination table as well as all the previous versions of this determination will be shown.

If the history view with the menu item **Determinations ► Show history** or the symbol  is disabled again, then the original selection of determinations in the determination table will appear again.

Menu item:Database ► Determinations ► Make current

Make old version current

With the menu item **Determinations ► Make current** or the symbol  the determination version selected in the determination table will again be made the current determination version. This creates a new determination whose version number is increased by **+1** compared with the last version to have been saved.

4.5.2.15 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 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)** 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 1016). The command type is shown above the calibration curve. The curve display shows the measured values and the curve calculated from these measured

Standard addition curve for STDADD



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 (see *Chapter 4.4.1.4.3.7, page 226*).

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

Selection	Standard 'Template name'
Default value	Standard

Selection of the saved templates for control charts (*see Chapter 4.4.2.2.1, page 235*). When the dialog window is opened, the last template to have been loaded will be shown. If a new template is selected then the display will be updated automatically.

Open dialog window **Templates for control charts** (see Chapter 4.4.2, page 234).

Shows the measured values together with warning and intervention limits and statistical values according to the settings on the selected control chart.

If the cursor is moved to a point then the number, date and value appear as a tooltip. The sorting and the date and time for the first and last point are shown as the legend.

[Print (PDF)]

Open dialog window **Print control chart (PDF)** (see Chapter 4.5.2.19, page 325). The content of the control chart can be shown as a PDF file in the required format.

4.5.2.17 Determinations - Overlay curves

Menu item: **Database ▶ Determinations ▶ Overlay curves... ▶ Overlay curves**

With the menu item **Determinations, Overlay curves...** or the symbol  the dialog window **Overlay curves** opens in which overlaid curves of the selected determinations are shown according to the loaded template.

Template

Selection of a saved template for showing overlaying curves.

Selection	Standard "Template" Last saved template
Default value	Last saved template If a new template is selected then the display will be updated automatically.



Note

In the template the **Command type** is defined for which the overlaying of curves is possible. Curves from the selected determinations can only be overlaid when the determination method contains a command with this **Command type** (e.g. **DET**).

Command name

Selection of the command, whose curves are to be displayed with the selected template.

Selection	"Command" This selection is only necessary if the method contains several commands of the same Command type.

[Templates]

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

Graphics presentation

Shows the curves according to the settings of the selected template. The command type (e.g. **DET pH**) is shown centrally above the graph. At the

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)**

Orientation

Portrait

Landscape

Produces control chart in landscape format.

Possibility of entering comments on the control chart which will be produced together with the control chart.

[OK]

4.5.2.19 Print control chart

In the dialog window **Print control chart (PDF)** the format for the printout of the control chart is indicated.

Orientation

Selection	Portrait Landscape
Default value	Landscape



Portrait

Produces control chart in portrait format.

Landscape

Produces control chart in landscape format.

Comment

Possibility of entering comments on the control chart which will be produced together with the control chart.

Input	1000 characters

[OK]

The control chart is shown in the required format as a PDF file and opened directly with the Acrobat Reader; it can then be printed out and/or saved.

4.6 Subwindow Information

4.6.1 Information - Overview

Subwindow: **Database** ▶ **Information**

General

In the subwindow **Information** general information about the focused determination in the determination table is shown. The subwindow can be switched on in the program part **Database** during the definition of the layout and thus made visible. It can be enlarged and reduced as required; it can also be maximized.

Tabs

Information about the determination is shown on the following tabs:

- *Determination*
Display of general information about determination.
- *Method*
Shows general information about the method used.
- *Sample*
Shows general information about the sample used.
- *Configuration*
Shows general information about the devices, sensors and common variables used.
- *Messages*
Shows messages about the determination.
- *Determination comment*
Shows the comment on the determination.

4.6.2 Information - Determination

Tab: **Database** ▶ **Information** ▶ **Determination**

Display of general information about determination.

Identification

Information about the identification of the determination.

Determination ID:

Unambiguous and unmistakable identification for the determination.

Server name:

Computer name of the server to which the client was connected when the determination was recorded.

Client name:

Computer name of the client the determination was recorded with.

Sample number:

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

Start counter:

Shows the start counter which is increased by +1 at the start of each determination. The start counter is saved for each client and cannot be reset.

Recording

Information about recording the determination.

Determination start:

Date and time at start of determination.

Determination duration:

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

Determination run:

Way in which the determination was ended:

Selection	Regular without messages Regular with remarks Stop Stop by error
1	100 100 100 100
2	100 100 100 100
3	100 100 100 100
4	100 100 100 100
5	100 100 100 100
6	100 100 100 100
7	100 100 100 100
8	100 100 100 100
9	100 100 100 100
10	100 100 100 100
11	100 100 100 100
12	100 100 100 100
13	100 100 100 100
14	100 100 100 100
15	100 100 100 100
16	100 100 100 100
17	100 100 100 100
18	100 100 100 100
19	100 100 100 100
20	100 100 100 100
21	100 100 100 100
22	100 100 100 100
23	100 100 100 100
24	100 100 100 100
25	100 100 100 100
26	100 100 100 100
27	100 100 100 100
28	100 100 100 100
29	100 100 100 100
30	100 100 100 100
31	100 100 100 100
32	100 100 100 100
33	100 100 100 100
34	100 100 100 100
35	100 100 100 100
36	100 100 100 100
37	100 100 100 100
38	100 100 100 100
39	100 100 100 100
40	100 100 100 100
41	100 100 100 100
42	100 100 100 100
43	100 100 100 100
44	100 100 100 100
45	100 100 100 100
46	100 100 100 100
47	100 100 100 100
48	100 100 100 100
49	100 100 100 100
50	100 100 100 100
51	100 100 100 100
52	100 100 100 100
53	100 100 100 100
54	100 100 100 100
55	100 100 100 100
56	100 100 100 100
57	100 100 100 100
58	100 100 100 100
59	100 100 100 100
60	100 100 100 100
61	100 100 100 100
62	100 100 100 100
63	100 100 100 100
64	100 100 100 100
65	100 100 100 100
66	100 100 100 100
67	100 100 100 100
68	100 100 100 100
69	100 100 100 100
70	100 100 100 100
71	100 100 100 100
72	100 100 100 100
73	100 100 100 100
74	100 100 100 100
75	100 100 100 100
76	100 100 100 100
77	100 100 100 100
78	100 100 100 100
79	100 100 100 100
80	100 100 100 100
81	100 100 100 100
82	100 100 100 100
83	100 100 100 100
84	100 100 100 100
85	100 100 100 100
86	100 100 100 100
87	100 100 100 100
88	100 100 100 100
89	100 100 100 100
90	100 100 100 100
91	100 100 100 100
92	100 100 100 100
93	100 100 100 100
94	100 100 100 100
95	100 100 100 100
96	100 100 100 100
97	100 100 100 100
98	100 100 100 100
99	100 100 100 100
100	100 100 100 100

Regular without messages

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

Regular with remarks

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

Stop

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

Stop by error

Due to an error, the determination was canceled automatically.

User (short name):

Short name of the user.



Note

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings (see Chapter 6.2.2.2, page 1181).

Active	User who started the determination.

Inactive	User logged in when finishing determination.

User (full name):

Full name of the user.



Note

Which user is entered depends on the option **Edit workplaces in 'BUSY' status** in the security settings (see Chapter 6.2.2.2, page 1181).

Active	User who started the determination.

Inactive	User logged in when finishing determination.

Remarks:

Shows the **Remarks** about the determination entered in the run window of the workplace.

Program version

Display of program version and build number of **tiamo** the determination was recorded with.

License ID

Display of the license serial number with which the determination was recorded.

Status/Version

Information about the determination version.

Determination status:

Selection	original	modified
	original Determination data unaltered.	
	modified Determination data altered.	

Determination version:

Version of the determination. The unaltered original determination has the version number **1**, reprocessed determinations have a version number **>1**.

Reprocessing date:

Date and time when the reprocessed determination version was saved.

Reprocessed by (short name):

Short name of user logged in when determination was reprocessed. If a new version was generated automatically by reprocessing statistically linked determinations without modification of determination data, *tiamo* will be displayed here.

Reprocessed by (full name):

Full name of user logged in when determination was reprocessed. If a new version was generated automatically by reprocessing statistically linked determinations without modification of determination data, **New generated version for statistics** will be displayed here.

Reprocessed with program version:

Display of program version and build number of **tiamo** the determination was reprocessed with.

Modification reason determination:

Reason for the determination modification.

Modification comment determination:

User comment on the determination modification.

Signature Level #

Information about the signatures at Level 1 or Level 2 in chronological order.

Signature date:

Date and time at which the determination was signed.

Signed by (short name):

Short name of user who signed the determination.

- Signed by (full name):**
Full name of user who signed the determination.
- Signature reason:**
Reason for signature selected by user.
- Signature comment:**
User comments on signing the determination.

4.6.3 Information - Method

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

Shows general information about the method used.

Identification
Information about the identification of the method.

Method name:
Name of the method.

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

Method ID:
Unambiguous and unmistakable identification for the method.

Method comment:
Method comment (**Command comment** on **START** command).

Status/Version
Information about method version.

Method status:	Selection	original modified (live) modified (reprocessed)
	original	
	Method when creating the determination.	
	modified (live)	
	Method has been modified live.	
	modified (reprocessed)	
	Method has been reprocessed.	

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.

Information about the signatures at Level 1 or Level 2 in chronological order.

Date and time at which the method was signed.

Short name of the user who signed the method.

Full name of user who signed the method.

Reason for signature selected by user.

User comments on signing the method.

Tab: **Database** ▶ **Information** ▶ **Sample**

Shows general information about the sample used.

Information about the sample. The only sample data shown is that for which a value is available.

Sample size:

Value for the sample size.

Sample size unit:

Unit of sample size.

Input date:

Date and time at which the sample size was entered.

Data source:

Data source for the sample size: For manual input **manual** is shown, for automatic input from a balance or barcode reader the corresponding device name, for data import from a file the corresponding file name.



Note

For Sartorius balances with their own data memory, the memory number shown in parentheses will be shown in addition to the balance name (e.g. **M-# 429**).

Sample position:

Position of the sample.

Identification

Information about the sample identifications.

ID1...ID16

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



Note

If for the sample data variables **ID1 ... ID16, Sample size, Sample size unit, Sample position** a different name is defined from that given in the method variables in the **START** command then the title shown here will consist of this name with the standard name shown in brackets (e.g. **Batch (ID2)**).

Live modification

Information on the last live modification of sample data.

Modification reason sample data:

Reason for the sample data modification.

Modification comment sample data:

User comment on the sample data modification.

4.6.5 Information - Configuration

Tab: **Database** ▶ **Information** ▶ **Configuration**

Shows general information about the devices, sensors and common variables used.

Device 'Device name'

Information about the device used (only the existing device information will be shown).

Device type:

Type of device.

Program version:

Device program version.

Device serial number:

Serial number of the instrument.

Rack name:

Name of the rack on the sample changer.

Rack code:

Rack code of the rack on the sample changer.

Tower:

Number of the tower on which a Swing Head is used.

Swing Head type:

Type of Swing Head attached to tower.

Swing Head serial number:

Serial number of Swing Head attached to tower.

Measuring input:

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

ADC type:

Type of analog/digital converter.

ADC serial number:

Serial number of measuring input.

Temperature sensor:

Type of connected temperature sensor.

Stirrer:

Stirrer connection at device.

Stirrer type:

Type of stirrer.

Serial number:

Serial number of stirrer.

Dosing device:

Dosing connection at device.

Dosing device type:

Dosing device type.

Dosing device serial number:

Serial number of dosing device.

Solution name:

Name of the solution.

Concentration:

Concentration value and 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:

Designation of exchange or dosing unit.

Order number:

Order number of exchange or dosing unit.

Serial number:

Serial number of exchange or dosing unit.

Cylinder volume:

Cylinder volume of exchange or dosing unit.

Cylinder serial number:

Serial number of cylinder.

Remote box:

Connection to device.

Oven program version:

Program version of the oven module.

Oven serial number:

Serial number of the oven module.

Detector type:

Type of the detector built in the spectrometer.

Date dark/reference spectrum:

Date and time of the recording of the dark spectrum and the reference spectrum.

User dark/reference spectrum:

User logged in during recording the dark spectrum and the reference spectrum.

Method dark/reference spectrum:

Method with which the dark spectrum and the reference spectrum were recorded.

Determination ID dark/reference spectrum:

Determination in which the dark spectrum and reference spectrum were recorded.

Date calibration:

Date and time of the wavelength calibration of the spectrometer.

User calibration:

User logged in during wavelength calibration of the spectrometer.

Method calibration:

Method with which the wavelength calibration of the spectrometer was carried out.

Determination ID calibration:

Determination in which the wavelength calibration of the spectrometer was carried out.

Sensor 'Sensor name'

Information about the sensor used.

Sensor type:

Type of sensor (+ designation **IS** for intelligent sensors).

lon:

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:

Temperature during the calibration.

Calibration method:

Shows the method with which the calibration was carried out.

User:

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

Measuring input

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

Common variable 'Name'

Information about the common variable used.

Value:

Value and unit of the common variables after the last value assignment.

Assignment date:

Date and time of last value assignment.



Assignment method:

Method with which the value was assigned.

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:

Short name of the user who has created or modified the solution.

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.



"Result"

Note

Mean value:

s(abs):

s(rel):

Minimum:

Maximum:

n:

tiamo 2.1

Table 3 Command DET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 4 Command DET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, μA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, μA, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, μA, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, μA, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 5 Command MET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, pH, 3	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, pH, 3	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, pH, 3	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, pH, 3	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 6 Command MET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 7 Command MET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, mV, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, mV, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, mV, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 8 Command MET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, μA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
HP#	HP#.VOL, mL, 4	HP#.MEA, μA, 1	HP#.TIM, s, 1	HP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1
BP#	BP#.VOL, mL, 4	BP#.MEA, μA, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1
GP	GP.VOL, mL, 4	GP.MEA, μA, 1	GP.TIM, s, 1.	GP.TEM, °C, 1

Table 9 Command SET pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, pH, 3	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, pH, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, pH, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, pH, 3	MA.TIM, s, 1	MA.TEM, °C, 1

Table 10 Command SET U

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Table 11 Command SET Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, mV, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Table 12 Command SET Upol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP#	EP#.VOL, mL, 4	EP#.MEA, μA, 1	EP#.TIM, s, 1	EP#.TEM, °C, 1
DRI	DRI, μL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, μA, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, μA, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, μA, 1	MA.TIM, s, 1	MA.TEM, °C, 1

Table 13 Command KFT Ipol

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	EP.VOL, mL, 4	EP.MEA, mV, 1	EP.TIM, s, 1	EP.TEM, °C, 1
DRI	DRI, µL/min, 1			
DTI	DTI, s, 1			
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 1	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 1	MA.TIM, s, 1	MA.TEM, °C, 1

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	EP.TEM, °C, 1
DRI	DRI, µg/min, 1			
DTI	DTI, s, 1			
FP#	FP#.MEA, mV, 1	FP#.QTY, µg, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EP	EP.MEA, mV, 1	EP.QTY, µg, 1	EP.TIM, s, 1	EP.TEM, °C, 1
DRI	DRI, µg/min, 1			
DTI	DTI, s, 1			
FP#	FP#.MEA, mV, 1	FP#.QTY, µg, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1

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

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	

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
RE#	RE#.DRT, mL/min, 4	RE#.DRS, mL/min, 4	RE#.DRC, "empty", 3	
FP#	FP#.VOL, mL, 4	FP#.MEA, mV, 3	FP#.TIM, s, 1	FP#.TEM, °C, 1
MI	MI.VOL, mL, 4	MI.MEA, mV, 3	MI.TIM, s, 1	MI.TEM, °C, 1
MA	MA.VOL, mL, 4	MA.MEA, mV, 3	MA.TIM, s, 1	MA.TEM, °C, 1

Table 19 Command 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 20 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 21 Command MEAS Ip_{ol}

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 22 Command MEAS Up_{ol}

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, μA, 1			

Table 23 Command MEAS TTable 24 Command MEAS T/Flow

Table 25 Command MEAS Conc

Table 26 Command MEAS Cond

tiamo 2.1

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
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 27 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 28 Command MEAS Ref

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

Table 29 Command MEAS Spec

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

Table 30 Command MEAS Opt

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
EME	EME, mAU, 1			
ETE	ETE, °C, 1			
FP#	FP#.MEA, mAU, 1	FP#.TIM, s, 1	FP#.TEM, °C, 1	
MI	MI.MEA, mAU, 1	MI.TIM, s, 1	MI.TEM, °C, 1	
MA	MA.MEA, mAU, 1	MA.TIM, s, 1	MA.TEM, °C, 1	
BP#	BP#.MEA, mAU, 1	BP#.TIM, s, 1	BP#.TEM, °C, 1	

Table 31 Command CAL LOOP pH

Column 2: Variable	Column 3	Column 4	Column 5	Column 6
SLO	SLO, %, 1			
ENP	ENP, −, 3			

Table 32 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 33 Command CAL Cond

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

Table 34 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 35 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 36 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 37 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:

■■■■■■■ 351

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 Curves subwindow

4.8.1 Curves - General

Dialog window: **Database ► Curves****Curves subwindow**

The subwindows **Curves 1...5** are subwindows in the program part **Database**, in which the measuring points generated by the measuring commands for the focused determination in the **Determination table** are shown as a graph. When navigating in the determination overview this data will be updated automatically (with a certain delay).

The subwindows **Curves 1...5** can be switched on in the program part **Database** during the definition of the layout and thus made visible. They can be enlarged and reduced as required; they can also be maximized.

Tabs

In the curve window a tab with the corresponding command name and the run index (e.g. **Chloride.1**) is provided for each execution of a measuring command; their sequence is determined by the method.

Show curves

The curves of the selected determination are shown on the tabs with the properties defined per window and per command type. The command type (e.g. **DET pH**) is shown above the left-hand y axis.

Curves can be **zoomed** as often as required by spanning a section of the curve display with the left mouse button pressed down. Zooming can be

undone with a double-click on the section of the graph or with the context-sensitive menu command **Show All**.



Note

When a new determination is selected the complete curve is always shown, i.e. the zoom range is not retained when the determination is changed.

Curves can be copied into the clipboard with the context-sensitive menu command **Copy graphics**.

Show monitoring report

With the context-sensitive menu item **Monitoring report...** in the curve window the dialog window **Monitoring report - 'Command name'** opens for displaying the measuring point list with the selected curve.

The column **Monitoring** is displayed as default for **STAT** and **DOS** commands and can contain the following entries:

Selection	<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.

The display of the measuring points in the table can be defined per window and per command type in the **Properties - Curve #**

4.8.3 Curves - Monitoring report

Dialog window: **Database ▶ Curves**

If the method contains commands of the type **STAT** or **DOS**, then with the context-sensitive menu item **Monitoring report...** in the curve window the dialog window **Monitoring report - 'Command name'** can be opened. In this window information on limit violations occurred are displayed for each monitoring switched on

The following columns are displayed:

Time [s]

Time in s until limit violation.

Limit

Selection	lower upper ok
lower	Lower limit value exceeded.
upper	Upper limit value exceeded.
ok	Measured value is inside limits again.

[pH]/[U]

Measured value limit.

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

Measured value at limit violation time.

Volume [mL]

Dosing volume at limit violation time.

Temp. [°C]

Temperature at limit violation time.

Action

Selection	Stop determination Stop command (only Titrando) Wait for [Continue] Wait for limit ok none
Stop determination	The running STAT command was quit, then the determination was stopped.



When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection of the quantity to be shown on the x axis.

For DET commands

Selection	Volume [mL] Measured value ERC Time [s] Temperature [°C] Calculated 1...3 External 1...3
Default value	Volume [mL]

For MET commands

Selection	Volume [mL] Measured value dMW Time [s] Temperature [°C] Calculated 1...3 External 1...3
Default value	Volume [mL]

For SET, STAT, DOS and KFT commands

Selection	Time [s] Measured value Volume [mL] dV/dt [μL/min] Temperature [°C] Calculated 1...3 External 1...3
Default value	Time [s]

For KFC commands

Selection	Time [s] Measured value Amount [µg] Charge [mAs] Drift [µg/min] dV/dt [µ/min] Ugen Igen [mA] Calculated 1...3 External 1...3
Default value	Time [s]

For BRC commands

Selection	Time [s] Measured value Amount [μg] Charge [mAs] Drift [μg/min] dV/dt [μ/min] Ugen Igen [mA] Calculated 1...3 External 1...3
Default value	Time [s]

For MEAS commands

Selection	Time [s]	Measured value	dMW/dt	Temperature [°C]	Calculated 1...3	External 1...3
Default value	Time [s]					

For MEAS T/Flow commands

Selection	Time [s] Measured value Flow [ml/min] Calculated 1...3 External 1...3
Default value	Time [s]

For MEAS TC Cond commands

Selection	Temperature [°C] Measured value Time [s] dMW/dt Calculated 1...3 External 1...3
Default value	Temperature [°C]

For MEAS Ref commands

Selection	Wavelength [nm] Intensity [Counts] Intensity Dark [Counts] Transmission [%] Saturated pixels
Default value	Wavelength [nm]

For MEAS Spec commands

Selection	Wavelength [nm] Absorbance [mAU] Intensity [Counts] Intensity Dark [Counts] Intensity Ref [Counts] Transmission [%] Saturated pixels
Default value	Wavelength [nm]

For MEAS Opt commands

Selection	Time [s] Measured value Intensity [Counts] Transmission [%] Saturated pixels
Default value	Time [s]

For CAL Spec-commands

Selection	Wavelength [nm] Intensity [Counts] Saturated pixels
Default value	Wavelength [nm]

Freely definable axis label for the x axis. With **auto** the designation from the field **Size** will be used.

Selection	50 characters auto
Default value	auto

Initial value for scaling the x axis.

Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	-1.00E+12

End value for scaling the x axis.

Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	+1.00E+12

Dialog window: **Database** ▶ **Curves** ▶ **Properties curves #** ▶ **y1 axis**

Parameters for the graphical display of the curves on the y1 axis (left-hand y 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 BRC STAT DOS
Default value	DET



When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection of the quantity to be shown on the y1 axis.

For DET commands

Selection	Volume [mL] Measured value ERC Time [s] Temperature [°C] Calculated 1...3 External 1...3
Default value	Measured value

For MET commands

Selection	Volume [mL] Measured value dMW Time [s] Temperature [°C] Calculated 1...3 External 1...3
Default value	Measured value

For SET, STAT, DOS and KFT commands

Selection	Time [s] Measured value Volume [mL] dV/dt [μL/min] Temperature [°C] Calculated 1...3 External 1...3
Default value	Volume [mL]

For KFC commands

Selection	Time [s] Measured value Amount [µg] Charge [mAs] Drift [µg/min] dV/dt [µ/min] Ugen Igen [mA] Calculated 1...3 External 1...3
Default value	Amount [µg]

For BRC commands

Selection	Time [s] Measured value Amount [µg] Charge [mAs] Drift [µg/min] dV/dt [µ/min] Ugen Igen [mA] Calculated 1...3 External 1...3
Default value	Amount [µg]

For MEAS commands

Selection	Time [s]	Measured value	dMW/dt	Temperature [°C]	Calculated 1...3	External 1...3
Default value	Measured value					

For MEAS T/Flow commands

Selection	Time [s] Measured value Flow [ml/min] Calculated 1...3 External 1...3
Default value	Measured value

For MEAS TC Cond commands

Selection	Temperature [°C] Measured value Time [s] dMW/dt Calculated 1...3 External 1...3
Default value	Measured value

For MEAS Ref commands

Selection	Wavelength [nm] Intensity [Counts] Intensity Dark [Counts] Transmission [%] Saturated pixels
Default value	Intensity [Counts]

For MEAS Spec commands

Selection	Wavelength [nm] Absorbance [mAU] Intensity [Counts] Intensity Dark [Counts] Intensity Ref [Counts] Transmission [%] Saturated pixels
Default value	Absorbance [mAU]

For MEAS Opt commands

Selection	Time [s] Measured value Intensity [Counts] Transmission [%] Saturated pixels
Default value	Measured value

For CAL Spec-commands

Selection	Wavelength [nm] Intensity [Counts] Saturated pixels
Default value	Intensity [Counts]

Label

Freely definable axis label for the y1 axis. With **auto** the designation from the field **Size** will be used.

Selection	50 characters auto
Default value	auto

Scaling**Start value**

Initial value for scaling the y1 axis.



Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	-1.00E+12

End value

End value for scaling the y1 axis.

Only editable when autoscaling is disabled.

Range	-1.00E+12 ... +1.00E+12
Default value	+1.00E+12

Curve

Curve color

Selection of the color for the curve line.

Selection	13 colors blue
Default value	blue

Symbol

Selection of the symbol for the display of the individual measuring points.

Selection	• × * ■ ▲ No symbol
Default value	No symbol

No symbol

Measuring points are not shown.



Note

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Selection	13 colors blue
Default value	blue

Smoothing

Switches smoothing on/off for the curve.

Factor for smoothing on the x axis.

Factor for smoothing on the y axis.

Show with original curve

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

If this check box is activated, then the original curve (solid line, same color) will be shown in addition to the smoothed curve (dotted line).

4.8.4.4 Curve properties - y2 axis

Dialog window: **Database** ▶ **Curves** ▶ **Properties curves #** ▶ **y2 axis**

Parameters for the graphical display of the curves on the y2 axis (right-hand y axis).

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.



When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Size

Selection of the quantity to be shown on the y2 axis.

For DET commands

Selection	Volume [mL] Measured value ERC Time [s] Temperature [°C] Calculated 1...3 External 1...3 off
Default value	off

For MET commands

Selection	Volume [mL] Measured value dMW Time [s] Temperature [°C] Calculated 1...3 External 1...3 off
Default value	off

For SET, STAT, DOS and KFT commands

Selection	Time [s] Measured value Volume [mL] dV/dt [μL/min] Temperature [°C] Calculated 1...3 External 1...3 off
Default value	off

For KFC commands

Selection	Time [s] Measured value Charge [mAs] Amount [μg] Drift [μg/min] Ugen Igen [mA] Calculated 1...3 External 1...3 off
Default value	off

For BRC commands

Selection	Time [s] Measured value Amount [mAs] Water [µg] Drift [µg/min] Ugen Igen [mA] Calculated 1...3 External 1...3 off
Default value	off

For MEAS commands

Selection	Time [s]	Measured value	dMW/dt	Temperature [°C]	Calculated 1...3	External 1...3	off
Default value	off						

Selection	Time [s] Measured value Flow [ml/min] Calculated 1...3 External 1...3 off
Default value	off

Selection	Temperature [°C] Measured value Time [s] dMW/dt Calculated 1...3 External 1...3 off
Default value	off

Selection	Wavelength [nm] Intensity [Counts] Intensity Dark [Counts] Transmission [%] Saturated pixels off
Default value	off

Selection	Wavelength [nm] Absorbance [mAU] Intensity [Counts] Intensity Dark [Counts] Intensity Ref [Counts] Transmission [%] Saturated pixels off
Default value	off

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 label for the y1 axis. With **auto** the designation from the field **Size** will be used.

Selection	50 characters auto
Default value	auto

Curve color

tiamo 2.1



Selection	13 colors pink
Default value	pink

Symbol

Selection of the symbol for the display of the individual measuring points.

Not editable for MEAS Ref and MEAS Spec commands

Selection	5 symbols No symbol
Default value	No symbol

No symbol
Measuring points are not shown.



Note

With curves, for which the distance between to measuring points is smaller than 5 pixels, the separate measuring points are not displayed anymore, even if a symbol has been selected. In this case, the graphics window can eventually be enlarged in order to display the symbols again.

Symbol color

Selection of the color for the measuring point symbol.

Not editable for MEAS Ref and MEAS Spec commands

Selection	13 colors pink
Default value	pink

Smoothing

Smoothing

on | off (Default value: **on**)
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 display of curves.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC BRC STAT DOS
Default value	DET



Note

When the dialog window is opened, those **Command type** will be selected as standard which applies for the curve shown in the curve window.

Autoscaling

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

If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Display grid

Display grid

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

If this check box is activated then a grid will be shown against the background.

Grid type

Selection of the type of grid line.

Selection	Line types dotted
Default value	dotted

Grid color

Selection of the grid line color.

Selection	13 colors gray
Default value	gray

Background

Background color

Selection of the color for the curve background.

Selection	13 colors white
Default value	white

Show endpoints

Show endpoints

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

If this check box is activated then the endpoints found will be shown on the curve by the symbol  and labeled with **EP#** (potentiometric endpoint), **BP#** (break point), **FP#** (fixed endpoint), **HP** (HNP), **MI** (minimum value) or **MA** (maximum value).

Automatic EPs

Selection of the color for automatically set endpoints.

Selection	13 colors black
Default value	black

Manual EPs

Selects the color for manually set endpoints.

Selection	13 colors pink
Default value	pink

Show evaluation lines

Show evaluation lines

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

If this check box is activated the evaluation lines (tangents, auxiliary lines) will be shown.

Tangents

Selection of the color for the tangents and auxiliary lines.

Selection	13 colors light green
Default value	light green

Auxiliary lines

Selection of the color for the auxiliary lines.

Selection	13 colors blue
Default value	blue

4.8.4.6 Curve properties - Measuring point list

Dialog window: **Database ▶ Curves ▶ Properties curves # ▶ Options**

Parameters for showing the measuring point list.

Command type

Selection of the command type for which the curve properties are to be defined. The curve properties defined for each command type are saved per curve window and per client.

Selection	DET MET SET MEAS MEAS T/Flow MEAS TC Cond MEAS Ref MEAS Opt MEAS Spec CAL Spec KFT KFC BRC STAT DOS
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**)

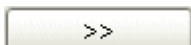
If this option is switched on then all axes in the curve window will be scaled automatically. In this case the fields **Start value** and **End value** cannot be edited.

Available columns

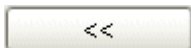
Shows all fields that can be displayed as columns in the measuring point list.

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; logout.
- *Edit*
Define method properties, recalculate calibration data, update calibration data and chromatograms.
- *View*
Switch toolbar on and off.
- *Insert*
Command, track.
- *Help*
Open MagIC Net help, display information on the program.

5.1.3.2 Method - Menu File

Program part: **Method**

 New...	Create a new method (<i>see Chapter 5.2.1, page 376</i>).
 Open...	Opens 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...	Opens the method manager (<i>see Chapter 5.3.1, page 389</i>).
 Method groups...	Opens 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 388</i>).
 Logout...	Logs out the user. The dialog window Login opens (<i>see Chapter 2.2.3, page 16</i>).
Exit	Ends program.
1 'Method name'	Opens the selected method

5.1.3.3 Method - Editing menu

Program part: **Method**

 Properties...	Opens the properties window of the command selected in the method (<i>see Chapter 5.2.4.2.8, page 384</i>).
 Undo:	Undoes the last modification of the method.
 Restore:	Restores the last undone modification of the method.
 Cut	Cuts selected elements (commands, tracks) and copy them to the clipboard.
 Copy	Copies selected elements (commands, tracks) to the clipboard.

 Insert	Inserts the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
 Delete	Deletes selected elements (commands, tracks).
 Comment...	Newly enter or edit a comment on the selected command.(see Chapter 5.2.4.2.9, page 384).

5.1.3.4 Method - Menu View

Program part: **Method**

 Split vertically	Splits method window vertically and display two methods side by side (see Chapter 5.2.3.2, page 379).
 Split horizontally	Splits method window horizontally and display two methods below each other (see Chapter 5.2.3.3, page 379).
 Unsplit	Undoes the splitting of the method window (see Chapter 5.2.3.1, page 379).
Toolbar	Switches toolbar display on/off.

5.1.3.5 Method - Menu Insert

Program part: **Method**

 New command...	Inserts a new command above the selected command (see Chapter 5.2.4.2.1, page 382).
 New track...	Inserts a new track on the right hand side of the selected track (see Chapter 5.2.4.1.1, page 380).

5.1.3.6 Help Menu

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

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

5.1.4 Method - Toolbar

Program part: **Method**

 New...	Create a new method (see Chapter 5.2.1, page 376).
 Open...	Opens an existing method (see Chapter 5.2.2, page 376).



 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...	Opens the method manager (<i>see Chapter 5.3.1, page 389</i>)
 Method groups...	Opens 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 388</i>).
 Method check	Check the selected method for plausibility (<i>see Chapter 5.2.5, page 385</i>).
 Properties...	Opens the properties window of the command selected in the method (<i>see Chapter 5.2.4.2.8, page 384</i>).
 Undo:	Undoes the last modification of the method.
 Restore:	Restores the last undone modification of the method.
 Cut	Cuts selected elements (commands, tracks) and copy them to the clipboard.
 Copy	Copies selected elements (commands, tracks) to the clipboard.
 Insert	Inserts the content of the clipboard (commands, tracks) above the selected command or on the right hand side of the selected track.
 Delete	Deletes selected elements (commands, tracks).
 Comment...	Newly enter or edit a comment on the selected command. (<i>see Chapter 5.2.4.2.9, page 384</i>).
 New command...	Inserts a new command above the selected command (<i>see Chapter 5.2.4.2.1, page 382</i>).
 New track...	Inserts a new track on the right hand side of the selected track (<i>see Chapter 5.2.4.1.1, page 380</i>).
 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 1417</i>).
 Split vertically	Splits method window vertically and display two methods side by side (<i>see Chapter 5.2.3.2, page 379</i>).

 Split horizontally	Splits method window horizontally and display two methods below each other (see Chapter 5.2.3.3, page 379).
 Unsplit	Undoes the splitting of the method window (see Chapter 5.2.3.1, page 379).
 Logout...	Logout user (see Chapter 2.2.3, page 16).
 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

- *Creating new method*
- *Opening method*
- *Select method*
- *Edit tracks*
- *Checking method*
- *Saving method*
- *Closing method*

Managing methods

- *Managing methods*
- *Renaming method*
- *Copying method*
- *Moving method*
- *Deleting method*
- *Exporting a method*
- *Importing method*
- *Signing methods*
- *Showing method history*

Managing method groups

- *Managing methods*
- *Edit method groups*



5.2 Method editor

5.2.1 Creating new method

Menu item: **Method ▶ File ▶ New...**

With the symbol  or with the menu item **File ▶ New...** the window **New method** is opened in which a method template can be selected for the new method.

Templates

Selection	Method templates Blank method
Default value	Blank method

Method templates

Selecting a method template as a basis for creating a new method.

Blank method

A template, containing only the commands **START** and **END**, is loaded.

Description

Description of the selected method template.

[OK]

Opens the selected method to edit.

5.2.2 Opening method

Menu item: **Method ▶ File ▶ Open...**

With the symbol  or the menu item **File ▶ Open** the window **Open method** is opened. One of the globally available methods can be selected and opened.

Method group

Method group

Selection of the Method group whose methods will be displayed in the method table (*see Chapter 5.4.1, page 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 order.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who saved the method.

Version

Version number of the method.

Signed

Display if and at which level the method has been signed.

Selection	no Level 1 Level 2
no	The method has not been signed. It can be opened for editing and also deleted.
Level 1	The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited and saved again, a new version is created and all the signatures will be deleted.
Level 2	The method has been signed electronically at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

Comment on the method entered as (*see Chapter 5.2.4.2.9, page 384*) in the command **START**.

Opening the method**Method name**

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

Input	50 characters

[Open]

Opens the selected method in the main window in the place of the method that is already opened. The method name is displayed in the title bar of the

program; the number of currently opened methods is displayed in the left upper corner of the method symbol.



Note

A maximum of 9 methods can be opened but only two can be displayed at the same time (see Chapter 5.2.3.1, page 379).

5.2.3 Select method

Program part: **Method**

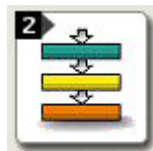
The number of the currently opened methods is displayed in the left upper corner of the method symbol. If 2 or more methods are opened, then these two methods, which can displayed either (*see Chapter 5.2.3.2, page 379*) or (*see Chapter 5.2.3.3, page 379*) in the main window, can be selected with the 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.

Selection	Fit to window Adjust to both height and width of the window.

5.2.4 Edit method

5.2.4.1 Edit tracks

Program part: **Method**

The following functions for tracks are available for a method currently opened in the main window:

5.2.4.1.1 Insert new track

Menu item: **Method ▶ Insert ▶ New track...**

With the icon  or the menu item **Insert ► New track...** the window **New track** opens for selection of the desired track type:

- Normal track
- Series start track
- Series end track
- Exit track
- Error track

The new track is inserted to the right of the selected track after confirming the selection with **[OK]**.

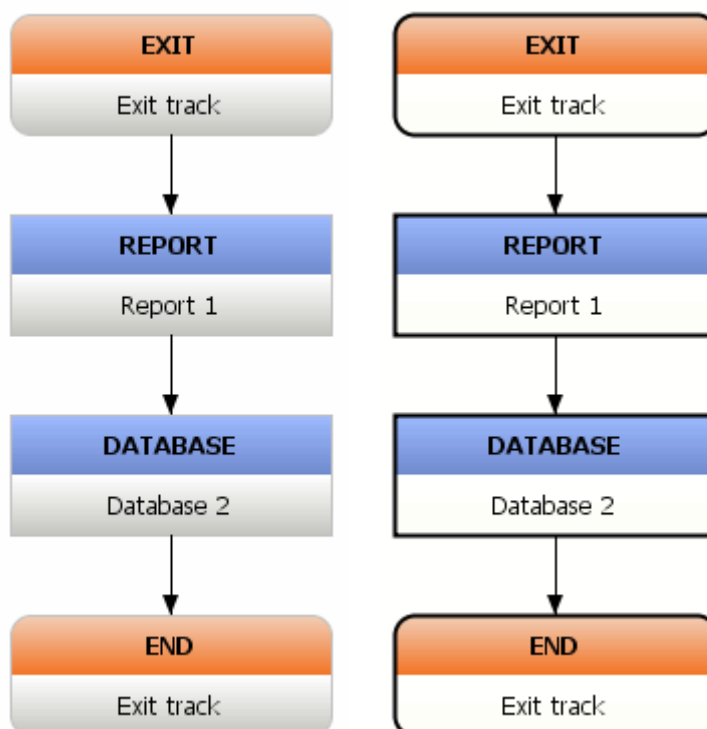
5.2.4.1.2 Select track

Program part: **Method ▶ Method window**

A track is being selected with a left mouse-click onto the start command of the track. All commands of the track are selected, indicated by a black border.

Non-selected track

Selected track



5.2.4.1.3 Move track

Program part: **Method** ► **Method window**

Move track with Drag&Drop

To move a track with Drag&Drop it has to be selected first. It can then be moved to the desired position with left mouse button pressed. A red vertical arrow indicates the possible positions.

Move track via the clipboard

To move a track via the clipboard it has to be cut first. It can then be inserted to the right of the selected track.

5.2.4.1.4 Copy track

Program part: **Method ▶ Method window**

Copy track with Drag&Drop

To copy a track with Drag&Drop it has to be selected first and can then be copied to the desired position with left mouse button and Ctrl key simultaneously pressed. A red vertical arrow indicates the possible positions.

Copy track to the clipboard

The selected track is copied to the clipboard with **Edit ► Copy**, the context-sensitive menu item **Copy** or with the icon .



5.2.4.1.5 Cut track

Menu item: **Method** ▶ **Edit** ▶ **Cut**

The selected track is moved to the clipboard with **Edit ► Cut**, the context-sensitive menu item **Cut** or with the icon .

5.2.4.1.6 Insert track

Menu item: **Method** ▶ **Edit** ▶ **Insert**

The track copied to the clipboard is inserted to the right of the selected track with **Edit ► Paste**, the context-sensitive menu item **Paste** or with the icon .

5.2.4.1.7 Delete track

Menu item: **Method** ▶ **Edit** ▶ **Delete**

The selected track is deleted with **Edit ► Delete**, the context-sensitive menu item **Delete**, with the icon  or with the Delete key.

5.2.4.2 Edit commands

Subwindow: **Method**

The following processing functions for commands are available for a method currently opened in the main window:

5.2.4.2.1 Insert new command

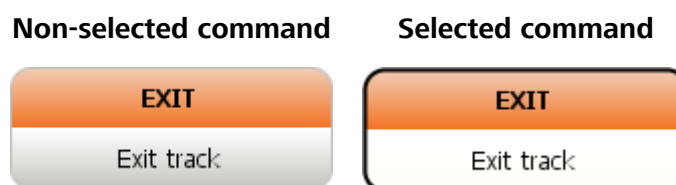
Menu item: **Method ▶ Insert ▶ New command...**

With the icon  or with the menu item **Insert ► New command...**, the window **New command** is opened, in which the desired command can be selected out of the following categories :

- **Titration**
DET, MET, SET, KFT, KFC, BRC, STAT
- **Measure**
MEAS, STDADD
- **Calibration**
CAL LOOP pH, CAL MEAS pH, CAL LOOP Conc, CAL MEAS Conc, CAL Cond, CAL Spec
- **Dosing**
ADD, DOS, LQH, PREP, EMPTY
- **Automation**
MOVE, SWING, LIFT, PUMP, STIR, RACK, HEATER, FLOW
- **Results**
CALC, DATABASE, REPORT, EXPORT
- **Communication**
CTRL, SCAN, SEND, RECEIVE, TRANSFER, 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 .

5.2.5 Checking method

Menu item: **Method ▶ File ▶ Method check**

With the symbol or menu item **File ► Method check** a method check for the method in focus is triggered. The following points are checked:

- Are the tracks defined in **CALL** commands available?
- Are the targets of loop commands defined?
- Are the variables defined in calculation formulas available?
- Does a track contain more than one command with conditioning activated?
- Does a special track (Series start track, Series end track, Exit track and Error track) contain a command with conditioning activated?

A message is displayed for each error found. The method check has to be started again afterwards. When the method check has been completed successfully, it is confirmed with a message.

5.2.6 Saving method

Menu item: **Method** ▶ **File** ▶ **Save / Save as...**

With the symbol  or the menu item **File ► Save** an existing focused method is saved again under its name without the window **Save method** being opened.

When saving a **newly** created method with **File ► Save** or when saving an existing method with **File ► Save as...** the dialog window **Save method** is opened, in which the method group can be selected and a method name can be entered or selected.

Method group

Method group

Selection of the method group where the method is to be stored (see *Chapter 5.4.1, page 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 order.

Name

Name of the method.

Saved

Date and time when the method was saved.

User

Short name of the user who saved the method.

Full name

Full name of the user who saved the method.

Version

Version number of the method.

Signed

Display if and at which level the method has been signed.

Selection	no	Level 1	Level 2

no

The method has not been signed. It can be opened for editing and also deleted.

Level 1

The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited and saved again, a new version is created and all the signatures will be deleted.

Level 2

The method has been signed electronically at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

Comment on the method entered as (see Chapter 5.2.4.2.9, page 384) in the command **START**.

Saving method

Method name

Name under which the Method is to be saved.

Input	50 characters



Note

The method name must be unique in the whole Client/Server system.

[Save]

Save the selected method under the desired method name in the selected method group.

The **method check** is automatically carried out before saving the method - it can also be started manually at any time (*see Chapter 5.2.5, page 385*). The method is checked as thoroughly as possible. Checks for devices, sensors and titrants/solutions are not carried out until the start of the method in order to ensure that method commands for devices etc. which are not yet configured in the system can be created. If an error is detected during the method check, a message is displayed asking whether the method should be saved nevertheless. Faulty methods cannot be started.

A new method version with a new identification is created each time a modified method is saved (see *Chapter 5.3.11, page 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 6.2.2.4, page 1186*), then 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 6.2.2.4, page 1186) when saving a modified method or when deleting methods, the dialog window **Modification comment method** is opened, in which a reason and a comment on the modification must be entered.

Reason

Selection from the **Default reasons** defined for the category **Modification of methods** in the **Security settings** dialog window (see Chapter 6.2.2.6, page 1188).

Selection	Selection from the Default reasons

Comment

Entry of a comment for modifying the method.

Input	1000 characters

5.3.1 Managing 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 opened for editing and also deleted.

Level 1

The method has been signed electronically at level 1. It can be opened for editing and also deleted. If the method is edited and saved again, a new version is created and all the signatures will be deleted.

Level 2

The method has been signed electronically at level 2. The method is locked now and it can neither be edited nor deleted.

Method comment

Comment on the method entered as (see Chapter 5.2.4.2.9, page 384) in the command **START**.

Window menus

The menu **[Edit]** below the method table contains the following menu items:

Rename...	Renames selected method (<i>see Chapter 5.3.2, page 391</i>).
Copy	Copies selected method(s) in the same method group (<i>see Chapter 5.3.3, page 391</i>).
Move...	Moves selected method(s) to a different method group (<i>see Chapter 5.3.4, page 391</i>).
Delete...	Deletes selected method(s) (<i>see Chapter 5.3.5, page 392</i>).
Send to...	Exports the selected method(s) and attaches it(them) to an E-mail (<i>see Chapter 5.3.6, page 392</i>).
Export...	Exports selected method(s) (<i>see Chapter 5.3.7, page 393</i>).
Import...	Imports 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 19</i>).
Signature 2...	Sign selected method on level 2 (<i>see Chapter 2.3.4, page 20</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 22*).**[History]**Opens the dialog window **Method history** of the selected method (*see Chapter 5.3.11, page 399*).**[Exit]**

Closes the dialog window and saves entries.

5.3.2 Renaming 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' after**

entering the new method name.

Input **50 characters****Note**

The method name must be unique in the whole Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

5.3.3 Copying 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 Moving method**Dialog window: **Method ▶ File ▶ Manage method... ▶ Method manager ▶ [Edit] ▶ Move... ▶ Move method(s)**The selected methods are moved to the desired method group with the menu item **Edit ▶ Move...** The method group can be selected in the window **Move method(s)**.

Method group

Selection of the method group to which the selected methods should be moved.

Selection	Method groups



Note

Locked methods (methods signed at **Level 2**) cannot be moved.

5.3.5 Deleting method

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Delete**

The selected methods and all method versions are deleted with the menu item **[Edit] ► Delete....**

If the option **Comment on modification of methods** is activated in the **Security settings** (see Chapter 6.2.2.4, page 1186), 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 Sending method to

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Send to...**

The selected methods are each exported as a file with the name '**Method name**'.mmet with the menu item **Edit ► Send to....**

Afterwards, the Windows Standard E-mail Client will open with an empty message. The export files of the highlighted objects will automatically be added as an attachment. The user can complete the E-mail himself/herself and send it on. The exported methods are stored only temporarily on the computer and will be deleted automatically after the E-mail has been sent.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

5.3.7 Exporting a method

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Export...**

The selected methods can each be exported as a file named '**Method name**'.mmet with the menu item **Edit ► Export....** The window **Select directory for export** opens in which the directory for export must be selected.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

5.3.8 Importing method

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Import...**

With the menu item **Edit ► Import...** the dialog window **Select files for import** opens. Here you must select the methods to be imported and the method groups into which the methods are to be imported. These methods are imported into the opened method table.

Sample methods

In the program directory under `..\tiamo\examples\methods\...` you will find examples of methods that can be imported into an opened method group.

5.3.9 Renaming imported method

Menu item: **Method** ▶ **File** ▶ **Method manager...** ▶ **Method manager** ▶ **[Edit]** ▶ **Import...**

Methods with the same name as methods already imported can only be imported under a new name. The window **Import method** opens for renaming the method.

Rename imported method 'Method name' after

entering the new method name.

Input	50 characters



Note

The method name must be unique in the whole Client/Server system. Locked methods cannot be renamed. Renaming the method is not regarded as modification i.e. the method version does not change.

5.3.10 Signing methods

5.3.10.1 Rules for electronic signatures

Program parts: **Method / Database**

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

- **Signature levels**

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

- **Multiple signing**

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

- **Sign at Level 1**

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

- **Sign at Level 2**

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

- **Different users**

The same user may only sign on either Level 1 or Level 2.

- Reason and comment

Each signature must be accompanied by a reason selected from predefined default reasons. A further comment can also be entered.

- **Saved data**

The signature date, user name, full name, reason and comments are saved for each signature.

- **Deleting signatures 1**

Signatures at Level 1 are automatically deleted again when compiling a new version.

- **Deleting signatures 2**

Signatures at Level 2 can only be deleted by users who have the appropriate rights.

- **Sign methods**

Methods can only be signed individually.

- **Signature options**

The options for electronic signatures are set in the **Signatures** tab in the **Security settings** dialog window.

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		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

Signature possible

The selected method or determination can be signed.

Signature 1 not possible (signature 2 exists)

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

Signature not possible (accessed by other client)

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons

Comment

Entry of comment on the signature.

Input	1000 characters

[Sign]

Sign method or determination. The window remains open.



Note

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

5.3.10.3 Signature Level 2

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

or

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

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



Note

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

Info

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

[illegible]

Signature possible

The selected method or determination can be signed.

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

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).

Input	24 characters

Password entry.

Input	24 characters

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

Selection	Selection from the Default reasons

Entry of comment on the signature.

Input	1000 characters

Sign method or determination. The window remains open.



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

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.

Shows at which level the method has been signed (**Level 1** or **Level 2**).



Signature date

Date and time at which the method was signed.

User

Short name of the user who signed the method.

Full name

Full name of the user who signed the method.

Reason

Reason for signature.

Signature comment

Comment on the signature.

5.3.10.5 Delete Signature Level 2

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

or

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

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

User

Entry of the user name (short name).

Input	24 characters

Password

Password entry.

Input	24 characters

Reason

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

Selection	Selection from the Default reasons
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
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
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

Comment

Entry of comment on the signature.

Input	1000 characters

Delete Signatures 2.



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**

The dialog window **[Method history]** showing a table with all **versions** of the selected method is opened with the button **History**.

Name of the method.

Version number of the method.

Unique method identification.

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.

Reason entered when saving the modified method.

Comment entered when saving the modified method.

Opens the dialog window **Method 'Method name' - Version #** in which the method for the selected method version is displayed.

Deleting the selected method group.

5.4.2.1 Method groups - Properties

The properties window **[Properties - Method group 'Name']** for the selected method group is opened with the button **Properties** or by double-clicking on the line in the table.

The parameters for the method groups are configured on the following tabs:

5.4.2.2 Method groups - General

Name

Name of the method group. The name has to be entered when creating a new method group.

Input	50 characters

Number

Number of methods in the method group.

Comment

Freely definable remarks about the user group.

Input	1000 characters

5.4.2.3 Method groups - Access rights

Tab: **Method** ▶ **File** ▶ **Method groups...** ▶ **Method groups** ▶ **[Properties]** ▶ **Properties**
- **Method group 'Name'** ▶ **Access rights**

Access rights for method groups and their methods can be assigned per user group.



Note

The user group **Administrators** always has both access rights, i.e. they cannot be disabled.

User group

Names of the user groups

Execute

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

Authorization to start methods from a method group. Methods in this group can only be opened and started but can not be edited or deleted.

Edit

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

Authorization to edit methods from a method group. Methods in this group can be opened, started, edited and deleted. New methods can be added as well.

5.5 Tracks

5.5.1 Tracks - General

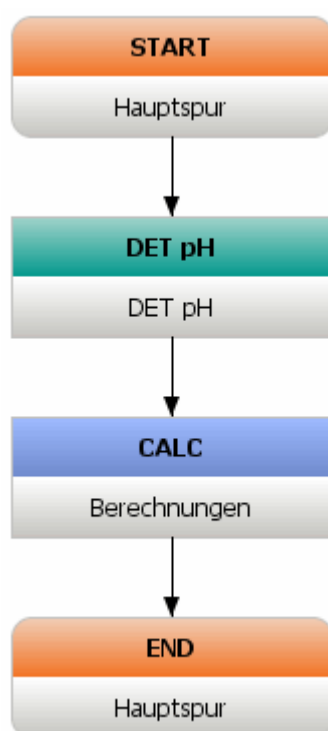
Subwindow: **Method**

Definition

A **track** is a partial sequence of a **method** comprised of **commands**. In addition to the **main track** that is present in each method, there are also **normal tracks** which are generated by the user and called up with a **CALL** command and **special tracks** (series start track, series end track, exit track and error track), which cannot be called up but which are started automatically with certain events.

Structure

Each track contains a **START** or **TRACK** command respectively and an **END** command, between which as many commands can be inserted as needed.



Presentation

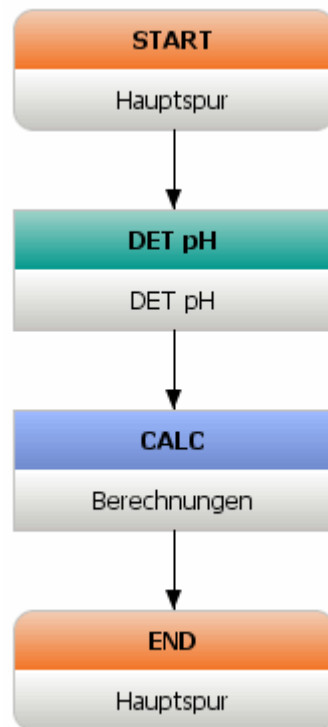
The individual tracks are arranged side by side in the method window. The track name is displayed in the **START** or **TRACK** command, respectively, as well as in the **END** command.

5.5.2 Track types

5.5.2.1 Main track

Subwindow: **Method**

The **main track** contains the main sequence of the method and exists in each method. It starts with a *(see Chapter 5.6.2.2, page 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:

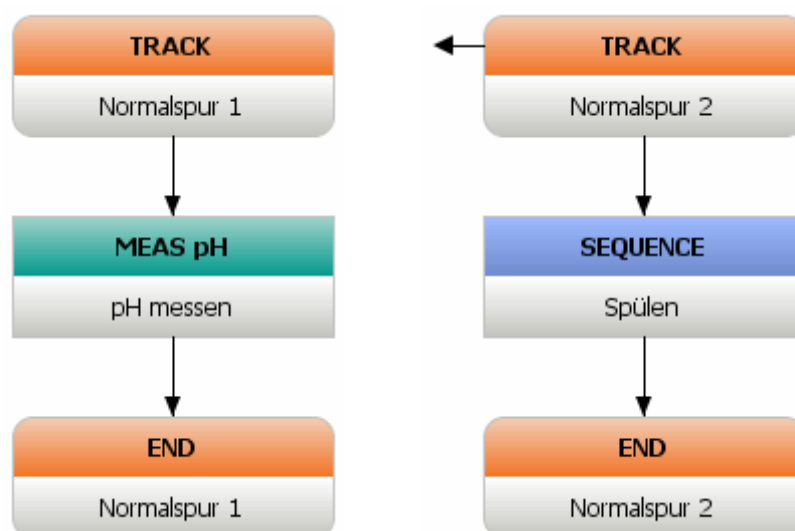
- Sequential running normal track

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 1151) 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 1151) 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

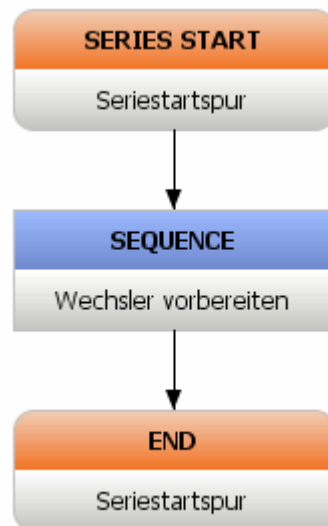


5.5.2.3 Series start track

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.

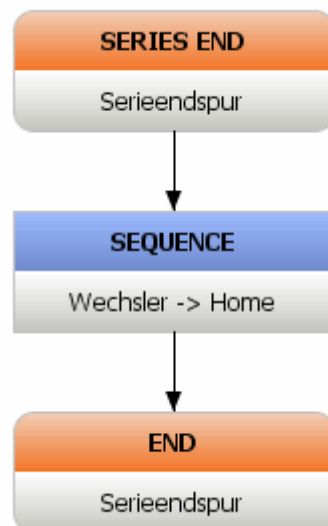


5.5.2.4 Series end track

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.

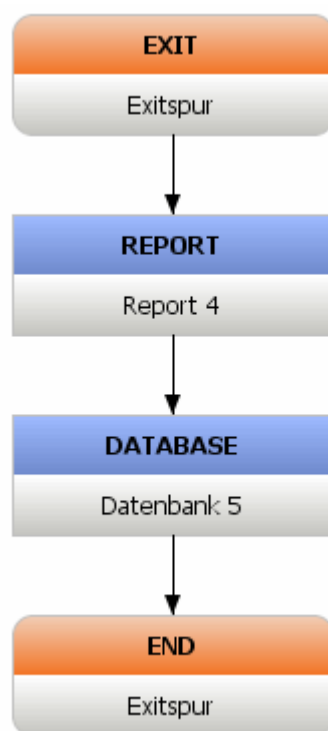


5.5.2.5 Exit track

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 1123) command and a (see Chapter 5.6.8.3, page 1121) 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.

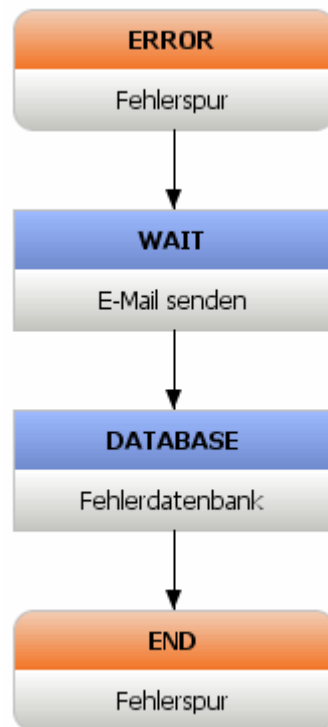


5.5.2.6 Error track

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 designation of the command type (short description in capital letters) cannot be changed.
- **Command name**
Each command has a freely selectable command name which must be 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.
- *BRC*
Command for coulometric titration for determining the bromine consumption.
- *CAL Cond*
Determination of cell constants of conductivity sensors.
- *CAL LOOP Conc*
Calibration loop for calibrating ion-selective electrodes (ISE electrodes).
- *CAL MEAS pH*
Measuring command for calibrating pH electrodes.
- *CAL MEAS Conc*
Measuring command for calibrating ion-selective electrodes (ISE electrodes).
- *CAL Spec*
Execution of a wavelength calibration.
- *CALC*
Calculation of intermediate and end results, titer values and common variables.
- *CALL*
Calling tracks (subprograms).

- *CTRL*
Setting remote output lines.
- *DATABASE*
Storage of the determination data in data bases.
- *DET*
Dynamic Equivalence Point Titrations.
- *DOS pH*
Controlled dosing with the measured quantity pH.
- *DOS U*
Controlled dosing with the measured quantity voltage U.
- *EMPTY*
Emptying a dosing unit.
- *END*
End command for all tracks.
- *ERROR*
Start command for error track.
- *EXIT*
Start command for exit track.
- *EXPORT*
Export of determination data.
- *FLOW*
Gas flow monitoring with 774 and 864 Sample Processor.
- *HEATER*
Controlling the oven temperature with the 774 and 864 Sample Processors.
- *KFC*
Coulometric Karl Fischer Titrations with voltametric measurement.
- *KFT*
Volumetric Karl Fischer Titrations.
- *LIFT*
Moving to a lift position.
- *LOOP*
Multiple execution of a command sequence.
- *LQH*
Extensive dosing possibilities with a Dosino.
- *MEAS*
Measuring.
- *MET*
Monotonic Equivalence Point Titrations.
- *MOVE*
Moving to a rack position or an external position.
- *PREP*
Preparing a exchange or dosing unit.
- *PUMP*
Switching on/off the connected or built-in pumps.



- *RACK*
Initialization of the rack attached.
- *RECEIVE*
Waiting for event messages or status messages.
- *REPORT*
Output of a report defined by a report template.
- *REQUEST*
Requesting sample data.
- *SCAN*
Scanning remote input lines.
- *SEND*
Sending event messages
- *SERIES END*
Start command for series end track.
- *SERIES START*
Start command for series start track.
- *SEQUENCE*
Combines several commands to one command.
- *SET*
Set Endpoint Titrations.
- *START*
Start command for main track.
- *STAT*
STAT Titration.
- *STDADD auto*
Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.
- *STDADD dos*
Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD man*
Standard addition with manual addition of the standard addition solution.
- *STIR*
Controlling a connected stirrer.
- *SWING*
Swinging of the robotic arm (with Swing Head only).
- *TRACK*
Start command for normal track.
- *TRANSFER*
Data transfer via RS-232 to external devices or programs.
- *WAIT*
Interrupts the method run.
- *WEIGH*
Interrupts the method run.

5.6.2 Track commands

5.6.2.1 Track commands - Overview

Menu item: **Method ▶ Insert ▶ New track...**

The following track commands exist for the different tracks:

- *START*
Start command for (see Chapter 5.5.2.1, page 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 ... 99
Selection	not defined
Default value	not defined

not defined

With **not defined** the number of single determinations must be specified on the tab **Determination series** in the subwindow **Run** of the program part **Workplace**.

Conditioning

Automatic conditioning

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

If this option is **enabled**, the conditioning will be started automatically at the start of a determination for all commands with activated conditioning (**SET**, **KFT**, **KFC** and **BRC**). After the track with the conditioning command has been finished, conditioning is started again automatically and will be continued even after the end of the determination.

If this parameter is **disabled**, then conditioning will not be started until the start of the command. Conditioning is not started again after the end of the track with the conditioning command. This parameter must be switched off for **automation applications**.

5.6.2.2.3 START - Application note

Tab: **Method** ▶ **START** ▶ **Properties...** ▶ **START 'Command name'** ▶ **Application note**

Command name

Name of the command.

Input	25 characters

The application note defined in the text window is displayed in the tab **Application note** in the subwindow **Live display** of the program part **Workplace**. The tab is opened automatically when the method is loaded.



Tab: **Method** ▶ **START** ▶ **Properties...** ▶ **START 'Command name'** ▶ **Method variable**

Name of the command.

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.

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).

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*).

Deletes the method variable selected in the table.

Dialog window: **Method ▶ START ▶ Properties... ▶ START 'Command name' ▶ Method variable ▶ [Properties] ▶ Method variable - 'Name'**

Freely selectable name of the method variable which must be unique within the method.

Is displayed only for method variables of the types **Number** or **Date/Time**.

Selection	Stop determination Stop determination and series
Default value	Stop determination

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

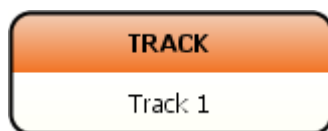
5.6.2.3 TRACK

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 never been started
.FIN	Command status; 1 = Command has ended at least once , 0, invalid (variable not available) = Command has never 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 never been started
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended

5.6.2.6 EXIT

Dialog window: **Method** ► **EXIT** ► **Properties...** ► **EXIT 'Command name'**

Start command for exit track.

Appearance

The command has the following appearance:



Parameters

Command name

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Command variables

The following command variables are generated in the method run by the command **EXIT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended

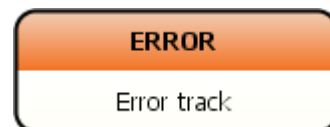
5.6.2.7 ERROR

Dialog window: **Method** ► **ERROR** ► **Properties..** ► **ERROR 'Command name'**

Start command for error track.

Appearance

The command has the following appearance:



Parameters

Command name

Name of the command.

Input	25 characters

Live display

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

If this option is enabled, then the track will be shown in the live display.

Command variables

The following command variables are generated in the method run by the command **START** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended

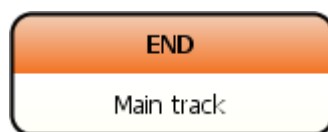
5.6.2.8 END

Dialog window: **Method ► END ► END -'Command name'**

End command for all tracks.

Appearance

The command has the following appearance:



Parameters

The **END** command does not have any parameters. It is created automatically at the end of a track when a new track is inserted.

Command variables

No command variables are generated in the method run by the **END** command.

5.6.3 Titration commands

5.6.3.1 Titration commands - Overview

Menu item: **Method ► Insert ► New command...**

Commands for titrations.

Modes

The following titration commands can be selected:

- *DET*
Command for Dynamic Equivalence Point Titrations.



- *MET*
Command for Monotonic Equivalence Point Titrations.
- *(see Chapter 5.6.3.4.1, page 639)*
Command for Set Endpoint Titrations.
- *KFT*
Command for volumetric Karl Fischer Titrations.
- *KFC*
Command for coulometric Karl Fischer Titrations with voltametric measurement.
- *BRC*
Command for coulometric titration for determining the bromine consumption.
- *STAT*
Command for STAT Titrations.

5.6.3.2 DET

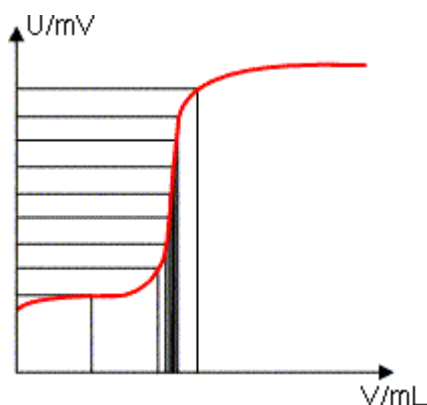
5.6.3.2.1 DET - Overview

Menu item: **Method ▶ Paste ▶ New command...**

Command for **Dynamic Equivalence Point Titrations.**

Principle

With this command titrations with dynamic incremental reagent addition are carried out. The volume increments vary as a function of the slope of the curve. An attempt is made to achieve constant measured value modifications with each dosing. The optimal volume for dosing is determined from the measured value modifications of the previous dosings. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting time.

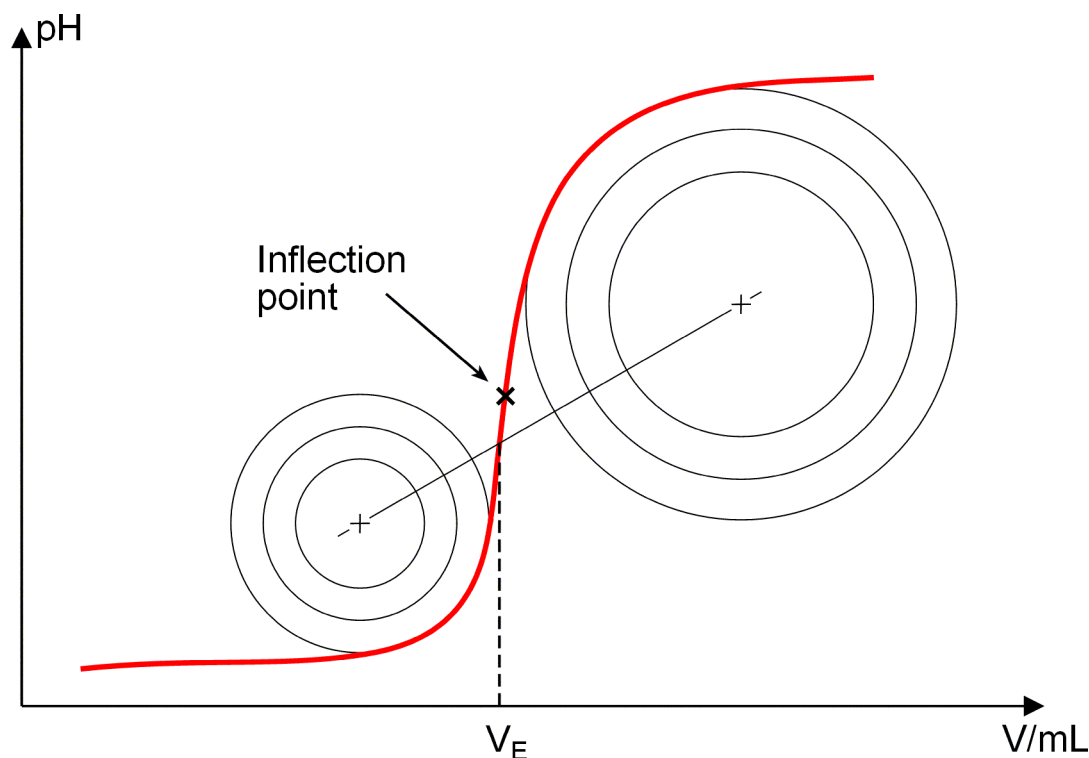


Note

As the reagent addition in **DET** depends on the measuring data, the titration curve should not vary too much from an S-shaped curve.

Evaluation

Equivalence points **EP** are determined 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:

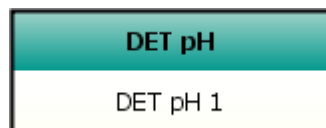
Titrand: 808, 809, 835, 836, 857, 888, 904, 905, 906, 907

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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.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

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
.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

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

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.

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.

5.6.3.2.2.3 DET pH - Start conditions

Tab: **Method ▶ DET pH ▶ Properties... ▶ Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for 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 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 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 ... 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.

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	10.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or

if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

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

Titrand

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.2.2.6 DET pH - Potentiometric evaluationTab: **Method** ▶ **DET pH** ▶ **Properties...** ▶ **Potentiometric evaluations****Command name**

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following evaluation methods can be chosen:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (pH) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (pH)

With this option set up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **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 (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 fixed endpoint (see *Chapter 5.6.3.2.2.11*, page 455).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.2.2.11, page 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 5.6.3.9.1, page 853).

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 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 5.6.3.9.4, page 856).

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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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.

Titrande, 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.

Titrande, 855

Range	0 ... 200
Default value	5

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.

5.6.3.2.2.11**DET pH - Fix endpoint evaluation**

Dialog window: **Method ▶ DET pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-20.000 ... 20.000 pH

- *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 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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.ERC	ERC for the endpoint 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

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 °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.ERC	ERC for the fixed endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in °C
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed 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
.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 on 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...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.

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

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.

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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

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	10.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or

if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

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

5.6.3.2.3.5 DET U - Stop conditions

Tab: **Method** ▶ **DET U** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

<i>Titrand, 855</i>	
Range	0.00000 ... 9999.99 mL
Default value	100,000 mL
Selection	off

<i>Titrimo</i>	
Range	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

<i>Titrand, 855</i>	
Range	-2000.0 ... 2000.0 mV
Selection	off
Default value	off

<i>Titrimo</i>	
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.

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

5.6.3.2.3.6 DET U - Potentiometric evaluationTab: **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:

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 (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 fixed endpoint (see *Chapter 5.6.3.2.3.11*, page 481).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.2.3.11, page 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 5.6.3.9.1, page 853).

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 5.6.3.9.4, page 856).

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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.10.2, page 858).

[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.

DET U - Fix endpoint evaluation

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	0.00000 ... 9999.99 mL

5.6.3.2.4 DET Ipol

5.6.3.2.4.1 DET Ipol - Overview

Dialog window: **Method ▶ DET Ipol ▶ Properties... ▶ DET Ipol - 'Command name'**

Command for **Dynamic Equivalence Point Titrations** with voltametric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

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 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 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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.ERC	ERC for the fixed endpoint x (1...9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached
.HP{x}.MEA	Measured value for the HNP x (1...9) in mV (HNP = half neutralization potential)
.HP{x}.TEM	Temperature for the HNP x (1...9) in °C
.HP{x}.TIM	Time in s until the HNP x (1...9) is reached
.HP{x}.VOL	Volume for the HNP x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on 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

Identification	Description
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal, 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL

Identification	Description
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.4.2 DET Ipol - General/Hardware

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

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

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: 0.5)
Default value	5.0 μA

Titrino

Range	-127 ... 127 μA (Increment: 1)
Default value	5 μA

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

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. 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.

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

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	-2000.0 ... 2000.0 mV
Selection	off
Default value	off



Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Start slope



Note

Is displayed only for Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 999 mV/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached.
The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.4.4 DET Ipol - Titration parameters

Tab: **Method** ▶ **DET Ipol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measuring point density

A small value means small volume increments, i.e. a high measuring point density. The curve then shows all the finest details which also include noise; this could cause unwanted equivalence points to be found. A larger value, i.e. a smaller measuring point density, permits quicker titrations. If you are using a dosing device with a small cylinder volume then a smaller measuring point density value may be beneficial. However, you should also set a smaller measured value drift and a higher EP criterion at the same time.

Range	1 ... 9
Default value	2 (slow), 4 (optimal), 6 (fast)

Min. increment

This smallest permitted volume increment is added at the start of the titration and with steep curves in the region of the equivalence point. Very small values should only be used if a low titrant consumption is expected; otherwise unwanted equivalence points could be evaluated.

Range	0.1 ... 999.9 µL
Default value	10.0 (slow), 10.0 (optimal), 30.0 (fast) µL

Max. increment

A maximum volume increment should be selected when the titrant consumption up to the equivalence point is expected to be very small, a start volume is to be added until just before the equivalence point is reached or if the change of direction in the potential jump region is very abrupt, as otherwise it is easy to add too large a volume in the equivalence point region. The value should not be less than 1/100 cylinder volume.

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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

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.

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

5.6.3.2.4.6 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 fixed endpoint (*see Chapter 5.6.3.2.4.11, page 508*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (*see Chapter 5.6.3.2.4.11, page 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

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 5.6.3.9.4, page 856*).

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

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 5.6.3.10.1, page 857*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

Deletes the calculated measured value selected in the table.

Additional external measured values

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**'-

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered.

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

Deletes the external measured value selected in the table.

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.

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 for the volume window.

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit for the volume window.

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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Volume
Default value	Measured value		

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.2.5 DET Upol**5.6.3.2.5.1 DET Upol - Overview**

Dialog window: **Method ▶ DET Upol ▶ Properties... ▶ DET Upol - 'Command name'**

Command for **Dynamic Equivalence Point Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices.

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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.ERC	ERC for the endpoint 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.ERC	ERC for the fixed endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in °C
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed 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
.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 on the measuring point list
.LP.ERC	ERC 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 unit of the measured value of the measuring point list

.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal;0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVM	Start volume measured value (volume which was added according to the start measured value given in the start conditions) in mL
.SVS	Start volume slope (volume that was added according to the start condition "start slope") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.2.5.2 DET Upol - General/Hardware

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

<i>Titrando</i>				
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, 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

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.

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 Titrando and 855.

Start slope

When the start slope is reached the dosing of the start volume is stopped and the titration is started. If the start slope is achieved by the dosing of a start volume then the titration starts directly.

Range	0 ... 99 µA/mL
Selection	off
Default value	off

Dosing rate

Speed at which the start volume is added until the start slope is reached. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used.

Range	0.01 ... 166.00 mL/min
Default value	5.00 mL/min
Selection	maximum

Pause

Pause

Waiting time, e.g. for the electrode to settle down after the start or a reaction time after the addition of the start volume. The pause follows at the end of all the start conditions.

Range	0 ... 999999 s
Default value	0 s

5.6.3.2.5.4 DET Upol - Titration parameters

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for the **Measured value acceptance** and **Dosing of increments** of these sets are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical rapid titrations.

User

Editing the individual titration parameters which affect the titration rate.

Measured value acceptance



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Measured value drift

Drift for the measured value acceptance during the titration.

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.

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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Range	-200.0 ... 200.0 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.

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

Titrimo

Range	0.01 ... 150.00 mL/min

Selection	maximum
Default value	maximum

5.6.3.2.5.6 DET Upol - Potentiometric evaluation

Tab: **Method** ▶ **DET Upol** ▶ **Properties...** ▶ **Potentiometric evaluation**

Command name

Name of the command.

Input	25 characters

Parameters for the potentiometric evaluation of the titration curve with automatic equivalence point recognition. One of the following three evaluation methods can be chosen here:

Potentiometric evaluation

Selection	Evaluation without window Evaluation with measured value window (Upol) Evaluation with volume window (mL)
Default value	Evaluation without window

Evaluation without window

With this option set, the two parameters **EP criterion** and **EP recognition** will be applied across the entire range of the titration curve.

Evaluation with measured value window (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **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 fixed endpoint (*see Chapter 5.6.3.2.5.11, page 534*).

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

Value for the upper limit of the Gran evaluation range.

5.6.3.2.5.8 DET Upol - Additional measured values

Command name

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**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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

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.

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 for the volume window.

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Upper limit for the volume window.

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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Volume
Default value	Measured value		

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 μA

Time

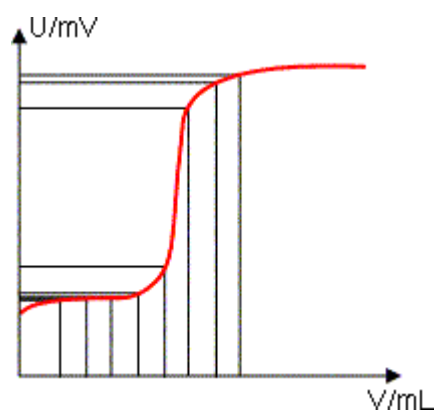
Range 0.0 ... 999999.9 s

Volume

Range 0.00000 ... 9999.99 mL

5.6.3.3 MET**5.6.3.3.1 MET - Overview**Menu item: **Method ▶ Paste ▶ New command...**Command for **Monotonic Equivalence Point Titrations**.**Principle**

With this command titrations with reagent addition at constant volume increments are carried out. Measured value acceptance is drift-controlled (equilibrium titration) or after a waiting time.

**Note**

This command is suited for titrations with relatively high signal fluctuations or suddenly occurring potential jumps and for slow titrations or slowly responding electrodes.

Evaluation

The equivalence points (EPs) are localized by a procedure based on the Fortuin method which has been adapted by Metrohm for numerical methods. A search is made for the largest measured value modification (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 modifications before and after the jump:

$$|\Delta_{n-2}|+|\Delta_{n-1}|+|\Delta_n|+|\Delta_{n+1}|+|\Delta_{n+2}|$$

(In certain cases, only three or only one summand is taken into account.) EPs whose ERC is smaller than the set EP criterion will not be recognized.

Commands

Depending on the measured value one of the following four **MET** commands can be selected:

- *MET pH*
Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *MET U*
Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *MET 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

Titrimo: 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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s

Identification	Description
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.DME	Measured value differential for the fixed endpoint x (1...9)
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL
.GP.VOL	Volume for the Gran endpoint in mL
.GP.MEA	Measured value for the Gran endpoint in the unit of the measured value
.GP.TEM	Temperature for the Gran endpoint in °C
.GP.TIM	Time in s until the Gran endpoint is reached

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 on 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.

not defined

Device type

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.

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.

855

Titrimo

736, 751, 799

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.

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.

5.6.3.3.2.3 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

<i>Titrimo</i>	
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.

<i>Titrand, 855</i>	
Range	0.00000 ... 9999.99 mL
Default value	100,000 mL
Selection	off

<i>Titrimo</i>	
Range	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value pH

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

<i>Titrande, 855</i>	
Range	-20.000 ... 20.000
Selection	off
Default value	off

<i>Titrimo</i>	
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 fixed endpoint (see Chapter 5.6.3.3.2.11, page 561).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.3.2.11, page 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 5.6.3.9.1, page 853).

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 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 5.6.3.9.4, page 856).

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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range **-20.000 ... 20.000 pH**

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.3.3 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

Titrino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MET U** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.

- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.DME	Measured value differential for the break point 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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.DME	Measured value differential for the endpoint 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.DME	Measured value differential for the fixed endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed 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 on 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

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

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.

5.6.3.3.3 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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

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 fixed endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see *Chapter 5.6.3.3.3.11, page 587*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.3.3.11, page 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 5.6.3.9.1, page 853).

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 5.6.3.9.4, page 856).

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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.10.2, page 858).

[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 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.

5.6.3.3.3.10

MET U - Volume window

Dialog window: **Method ▶ MET U ▶ Properties... ▶ Potentiometric evaluation ▶ Evaluation with measured value window ▶ [New]/[Properties] ▶ Volume window #**

Volume windows are defined sub-regions (windows) on the volume axis for which different parameters for the potentiometric evaluation can be defined. Only those endpoints which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one endpoint will be recognized per window.

Lower limit

Lower limit for the volume window.

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.

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.

5.6.3.3.3.11**MET U - Fix endpoint evaluation**

Dialog window: **Method ▶ MET U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00000 ... 9999.99 mL

5.6.3.3.4 MET Ipol

5.6.3.3.4.1 MET Ipol - Overview

Dialog window: **Method** ▶ **MET Ipol** ▶ **Properties...** ▶ **MET Ipol - 'Command name'**

Command for **Monotonic Equivalence Point Titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices.

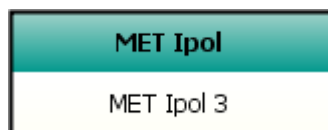
Titrand: 808, 809, 835, 836, 852, 857, 888, 904, 905, 906, 907

Titirino: 702, 716, 721, 736, 751, 785, 794, 798, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MET Ipol** are configured in the following 7 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Potentiometric evaluation*
Parameters for the potentiometric evaluation of titration curves.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MET Ipol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.DME	Measured value differential for the break point 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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint 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
.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
.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: 0.5)
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.

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 evaluationTab: **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 **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 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 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

Range	0 ... 999999 s
Default value	999999 s

This evaluation method is possible only with Titrando and 855.

If this option is enabled, then titration curves will be evaluated in accordance with the Gran Plot procedure(see *Chapter 5.6.3.9.4, page 856*).

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

Value for the lower limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Value for the upper limit of the Gran evaluation range.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Tab: **Method** ▶ **MET 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:

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

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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

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 never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.DME	Measured value differential for the endpoint 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 ended at least once , 0, invalid (variable not available) = Command has never ended

Identification	Description
.FP{x}.DME	Measured value differential for the fixed endpoint $\times (1 \dots 9)$
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed 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 $^{\circ}\text{C}$
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point on the measuring point list
.LP.DME	Measured value differential for the last measuring point on the measuring point list
.LP.EXx	External value $\times (1 \dots 3)$ 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 $^{\circ}\text{C}$

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

5.6.3.3.5.2 MET Upol - General/Hardware

Tab: Method ▶ MET Upol ▶ Properties... ▶ General/Hardware

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined
In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

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.

Titrandu, 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

Titrino

Range	0.1 ... 9999 s
Default value	38.0 (slow), 26.0 (optimal), 21.0 (fast) s

Dosing of increments



Note

The following parameters will be displayed only if the **User** option is selected in the **Titration rate** list box.

Volume increment

Small volume increments are used for the determination of blank values or for very asymmetrical curves. A good guideline is $1/20$ of the expected EP volume. For steep jumps the volume increment should tend toward $1/100$ and for flat jumps toward $1/10$ of the EP volume. Small volume increments are used for determining blank values or with very asymmetrical curves. The accuracy of the evaluation cannot be increased by using smaller increments as the measured value alterations between two measuring points are then of the same order of magnitude as the noise.

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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop measured value

Stops when the preset value for a measuring point has been exceeded or not achieved since the start of the titration.

Range	-200.0 ... 200.0 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.

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 Upol** ▶ **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 (Upol) 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 (Upol)

With this option set, up to 9 regions (windows) can be defined on the measured value axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Per window only one EP will be recognized. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation with volume window (mL)

This option is visible only for **Titrando** and **855**.. With this option up to 9 regions (windows) can be defined on the volume axis. Only those equivalence points which lie within these windows and additionally meet the parameters defined for each window will be recognized. Only one EP will be recognized per window. The defined windows with their parameters are shown in the window table and can be edited with the following buttons:

Evaluation without window

EP criterion

Criterion for the recognition of equivalence points which is valid for all windows. Equivalence points whose ERC is smaller than the set EP criterion will not be recognized.

Range	0.1 ... 99.9 μA
Default value	2.0 μA

EP recognition

Filter for the recognition of equivalence points:

Titrino

Selection	all greatest last off
Default value	all

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 fixed endpoint (see *Chapter 5.6.3.3.5.11*, page 639).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.3.5.11, page 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 5.6.3.9.4, page 856).

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.

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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 µA

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.4 SET**5.6.3.4.1 SET - Overview**

Menu item: **Method ▶ Paste ▶ New command...**

Command **set endpoint titrations..**

Principle

With this command titrations to one or two preset endpoints are carried out. The termination of the titration at the endpoint is either drift-controlled

or after a waiting period. The volume that has been added when the end-point is reached gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**

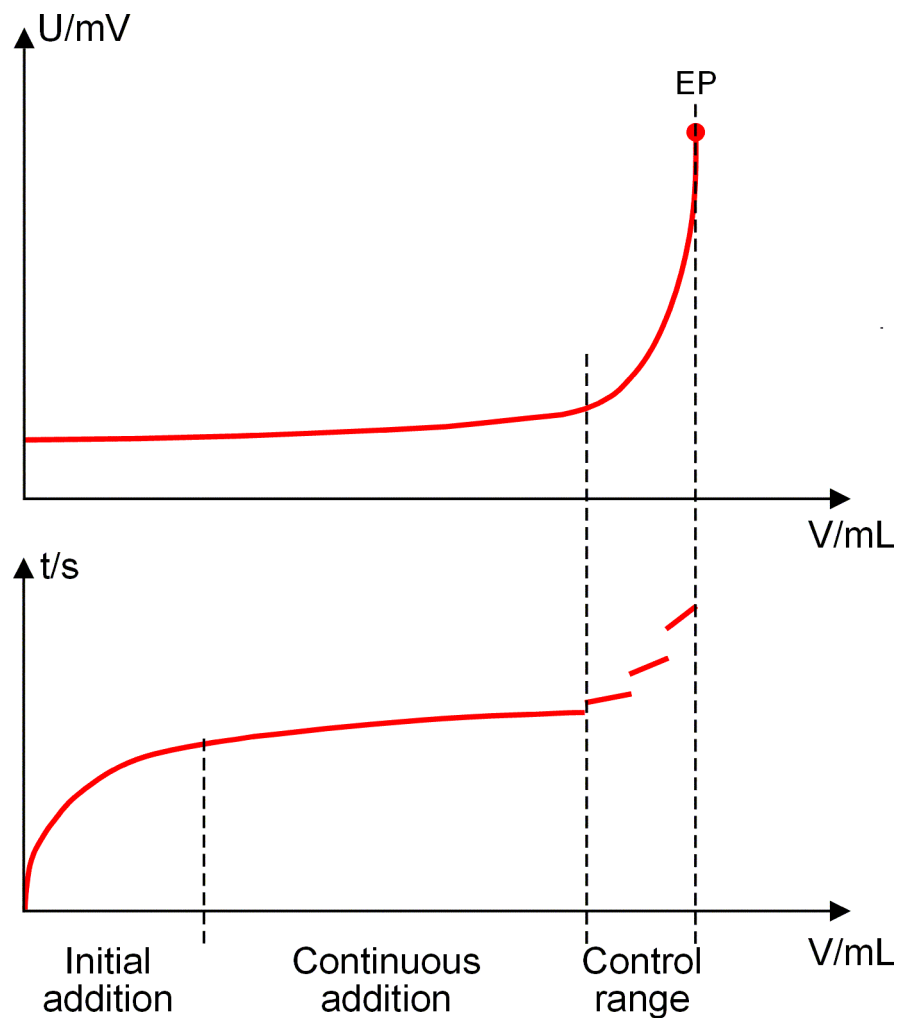
During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.

- **Continuous dosing**

In this phase addition is carried out at the **Max. rate** until the **Control range** is reached.

- **Dynamics**

Dosing is finely controlled in this range. Shortly before the endpoint is reached addition is only carried out at the **Min. rate** (*Control range*).





Note

This command is used for rapid routine determinations when the endpoint does not change throughout a series or when an excess of reagent must be avoided.

Commands

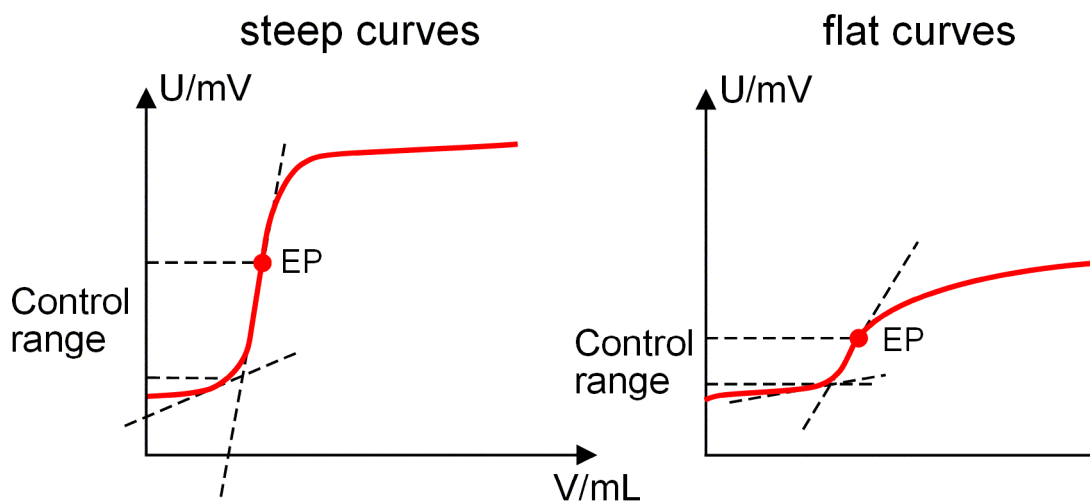
Depending on the measured value one of the following four **SET** commands can be selected:

- *SET pH*
Potentiometric pH measurement with pH electrodes (measured quantity pH).
- *SET U*
Potentiometric voltage measurement with metal electrodes (measured quantity voltage U).
- *SET Upol*
Amperometric measurement with selectable polarization voltage (measured value current I).
- *SET Ipol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).

5.6.3.4.2 SET - Control range

Menu item: **Method ▶ SET ▶ Properties... ▶ Control parameters**

Set a large control range for steep curves and a small control range for flat ones. A good approximation for the start of the control range is given by the point where the tangents intersect.



- *Additional measured values*

Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.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	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.EP{x}.MEA	Measured value for the endpoint x (1...9) in the unit of the measured value
.EP{x}.MEP	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 $^{\circ}\text{C}$
.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
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SLO	Electrode slope of the sensor used for the command (in %)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal, 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.3.2 SET pH - General/Hardware

Tab: Method ► SET pH ► Properties... ► General/Hardware

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

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.

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.

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 Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.3.3 SET pH - Start conditions

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured 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.

Titrandos, 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.

Titrandu, 855

Range	0.00000 ... 9999.99 mL
Default value	0.00000 mL

Titirino

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

5.6.3.4.3.4 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 **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.



Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Dynamics pH

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 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

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

Titrimo

Range	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

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

5.6.3.4.3.7 SET pH - Conditioning

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

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

Enable/Disable the conditioning. If the conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

Titrande, 855

Range	1 ... 999 µL/min
Default value	20 µL/min



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see *Chapter 5.6.3.4.3.10*, page 662).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see *Chapter 5.6.3.4.3.10*, page 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

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

SET pH - Additional measured values

Tab: **Method** ▶ **SET pH** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).



[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.3.10 SET pH - Fix endpoint evaluation

Dialog window: **Method ▶ SET pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-20.000 ... 20.000 pH

Time	
Range	0.0 ... 9999999.9 s

Volume	
Range	0.00000 ... 9999.99 mL

5.6.3.4.4 SET U

5.6.3.4.4.1 SET U - Overview

Dialog window: **Dialog window ▶ SET U ▶ Properties... ▶ SET U - 'Command name'**

Command for **Set Endpoint Titrations** with potentiometric voltage measurement.

Devices

This command can be executed with the following devices:

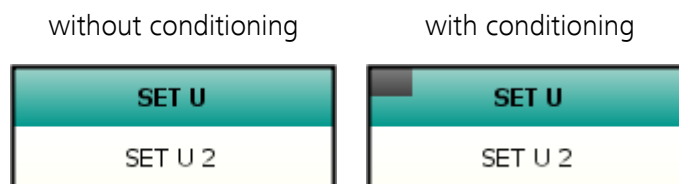
Titrand: 808, 809, 835, 836, 841, 842, 857, 888, 901, 902, 904, 905, 906, 907

Titirino: 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*
Enable/Disable the conditioning. Definition of the start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started

Identification	Description
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.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	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$

Identification	Description
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC)
.LP.EXx	External value 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
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list

Identification	Description
.SLO	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.4.2 SET U - General/Hardware

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined

Default value **not defined**

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

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

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.

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, 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

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 **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow	optimal	fast	User

Default value **optimal**

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 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.

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 **Delay time = inf.**

Titrimo

Range	0 ... 999999 s
Selection	off
Default value	off

Endpoint 2**Note**

Is activated only for **EP1 with ≠ off**.

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

Switching endpoint 2 on/off. If this is deactivated all following parameters are not visible.

EP2 at pH

Measured value for the second endpoint.

Titrimo, 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.

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.

Titrando, 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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

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

Titrino

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.4.4.7 SET U - Conditioning

Tab: **Method** ▶ **SET U** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

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

Enable/Disable the conditioning. If the conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the entered **start drift** entered here. If this is the case, then the status displayed in the **Run** subwindow in the **Workplace** program part changes to **COND READY**.

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** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	off

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 99.9 µL/min
Default value	0.0 µL/min

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

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	1 ... 999999 s
Selection	off
Default value	off

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (*see Chapter 5.6.3.4.4.10, page 683*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (*see Chapter 5.6.3.4.4.10, page 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

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

[Delete]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

Deletes the external measured value selected in the table.

5.6.3.4.4.10

Dialog window: **Method ▶ SET U ▶ Properties... ▶ Additional evaluations ▶ Fix end-point evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	-2000.0 ... 2000.0 mV
<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00000 ... 9999.99 mL

5.6.3.4.5

5.6.3.4.5.1

Dialog window: **Method ▶ SET Ipol ▶ Properties... ▶ SET Ipol - 'Command name'**

Command for **Set Endpoint Titrations** with voltametric measurement (selectable polarization current).

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 852, 857, 888, 901, 902, 904, 905, 906, 907

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

Robotic Titrosampler: 855

Identification	Description
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.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	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed endpoint $\times (1 \dots 9)$ in mL

Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in $\mu\text{g}/\text{min}$ (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 measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value

Identification	Description
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.4.5.2 SET Ipol - General/Hardware

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrand
Default value	Titrand

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.

Titrande, 855

Range	-125.0 ... 125.0 μA (Increment: 0.5)
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.

Titrande, 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 Titrandos and 855.

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command. This parameter is displayed only for 751, 758, 785, 798 and 799.

5.6.3.4.5.3 SET Ipol - Start conditions

Tab: **Method** ▶ **SET Ipol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured 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

Start volume

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

Pause 2

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 **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 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

Titrino

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), 10.00 (optimal), 150.00 (fast) mL/min

Min. rate

Rate at which dosing is carried out at the very beginning of the titration and in the **control range** at the end of the titration. The smaller the selected minimum rate, the slower the titration.

Range	0.01 ... 9999.00 µL/min
Default value	5.00 (slow), 25.00 (optimal), 50.00 (fast) µL/min

Stop criterion

Stop criterion

The titration 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 **Delay time = inf**.

Titrimo

Range	0 ... 999999 s
Selection	off
Default value	off

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

Titrimo

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.

Titrandu, 855

Range	0.1 ... 999999 s
Default value	2.0 s

Titrimo

Range	0.08 ... 16200 s
Default value	2.00 s

5.6.3.4.5.6 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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

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



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see *Chapter 5.6.3.4.5.10*, page 704).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.4.5.10, page 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

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

Tab: **Method** ▶ **SET Ipol** ▶ **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:

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 #**(see Chapter 5.6.3.10.1, page 857) 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 5.6.3.10.1, page 857*).

Deletes the calculated measured value selected in the table.

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**'-

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.5.10 SET Ipol - Fix endpoint evaluation

Dialog window: **Method ▶ SET Ipol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-2000.0 ... 2000.0 mV

Time	
Range	0.0 ... 9999999.9 s

Volume	
Range	0.00000 ... 9999.99 mL

5.6.3.4.6 SET Upol

5.6.3.4.6.1 SET Upol - Overview

Dialog window: **Method ▶ SET Upol ▶ Properties... ▶ SET Upol - 'Command name'**

Command for **Set Endpoint Titrations** with amperometric measurement (selectable polarization voltage).

Devices

This command can be executed with the following devices:

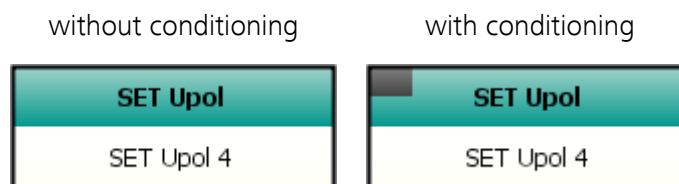
Titrand: 808, 809, 835, 836, 841, 842, 852, 857, 888, 901, 902, 904, 905, 906, 907

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

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SET Upol** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Control parameters for endpoint 1 and endpoint 2 (measured values for the endpoints, titration rate, user defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Conditioning*
Enable/Disable the conditioning. Definition of the start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **SET Upol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.CBY	Command status; 1 = Conditioning activated , 0 = Conditioning deactivated

Identification	Description
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in $\mu\text{L}/\text{min}$
.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	End measured value (measured value after processing of the command) in the unit of the measured value
.EP{x}.MEA	Measured value for the endpoint $\times (1 \dots 9)$ 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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed endpoint $\times (1 \dots 9)$ in mL

Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in $\mu\text{g}/\text{min}$ (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 measuring point list in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list

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, 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.

Titrandu, 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.

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.

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

5.6.3.4.6.4 SET Upol - Control parameters

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

The control parameters can be set for each endpoint separately.

Endpoint 1

EP1 with

Measured value for the first endpoint.

Range	-200.0 ... 200.0 µA
Selection	off
Default value	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Control range

Dynamics defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and therefore on the accuracy. In the control range, dosing is controlled by the **Min. rate**. The closer the endpoint, the slower the dosing until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place with **Max. rate** (see Chapter 5.6.3.4.2, page 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.

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 **Delay time = inf.**

Titrimo

Range	0 ... 999999 s
Selection	off
Default value	off

Endpoint 2**Note**

Is activated only for **EP1 with ≠ off**.

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

Check box for switching endpoint 2 on/off. If this is deactivated, then the associated parameters will not be displayed.

EP2 with

Measured value for the second endpoint.

Range	-200.0 ... 200.0 µA
Selection	off
Default value	off

For additional parameters for **Endpoint 2**, see **Endpoint 1**.

5.6.3.4.6.5 SET Upol - Titration parameters

Tab: **Method** ▶ **SET Upol** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

—

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). For example, it makes sense to enter an extraction time for the titration of samples that are not easily soluble.

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.

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	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time (including start conditions) has elapsed since the start of the titration.

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** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	off

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 99.9 µL/min
Default value	0.0 µL/min

Stop volume

Stops when the given volume has been added after the start of the titration. The stop volume should be adapted to the size of the titration cell in order to prevent any overflow.

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	1 ... 999999 s
Selection	off
Default value	off

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s



Only start titration by a start command from a SEND command

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

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

If this option is enabled, then the measured value will be shown in the 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 fixed endpoint (see Chapter 5.6.3.4.6.10, page 725).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.4.6.10, page 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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (see Chapter 5.6.3.10.2, page 858).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.4.6.10 SET Upol - Fix endpoint evaluation

Dialog window: **Method ▶ SET Upol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 µA

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.5 KFT**5.6.3.5.1 KFT - Overview**

Menu item: **Method ▶ Paste ▶ New command...**

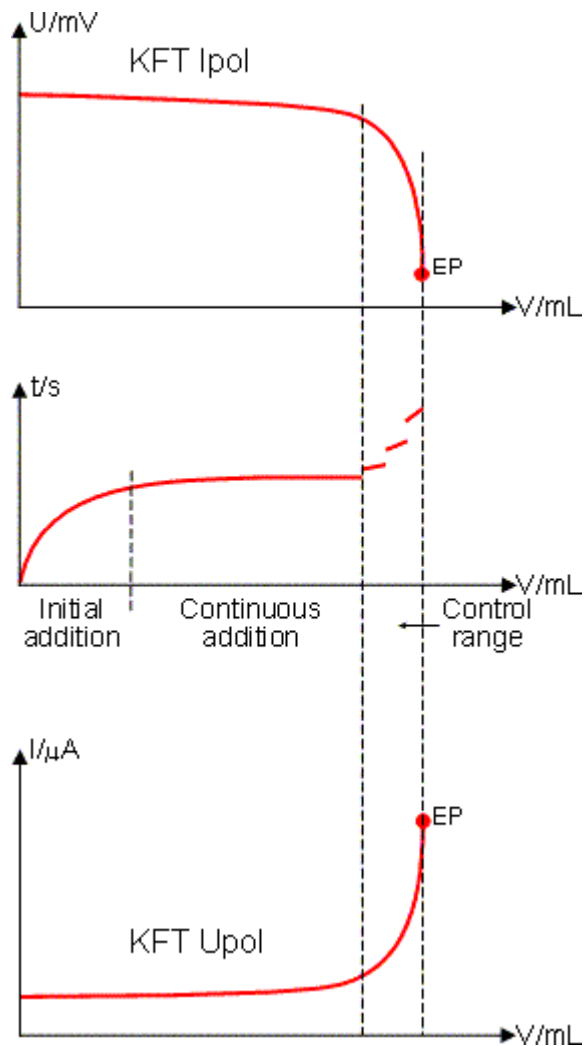
Command for volumetric **Karl Fischer Titrations**.

Principle

With this command, volumetric titrations for determining the water content by the Karl Fischer method with automatic conditioning are carried out. A typical feature of the Karl Fischer titration is the controlled reagent addition, which depends on the control difference (current measured value – endpoint), with the aim of reaching the measured value given as being the predefined target endpoint as quickly and accurately as possible. Overtitrating is avoided to a great extent. The titration termination at the endpoint takes place either drift-controlled or after a waiting period. The volume added up to the endpoint gives the calculable reagent consumption.

Reagent addition takes place in three phases during the titration:

- **Initial dosing**
During this phase the dosing rate increases continuously. It starts with the **Min. rate** and increases to the **Max. rate**.
- **Continuous dosing**
In this phase, addition is carried out at the **Max. rate** until the **Control range** is reached.
- **Dynamics**
Dosing is finely controlled in this range. Shortly before the endpoint is reached. addition is carried out only at the **Min. rate**.



Commands

Depending on the measured value, one of the following two **KFT** commands can be chosen:

- *KFT Ipol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).

- *KFT Upol*

Amperometric measurement with selectable polarization voltage (measured value current I).

5.6.3.5.2 KFT Ipol

5.6.3.5.2.1 KFT Ipol - Overview

Dialog window: **Method** ► **KFT Ipol** ► **Properties...** ► **KFT Ipol - 'Command name'**

Command for **Karl Fischer Titrations** with voltametric measurement (selectable polarization current).

Devices

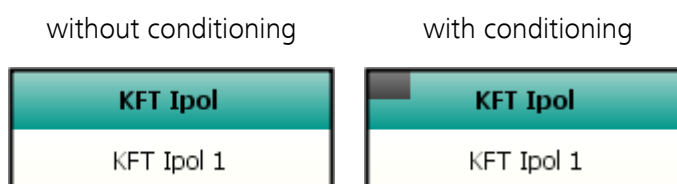
This command can be executed with the following devices.

Titrand: 835, 836, 841, 852, 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*
Enable/Disable the conditioning. Definition of the start drift, drift correction and stop conditions.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.

- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **KFT Ipol** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DSC	Time for processing all start conditions s
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Quantity of endpoints 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP.TEM	Temperature for the endpoint in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.VOL	Volume for the endpoint in mL
.ETE	End temperature (temperature following processing of the command) in °C

Identification	Description
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on 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.

5.6.3.5.2.3 KFT Ipol - Start conditions

Tab: **Method** ▶ **KFT Ipol** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrandos.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	1 s

Pause 1**Pause 1**

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

Start volume**Start volume**

Volume to be dosed with the indicated dosing rate before the start of the titration .

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.

Dynamics

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. In the control range, dosing is controlled by the **Minimum rate**. The closer the endpoint, the slower the dosing until the **Minimum rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Maximum rate**.

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), maximum (optimal), maximum (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), maximum (optimal), maximum (fast) mL/min

Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Range	0.1 ... 9.9 µL/min
Default value	minimum (slow), minimum (optimal), 5.0 (fast) µL/min

Stop criterion

Stop criterion

The titration 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**.

Titrimo

Selection	drift time
Default value	drift

Titrandu

Selection	drift rel. drift off time
Default value	drift

drift

The titration is stopped when the **stop drift** has been reached.

rel. drift

The titration is stopped when the relative stop drift (drift value at time of start + **relative stop drift**) has been reached.

off

The titration will not be stopped.

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different, very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.



Note

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been switched off.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Relative stop drift

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = rel. drift**.

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.

Titrand, 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	0.00000 ... 9999.99 mL
Default value	100,000 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** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	off

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 99.9 µL/min
Default value	0.0 µL/min

Stop volume

Determination stops when the specified volume has been dosed since the start of the conditioning. The stop volume should be adjusted to the size of the titration cell in order to prevent any overflow.

Titrand

Range	0.000000 ... 9999.99 mL
Default value	20,000 mL
Selection	off
Default value	off

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Titrand

Range	1 ... 999999 s
Selection	off
Default value	off

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

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

If this option is enabled, then the measured value will be shown in the 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 fixed endpoint (see *Chapter 5.6.3.5.2.10*, page 747).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.5.2.10, page 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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.5.2.10

Dialog window: **Method ▶ KFT Ipol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	-2000.0 ... 2000.0 mV
<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00000 ... 9999.99 mL

5.6.3.5.3

5.6.3.5.3.1

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.

Titrand: 835, 836, 841, 852, 857, 890, 901, 906, 907

Titrimo: 720, 736, 751, 758, 784, 795, 799

Appearance

The command has the following appearance:

without conditioning

with conditioning



Identification	Description
.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	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.MEA	Measured value for the endpoint in the unit of the measured value
.EP.MEP	Quantity of endpoints 1 = 1 endpoint, 2 = 2 or more endpoints, 3 = EP corrected with Autodrift, 4 = EP corrected with manual drift
.EP.TEM	Temperature for the endpoint in $^{\circ}\text{C}$
.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 ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint $\times$ (1...9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times$ (1...9) in $^{\circ}\text{C}$
.FP{x}.TIM	Time in s until the fixed endpoint $\times$ (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint $\times$ (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 $^{\circ}\text{C}$
.LP.CAx	Calculated value $\times$ (1...3) for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point in the measuring point list

5.6.3.5.3.2 KFT Upol - General/Hardware

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

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 (without 852)

Selection	1 2
Default value	1

852

Selection	2
Default value	2

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

U(pol)

The polarization voltage is the voltage applied to the polarized electrode during an amperometric measurement.

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.

Titrand

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	0.01 ... 99.90 μA/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

Start volume**Start volume**

Volume to be dosed with the indicated dosing rate before the start of the titration .

Titrand

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

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

5.6.3.5.3.4 KFT Upol - Control parameters

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

Endpoint

Ep with

Measured value for the endpoint.

Range	-200.0 ... 200.0 μA
Default value	25.0 μA
Selection	off

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Dynamics

The control range defines the measured value range before the given endpoint. It has a decisive influence on the titration rate and thus also on the accuracy. In the control range, dosing is controlled by the **Minimum rate**. The closer the endpoint, the slower the dosing until the **Minimum rate** has been reached. The larger the control range, the slower the titration. Outside the range the dosing takes place at the **Maximum rate**.

Titrand

Range	0.01 ... 200.0 µA
Default value	40.0 (slow), 10.0 (optimal), 5.0 (fast) µA

Titrim

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), maximum (optimal), maximum (fast) mL/min

Titrimo

Range	0.01 ... 150.00 mL/min
Default value	1.00 (slow), maximum (optimal), maximum (fast) mL/min

Min. volume increment

This parameter determines the volume increment which is added at the start and finish of the titration. The smaller the increment that is selected, the slower the titration and the higher the accuracy.

Range	0.1 ... 9.9 µL
Default value	minimum (slow), minimum (optimal), 5.0 (fast) µL

Stop criterion

Stop criterion

The titration 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**.

Titrino

Selection	drift time
Default value	drift

Titrandu

Selection	drift rel. drift off time
Default value	drift

drift

The titration is stopped when the **stop drift** has been reached.

rel. drift

The titration is stopped when the relative stop drift (drift value at time of start + **relative stop drift**) has been reached.

off

The titration will not be stopped.

time

The endpoint must be exceeded for a certain time: the Delay time. The same Delay time with different, very small volume increments (depending on the volume of the exchange or dosing unit) means different switch-off points.

**Note**

The Stop conditions will always stop the titration even if the stop criterion has not been fulfilled or has been switched off.

Stop drift

Titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Range	1 ... 999 µL/min
Default value	20 µL/min

Relative stop drift

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = rel. drift**.

Titrande

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.

Titrande, 855

Range	0 ... 999 s
Default value	10 s

Titrimo

Range	0 ... 999 s
Default value	10 s
Selection	inf.

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.

Titrande

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

Titrino

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

5.6.3.5.3.7 KFT Upol - Conditioning

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

Conditioning

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

Switching conditioning on/off. If conditioning is deactivated all following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

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** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	off

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 99.9 µL/min
Default value	0.0 µL/min

Stop volume

Determination stops when the specified volume has been dosed since the start of the conditioning. The stop volume should be adjusted to the size of the titration cell in order to prevent any overflow.

Titrand

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

Range	1 ... 999999 s
Selection	off
Default value	off

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND command** is received, otherwise the command to start the titration will be ignored.

Show measured value during conditioning

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

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.5.3.8 KFT Upol - Additional evaluations

Tab: **Method** ▶ **KFT Upol** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional methods for evaluation of titration curves can be activated and defined on this tab:

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 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.5.3.10**KFT Upol - Fix endpoint evaluation**

Dialog window: **Method ▶ KFT Upol ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-200.0 ... 200.0 μA

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.6 KFC

5.6.3.6.1 KFC - Overview

Dialog window: **Method ▶ KFC ▶ Properties.. ▶ KFC - 'Command name'**

Command for coulometric **Karl Fischer Titrations** with voltametric measurement.



Note

The coulometric water determination is mainly used to determine small amounts of water.

Devices

This command can be executed with the following devices.

Coulometer: 756, 831

Titrandos: 851, 852

Appearance

The command has the following appearance:

without conditioning

with conditioning



Parameters

The parameters for the command **KFC** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, indicator and generator electrode and stirrers.
- *Start conditions*
Entry of a waiting period before the start of the titration.
- *Control parameters*
Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Entry of the stop time which causes the titration to stop.
- *Conditioning*
Enable/Disable the conditioning. Definition of start drift, drift correction and drift value.

- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **KFC** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µL/min
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.EP.CHA	Load for endpoint in mA·s
.EP.DVT	Drift for the endpoint in µg/min
.EP.MEA	Measured value for the endpoint in mV
.EP.QTY	Measured value (water) for the endpoint in µg
.EP.TEM	Temperature for the endpoint 1 in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.TIM	Time in s until the endpoint is reached
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.DVT	Drift for the fixed endpoint x (1...9) in µg/min

Identification	Description
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.QTY	Measured value (water) for the fixed endpoint x (1...9) in µg
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.CHA	Load for the last measuring point of the measuring point list in mA s
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC)
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list in V; in case of measurements with 756, 831: 0 = not defined, 1 = <14 V, 2 = 14...28 V, 3 = >28 V
.MTE	Temperature measurement with sensor; 1 = on, 0 = off

Identification	Description
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C

5.6.3.6.2 KFC - General/Hardware

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	'Device types Ttitrando
Default value	Ttitrando

Sensor

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

Polarization current at the indicator electrode.

Selection	2 μA 5 μA 10 μA 20 μA 30 μA
Default value	10 μA



Note

When changing this parameter, make sure that the polarization current of the indicator electrode, the endpoint and the control range are linked closely with one another (*see Chapter 5.6.3.6.4, page 774*).

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

851, 852

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Cell**Generator type**

Selection of the generator type.

Selection	without diaphragm with diaphragm
Default value	without diaphragm

Generator current

Polarization current at the generator electrode.

für Generator type = without diaphragm

Selection	100 mA 200 mA 400 mA auto
Default value	400 mA

auto

Means that the current is automatically adapted to the conductivity of the reagent and that in the region of the endpoint the current will be controlled at smaller values

für Generator type = with diaphragm

Selection	100 mA 200 mA 400 mA auto
Default value	auto

auto

Means that the current is automatically adapted to the conductivity of the reagent and that in the region of the endpoint the current will be controlled at smaller values

**Note**

For generator electrodes of the type **with diaphragm**, it is recommended to set the **Generator current** to **auto**.

For generator electrodes **without diaphragm** it is recommended to set the **Generator current** to **400 mA**.

Stirrer**Stirrer**

Selection of the stirrer.

851, 852

Selection	1 2 3 4 off
Default value	1

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

851, 852

Range	-15 ... 15
Default value	8

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command.

5.6.3.6.3 KFC - Start conditions

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

Pause

Pause

Waiting time before the start of the titration.

Range	0 ... 999999 s
Default value	0 s

5.6.3.6.4 KFC - Control parameters

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

End point

EP at

Measured value for the endpoint.

756, 831

Range	-2000.0 ... 2000.0 mV
Default value	50.0 mV

851, 852

Range	-1250.0 ... 1250.0 mV
Default value	50.0 mV

Titration rate

Titration rate

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast user
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.

optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

user

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.



Dynamics

The control range is entered as distance to the endpoint. Within the control range, iodine will be generated in steps which are controlled by the **minimum rate**. The larger the control range, the slower the titration. Outside the control range, iodine will be generated continuously with **Maximum rate**.

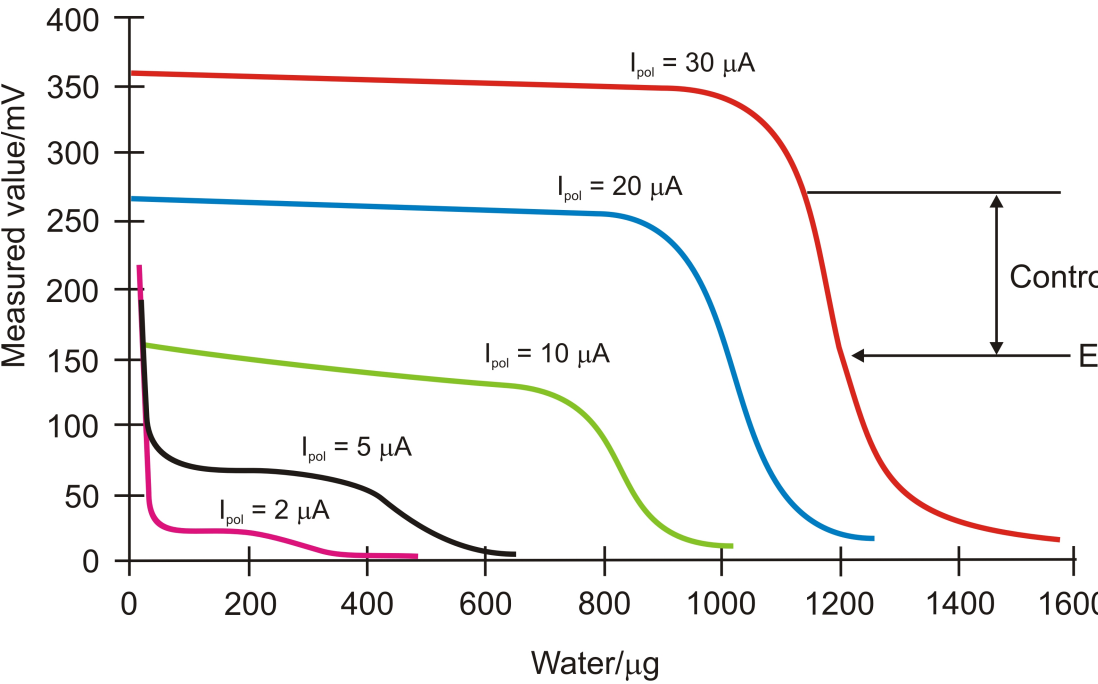
The standard control parameters are optimal for most applications and should not be modified. If you nevertheless need to modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

756, 831

Range	1.0 ... 2000 mV
Default value	120.0 (slow), 70.0 (optimal), 30.0 (fast) mV

851, 852

Range	0.1 ... 1250.0 mV
Default value	120.0 (slow), 70.0 (optimal), 30.0 (fast) mV



The diagram shows KF titration curves at different polarization currents. It is clear to see that the position of the endpoint varies with the polarization current. The curves have different slopes, i.e. dynamics must also be adapted. Polarization currents smaller than 10 μA are not suitable for this application. The following table gives an idea of the optimal control parameters for various polarization currents.

Ipol	10 μ A	20 μ A	30 μ A
EP	50 mV	100 mV	150 mV
Dynamics	70 mV	100 mV	120 mV

Max. rate

Maximum rate with which iodine is generated outside the **Control range**.

Range	1.5 ... 2240.0 μg/min
Default value	1000.0 (slow), maximum (optimal), maximum (fast) μg/min
Selection	maximum

Min. rate

This parameter defines the minimum rate with which iodine is generated inside the **Control range**. The smaller the rate the slower the titration and the higher the accuracy.

756, 831

Range	0.3 ... 999.9 μg/min
Default value	0.3 (slow), 15.0 (optimal), 30.0 (fast) μg/min
Selection	minimum

851, 852

Range	0.3 ... 999.0 μg/min
Default value	0.3 (slow), 15.0 (optimal), 30.0 (fast) μg/min
Selection	minimum

Stop criterion**Stop criterion**

Switches off titration when the endpoint has been reached and the stop criterion has been met.

756, 831

Selection	drift rel. drift
Default value	rel. drift

851, 852

Selection	drift rel. drift time off
Default value	rel. drift

Stop drift

The titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift**.

Time interval for entering a measuring point in the measuring point list.

Range	1 ... 999999 s

851, 852

Range	0.1 ... 999999.0 s

Default value	2.0 s

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Stop conditions**

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab.

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

Range	1 ... 999999 s

Selection **off**

Default value	off

Tab: **Method** ▶ **KFC** ▶ **Properties...** ▶ **Conditioning**

Name of the command.

Input	25 characters

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

Enable/Disable the conditioning. If the conditioning is disabled, the following parameters are not visible.

The determination can only be started when the currently measured drift is less than the **start drift** entered here. In such cases, the **Status** in the

Run subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Range	1 ... 999 µg/min
Default value	20 µg/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	automatic

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 99.9 µg/min
Default value	0.0 µg/min

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Range	1 ... 999999 s
Selection	off
Default value	off

Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Automatic start after sample addition

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

If this option is enabled, the titration starts automatically when the command is in status **COND OK** and the **Threshold value** set is exceeded. In this case the system assumes that the sample has been injected. This parameter is displayed only for 851 and 852.

Threshold value

Value the automatic start after the sample addition is carried out automatically when it is exceeded.

851, 852

Range	0 ... 999 mV
Default value	50 mV

Only start titration by a start command from a SEND command

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND** command is received, otherwise the command to start the titration will be ignored.

If this command is already started (e.g. via **Automatic start after sample addition**), the **SEND** command will not have any effect.

Show measured value during conditioning

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

If this option is enabled, then the measured value will be shown in the 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 **water**) for the fixed endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see *Chapter 5.6.3.6.10*, page 784).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.6.10, page 784).

[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:

Parameters

The parameters for the command **BRC** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, indicator and generator electrode and stirrers.
- *Start conditions*
Entry of a waiting period before the start of the titration.
- *Control parameters*
Control parameters for the endpoint (measured value for the endpoint, titration rate, user-defined parameters, stop criterion).
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Entry of the stop time which causes the titration to stop.
- *Conditioning*
Enable/Disable the conditioning. Definition of start drift, drift correction and drift value.
- *Additional evaluations*
Definition of additional methods for the evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **BRC** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.CBY	Command status; 1 = Conditioning activated, 0 = Conditioning deactivated
.COK	Command status; 1 = Condition requirement fulfilled, 0 = Condition requirement not fulfilled
.DBL	Total duration for the processing of the command in s
.DRI	Current and/or last drift for drift correction in µg/min
.DTI	Time for drift correction (time from the start of the titration to the end of the command) in s

Identification	Description
.EME	End measured value (measured value after processing of the command) in mV
.EP.CHA	Load for endpoint in mA·s
.EP.DVT	Drift for the endpoint in µg/min
.EP.MEA	Measured value for the endpoint in mV
.EP.QTY	Measured value (water) for the endpoint in µg
.EP.TEM	Temperature for the endpoint 1 in °C
.EP.TIM	Time in s until the endpoint is reached
.EP.TIM	Time in s until the endpoint is reached
.EQT	End quantity following processing of the command in µg
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.DVT	Drift for the fixed endpoint x (1...9) in µg/min
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV
.FP{x}.QTY	Amount of bromine for the fixed endpoint x (1...9) in µg
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in mV
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.CHA	Load for the last measuring point of the measuring point list in mA s
.LP.DVT	Drift for the last measuring point of the measuring point list in µg/min
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list

Identification	Description
.LP.IGE	Current pulsed current for the last measuring point in the measuring point list in mA
.LP.MEA	Measured value for the last measuring point in the measuring point list in mV
.LP.QTY	Measured value (water) for the last measuring point in the measuring point list in µg
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.UGE	Voltage at the generator electrode for last measuring point of the measuring point list in V
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.NMP	Number of measuring points in the measuring point list
.SME	Start measured value (measured value after processing the start conditions) in mV
.STE	Start temperature (temperature after processing of the start conditions) in °C

5.6.3.7.2 BRC - General/Hardware

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the electrodes and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.



Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	'Device types' Titrando
Default value	Titrando

Sensor

Sensor

Selection of a sensor of type **Metal electrode** from the sensors configured in the sensor table. The calibration data for the sensor will be adopted for the determination.

Selection	Sensor name Metal electrode
Default value	Metal electrode

I(pol)

Polarization current at the indicator electrode.

Range	-125.0 ... 125.0 μA (Increment: 0.5)
Default value	1.0 μA



Note

When changing this parameter, make sure that the polarization current of the indicator electrode, the endpoint and the control range are linked closely with one another (*see Chapter 5.6.3.7.4, page 791*).

Electrode test

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

If this option is enabled, then an electrode test will be carried out for polarizable electrodes during the transition from an inactive condition to a measurement. A check is also made while doing so to ensure that the electrode is properly connected and that no short-circuit is present.

Temperature measurement

Type of temperature measurement.

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise the temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** on the **Titration parameters** tab will be used.

Cell**Generator type**

Selection of the generator type.

Selection	without diaphragm with diaphragm
Default value	with diaphragm

Generator current

Polarization current at the generator electrode.

Selection	100 mA 200 mA 400 mA auto
Default value	auto

auto

Means that the current is automatically adapted to the conductivity of the reagent and that in the region of the endpoint the current will be controlled at smaller values

Stirrer**Stirrer**

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch on/off automatically

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

If this option is enabled, the stirrer will be switched on automatically at the start of the command and will be switched off automatically at the end of the command.

5.6.3.7.3 BRC - Start conditions

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

Initial measured value



Note

Is displayed only for Titrando and 855.

The initial measured value is determined before the other start conditions are processed. The measured value acceptance depends on the three following parameters:

Measured value drift

The measured value is only accepted if the drift is less than the value entered here.

Range	0.1 ... 999.0 mV/min
Selection	off
Default value	off

off

The measured vales will not be applied until after the maximum waiting time has passed.

Min. waiting time

The minimum waiting period is only important for drift-controlled measurements. The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If signal drift has been switched off or has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed.

Range	0 ... 999999 s
Default value	15 s

Pause**Pause**

Waiting time before the start of the titration.

Range	0 ... 999999 s
Default value	0 s

5.6.3.7.4 BRC - Control parameters

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

Endpoint**Ep with**

Measured value for the endpoint.

Range	-1250.0 ... 1250.0 mV
Default value	200.0 mV

Titration rate**Titration rate**

The three predefined sets of parameters can be selected for the titration rate: **slow**, **optimal** and **fast**; the parameters for **Control** are not displayed. The **User** setting must be selected in order to be able to edit these parameters.

Selection	slow optimal fast User
Default value	optimal

slow

For titrations in which the finest details are also to be visible. This could however also lead to an increase in noise, which could result in unwanted EPs.



optimal

Parameter set for all standard titrations; optimized for the most frequent applications.

fast

For less critical, fast titrations.

User

Editing the individual titration parameters which affect the titration rate.

Control



Note

Will be displayed only if the **User** option is selected in the **Titration rate** list box.

Dynamics

The control range is entered as distance to the endpoint. Within the control range, bromine will be generated in steps which are controlled by the **Minimum rate**. The larger the control range, the slower the titration. Outside the control range, bromine will be generated continuously with **Maximum rate**.

The standard control parameters are optimal for most applications and should not be modified. If you nevertheless need to modify the control parameters for special reagents and/or samples take care that the polarization current of the indicator electrode (**I(pol)**), the endpoint and the control range are linked to each other.

Range	0.1 ... 1250.0 mV
Default value	400.0 mV

Max. rate

Maximum rate with which bromine is generated outside the **Control range**.

Range	10.0 ... 19876.0 µg/min
Default value	500.0 (slow), 1000.0 (optimal), 2000.0 (fast) µg/min
Selection	maximum
Default value	maximum

Min. rate

This parameter defines the minimum rate with which bromine is generated inside the **Control range**. The smaller the rate the slower the titration and the higher the accuracy.

Range	1.0 ... 999.0 µg/min
Default value	15.0 (slow), 25.0 (optimal), 50.0 (fast) µg/min
Selection	minimum

Stop criterion

Stop criterion

Switches off titration when the endpoint has been reached and the stop criterion has been met.

Selection	drift rel. drift time drift & time off
Default value	drift & time

Stop drift

The titration is stopped when the endpoint and the stop drift have been reached. This parameter is only shown for **Stop criterion = drift** or **drift & time**.

Range	1 ... 999 µg/min
Default value	15 µg/min

Relative stop drift

The titration is stopped when the endpoint and the stop drift have been reached. The stop drift is the sum of the drift at the titration start and the relative stop drift defined here. This parameter is only shown for **Stop criterion = rel. drift**.

Range	0 ... 999 µg/min
Default value	5 µg/min

Delay time

If the endpoint has been reached, the delay time defined here is awaited after the last dosing and then the titration is stopped. This parameter is only shown for **Stop criterion = time** or **drift & time**.

Range	0 ... 999 s
Default value	40 s

5.6.3.7.5 BRC - Titration parameters

Tab: **Method ▶ BRC ▶ Properties... ▶ Titration parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the running of the titration are defined on this tab.



Extraction time

The titration is not stopped until the extraction time has elapsed (even when the EP has already been reached). The entry of an extraction time may be advisable, e.g. for the titration of sparingly soluble samples.

Range	0 ... 999999 s
Default value	0 s

Temperature

Manually entered titration temperature.

Range	-20.0 ... 150.0 °C
Default value	25.0 °C

Time interval measuring point

Time interval for entering a measuring point in the measuring point list.

Range	0.1 ... 999999.0 s
Default value	2.0 s

5.6.3.7.6 BRC - Stop conditions

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

The conditions for stopping the titration are defined on this tab.

Stop time

Stops when the preset time has elapsed since the start of the titration. **off** means no stop.

Range	1 ... 999999 s
Selection	off
Default value	off

5.6.3.7.7 BRC - Conditioning

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **Conditioning**

Command name

Name of the command.

Input	25 characters

Conditioning

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

Enable/Disable the conditioning. If the conditioning is disabled, the following parameters are not visible.

Start drift

The determination can only be started when the currently measured drift is less than the **start drift** entered here. In such cases, the **Status** in the **Run** subwindow displayed on the **Single determination** or **Determination series** tab will then switch to **COND READY**.

Range	1 ... 999 µg/min
Default value	20 µg/min

Drift correction

If this parameter is set to **automatic** or **manual** the drift correction (= **Drift value** × **Time for drift correction**) caused by empty consumption during titration is deducted from the total consumption. The **Time for drift correction** is the period between end of conditioning and end of titration.

Selection	automatic manual off
Default value	off

automatic

The drift lastly determined during conditioning will be used as drift value.

manual

The drift value defined under **Drift value** will be used.

off

No drift correction takes place.

Drift value

Drift value for drift correction. This parameter is only shown for **Drift correction = manual**.

Range	0.0 ... 999.9 µg/min
Default value	0.0 µg/min

Stop time

Determination stops when the specified time has elapsed since the start of the conditioning.

Range	1 ... 999999 s
Selection	off
Default value	off



Stabilizing time

Waiting period until the start of the titration during which the condition requirement must be continuously fulfilled.

Range	0 ... 999 s
Default value	0 s

Sample addition time

Waiting time between stop of conditioning and start of titration during which the sample can be added.

Range	0 ... 99 s
Default value	0 s

Only start titration by a start command from a SEND command

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

If this option is activated, then the titration will not be started until the **Event message Start titration** is sent to the command with a **SEND** command.



Note

Conditioning must already be completed (= **Condok**) at the time the **SEND** command is received, otherwise the command to start the titration will be ignored.

If this command is already started (e.g. via **Automatic start after sample addition**), the **SEND** command will not have any effect.

Show measured value during conditioning

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

If this option is enabled, then the measured value will be shown in the sub-window **Live display** of the program part **Workplace**, in addition to the drift and the time.

5.6.3.7.8 BRC - Additional evaluations

Tab: **Method** ▶ **BRC** ▶ **Properties...** ▶ **Additional evaluations**

Command name

Name of the command.

Input	25 characters

The following additional method for evaluation of the titration curves can be activated and defined on this tab:

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is enabled, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**measured value, time** or **bromine**) for the fixed endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see Chapter 5.6.3.7.10, page 798).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.7.10, page 798).

[Delete]

Deletes the selected line.

5.6.3.7.9 BRC - Additional measured values

Tab: **Method ▶ BRC ▶ Properties... ▶ Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.



[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.7.10 BRC - Fix endpoint evaluation

Dialog window: **Method ▶ BRC ▶ Properties... ▶ Additional evaluations ▶ Fix end-point evaluation ▶ [New]/[Property] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value	Time	Bromine
Default value	Measured value		

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Bromine

Range	0.0 ... 999999.9 µg

5.6.3.8 STAT**5.6.3.8.1 STAT - Overview**

Menu item: **Method ▶ Paste ▶ New command...**

Command for **STAT Titrations (STAT)**.

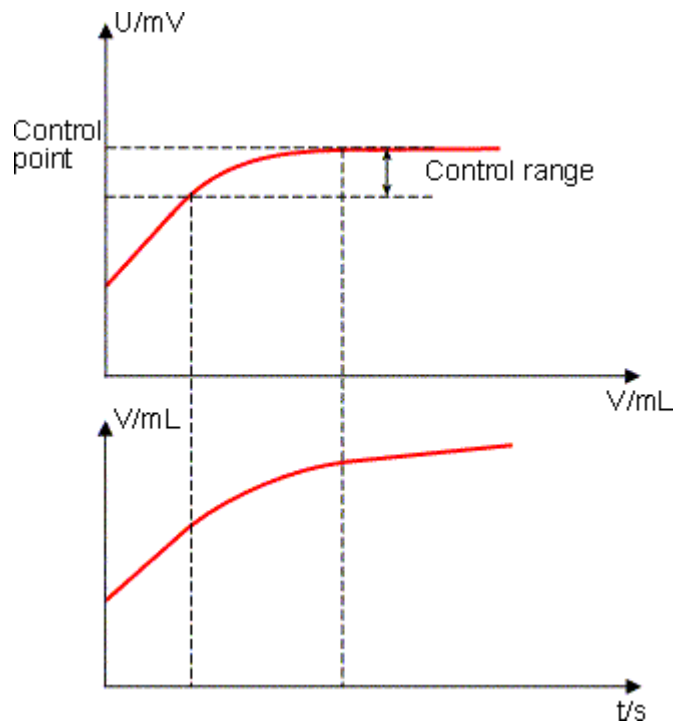
Principle

In **STAT** titrations, reagent is added until a preset measured value (control point) has been reached, which is then maintained at a constant level. The substance released by the reaction is immediately titrated off with the reagent in order to maintain the control point. The STAT titration keeps the control point constant until the preset stop criterion has been reached.

STAT titrations are used, for example, in enzyme analysis where the enzyme activity can be determined from the resulting dosing rate (in mL/min).

Reagent addition takes place in two phases during the titration:

- **Dosing outside the control range**
The dosing is carried out at the **Max. rate** until the **Control range** is reached.
- **Dosing inside the control range**
Dosing is finely controlled in this range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached.



Commands

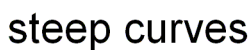
Depending on the measured value, one of the following two **STAT** commands can be chosen:

- *STAT pH*
STAT titration with pH electrodes (measured quantity pH)
- *STAT U*
STAT Titration with metal electrodes (measured quantity U).

5.6.3.8.2 STAT - Control range

Tab: **Method** ▶ **STAT** ▶ **Properties...** ▶ **Control parameters**

Set a large control range for steep curves and a small control range for flat ones. A good approximation for the start of the control range is given by the point where the tangents intersect.



flat curves

Evaluation windows are defined time segments in which the dosing rate is determined by linear regression.

Lower limit of evaluation window.

Upper limit

Upper limit of evaluation window.

5.6.3.8.4 STAT - Track call

Monitoring

Selects the quantity at which a track is to be started when its limit value is exceeded.

Any

tiamo 2.1

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

5.6.3.8.6 STAT pH

5.6.3.8.6.1 STAT pH - Overview

Dialog window: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **STAT pH** - 'Command name'

Command for **STAT titrations** with measured value pH.

Devices

This command can be executed with the following devices:

Titrand: 835, 836, 842, 857, 902, 906, 907

Titrim: 718, 736, 751, 799

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **STAT** are configured in the following 8 tabs:



- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Parameters for the control point.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Monitoring*
Definition of measured value, dosing rate, and temperature monitoring.
- *Evaluations*
Definition of methods for evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **STAT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL

Identification	Description
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint $\times (1 \dots 9)$ in mV
.FP{x}.TEM	Temperature for the fixed endpoint $\times (1 \dots 9)$ in °C
.FP{x}.TIM	Time in s until the fixed endpoint $\times (1 \dots 9)$ is reached
.FP{x}.VOL	Volume for the fixed 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 °C
.LP.CAx	Calculated value $\times (1 \dots 3)$ for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point on 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 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

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.

<i>Titrando</i>				
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 5.6.3.8.5, page 802*). This parameter is displayed only for Titrados 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.

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 run to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked.

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(see Chapter 5.6.3.8.5, page 802).

Titrande, 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.

Titrande

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.

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, 785, 798 and 799.

5.6.3.8.6.3 STAT pH - Start conditions

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Start conditions**

Command name

Name of the command.

Input	25 characters

The start conditions are processed in the listed sequence before the titration is started.

Initial measured value



Note

Is displayed only for Titrando 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.

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

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

Waiting time, e.g. until the electrode has settled down, before a start volume is added.

Range	0 ... 999999 s
Default value	0 s

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

<i>Titrimo</i>	
Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Pause 2

Range	0 ... 999999 s
Default value	0 s

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Control parameters**

Name of the command.

Control point

Definition of the pH value to be controlled.

<i>Titrimo</i>	
Range	-20.00 ... 20.00
Selection	off
Default value	off

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.

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 $\mu\text{L}/\text{min}$
Default value	10.00 (50 $\mu\text{L}/\text{min}$), 20.00 (100 $\mu\text{L}/\text{min}$), 40.00 (500 $\mu\text{L}/\text{min}$) $\mu\text{L}/\text{min}$

**Note**

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. The parameters **Max. rate** and **Dynamics pH** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The control range should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. pH = 3). The nominal value is often set with a SET pretitration before the substrate is added. This means that the STAT titration can be started with a small deviation from the control point. Within the control range, the dosing rate is determined primarily by the **Min. rate**.

5.6.3.8.6.5 STAT pH - Titration parameters

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

- negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

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

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

Titrimo

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.

Titrand, 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

5.6.3.8.6.6 STAT pH - Stop conditions

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Stop conditions**

Command name

Name of the command.

Input	25 characters

Conditions for stopping the titration. If more than one stop condition is in effect at the same time, then the criterion which is fulfilled first will stop the titration.

Stop volume

Stops when the given volume has been added after the start of the titration (including start conditions). The stop volume should be adapted to suit the sample weight or the titration vessel size.

Titrand, 855

Range	0.00000 ... 9999.99 mL
Default value	100,000 mL
Selection	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

5.6.3.8.6.7 STAT pH - Monitoring

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Monitoring**

Command name

Name of the command.

Input	25 characters

The following monitoring processes can be switched on and defined on this tab:

Monitoring Measured value

Monitoring Measured value

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

If this option is switched on then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit pH

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

Titrande, 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.

Titrando, 855

Range	0.000 ... 20,000
Default value	0.020

Upper limit pH

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

Titrandu, 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	0.000 ... 20,000
Default value	0.020

Action

Selection of the event to be triggered if the upper or lower limit is exceeded:

Selection	Stop determination Stop command (only Titrand) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Dosing rate**Monitoring Dosing rate**

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

If this option is activated, then the dosing rate will be monitored and any exceeded limits will be entered in the list of measuring points. This monitoring is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

Titrande, 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.

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 (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 the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

**Note**

If, when monitoring the dosing rate, the **Lower limit** is exceeded then the actions **Wait for [Continue]** and **Wait for limit ok** are irrelevant as the mean dosing rate becomes ever smaller during this time. The valid range can never be reached again.

Monitoring Temperature**Monitoring Temperature**

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

If this option is switched on then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

Titrande, 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

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 (only Titrand) Wait for [Continue] Wait for limit ok none
Default value	none

Stop determination

The running **STAT** command is quit, then the exit track (if present) is started and the determination is stopped.

Stop command (only Titrando)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is exceeded.

[New]

Opens the dialog window **Track call #** in which the parameters for the track call can be entered.



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fixed endpoint (see *Chapter 5.6.3.4.3.10*, page 662).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.3.4.3.10, page 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

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

STAT pH - Additional measured values

Tab: **Method** ▶ **STAT pH** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings:

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.8.6.10 STAT pH - Fix endpoint evaluation

Dialog window: **Method ▶ STAT pH ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

<i>Measured value</i>	
Range	-20.000 ... 20.000 pH
<i>Time</i>	
Range	0.0 ... 999999.9 s
<i>Volume</i>	
Range	0.00000 ... 9999.99 mL

5.6.3.8.7 STAT U

5.6.3.8.7.1 STAT U - Overview

Dialog window: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **STAT U - 'Command name'**

Command for **STAT titrations** with measured value U.

Devices

This command can be executed with the following devices:

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 U** are configured in the following 8 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Start conditions*
Parameters for the measurement of the initial measured value and for defining the conditions which have to be met at the start of the titration.
- *Control parameters*
Parameters for the control point.
- *Titration parameters*
Parameters for the run of the titration.
- *Stop conditions*
Definitions of conditions which cause the stop of the titration.
- *Monitoring*
Definition of measured value, dosing rate, and temperature monitoring.
- *Evaluations*
Definition of methods for evaluation of the titration curves.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **STAT U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.DSC	Time for processing all start conditions s

Identification	Description
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.EVT	End volume (total dosed volume at the end of the command) in mL
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in mV
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.FP{x}.VOL	Volume for the fixed endpoint x (1...9) in mL
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.DVT	dV/dt for the last measuring point on the measuring point list (SET, KFT, STAT, DOS) or drift for the last measuring point on the measuring point list in µg/min (KFC)
.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
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.LP.VOL	Volume for the last measuring point in the measuring point list in mL

Identification	Description
.MA.MEA	Maximum measured value in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MA.VOL	Volume with maximum measured value in mL
.MI.MEA	Minimum measured value in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MI.VOL	Volume for minimum measured value in mL
.MR.MRC	Correlation coefficient for mean dosing rate for the whole range
.MR.MRS	Standard deviation for mean dosing rate for the whole range in mL/min
.MR.MRT	Mean dosing rate for the whole range in mL/min.
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.RE{x}.DRC	Correlation coefficient for mean dosing rate in window 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 mV for ISE sensors)
.SME	Start measured value (measured value after processing the start conditions) in the unit of the measured value
.STE	Start temperature (temperature after processing of the start conditions) in °C
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

Identification	Description
.SVA	Start volume absolute (volume that was added according to the start condition "start volume") in mL
.SVT	Total start volume (volume that was added in dependence on all three start conditions) in mL
.TITER	Titer value of the solution used for the command

5.6.3.8.7.2 STAT U - General/Hardware

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	756 KF Coulometer 831 KC Coulometer
Default value	831 KC Coulometer

Dosing device

Dosing device

Selection of the number of the dosing device (dosing or exchange unit) with which the solution is to be dosed. All the dosing device connections which are possible with the selected device type are displayed.

Titrando

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

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 5.6.3.8.5, page 802*). This parameter is displayed only for Titrandos and 855.

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, **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.

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

5.6.3.8.7.4 STAT U - Control parameters

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Control parameters**

Command name

Name of the command.

Input	25 characters

Control point

Control point at

Definition of the current value to be controlled.

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.

Dynamics

The control range defines the measured value range before the given control point. It has a decisive influence on the titration rate and thus also on the accuracy. The dosing is also monitored by the **Min. rate** within the control range. The nearer the control point, the slower the dosing takes place until the **Min. rate** has been reached. The larger the control range, the slower the titration. Outside the control range, dosing proceeds continuously at the **Max. rate**.

Titrando, 855

Range	0.1 ... 2000.0 mV
Default value	60.0 mV
Selection	off

Titrimo

Range	1.00 ... 2000 mV
Default value	60.0 mV
Selection	off

Max. rate

Rate at which dosing is carried out outside of the **Control range**. The maximum dosing rate depends on the cylinder volume of the exchange unit or dosing unit used. The following rule of thumb should be used as a starting

point for parameterization: **Max. rate** in mL/min = 0.005 • Expected rate of reaction in $\mu\text{L}/\text{min}$.

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	10.00 (50 µL/min), 20.00 (100 µL/min), 40.00 (500 µL/min) µL/min



Note

Outside the control range, the dosing rate is determined mainly by the **Max. rate**. The parameters **Max. rate** and **Control range** should be optimized together in such a way that the titration does not overshoot too much when the control point is reached. The **Control range** should be selected in such a way that the measured value remains within this range when dosing stops. A slightly larger control range should be defined for slow reactions (e. g. $U = 180 \text{ mV}$). 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**.

5.6.3.8.7.5 STAT U - Titration parameters

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Titration parameters**

Command name

Name of the command.

Input	25 characters

Parameters defining the run of the titration.

Titration direction

Selection of the titration direction. If two endpoints are set, then the titration direction is already established and the following selection of **titration direction** is ignored.

Selection	+ - auto
Default value	auto

+

positive measured value alteration

-

negative measured value alteration

auto

The titration direction is determined automatically from the start measured value and the set endpoint.

Temperature

Manually entered titration temperature. If a temperature sensor is connected and the **Temperature measurement** is set on the **General/Hardware** tab under **Sensor** to **automatic** or **continuous**, then the temperature will be measured continuously. This value is used for temperature correction in pH measurements.

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

The measured values are not entered in the measuring point list until this value has been reached.

Titrandu, 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

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.

<i>Titrand, 855</i>	
Range	0.00000 ... 9999.99 mL
Default value	100,000 mL
Selection	off

<i>Titrimo</i>	
Range	0.000 ... 9999.99 mL
Default value	100.00 mL
Selection	off

Stop time

Stops when the preset time has elapsed after the start conditions have been fulfilled.

Range	0 ... 999999 s
Selection	off
Default value	off

since

Specifies when the stop time begins to be counted down (will not be displayed if the **Stop time** is disabled):

Selection	Start Control point first reached Last dosing
Default value	Start

Start

The stop time starts after the start volume has been dosed and after the following pause time.

Control point first reached

The stop time starts as soon as the control point has been reached for the first time.

Monitoring Measured value

Monitoring Measured value

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

If this check box is activated, then the measured value will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the measured value. When the measured value falls below this value, the event **Measured value lower limit exceeded** is triggered.

Titrande, 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	0.2 mV

Upper limit

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

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.

Titrandu, 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 (Titrando, 855)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Dosing rate

Monitoring Dosing rate

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

If this check box is activated, then the averaged dosing rate will be monitored and any exceeded limits will be entered in the measuring point list. This monitoring is not started until 10 s after the start of the titration.

Lower limit

Lower limit of the dosing rate. When the dosing rate falls below this value, the action **Dosing rate lower limit exceeded** will be triggered.

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.

Titrand, 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.

Titrand, 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.

Titrand, 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 (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 the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Monitoring Temperature

Monitoring Temperature

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

If this check box is activated, then the temperature will be monitored and any exceeded limits will be entered in the measuring point list.

Lower limit

Lower limit of the temperature. When the temperature falls below this value, the action **Lower temperature limit exceeded** is triggered.

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.

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.

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 (Titrande, 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 (Titrande, 855)

The running **STAT** command is quit, then the next command is executed.

Wait for [Continue]

Reagent dosing in the current **STAT** command is interrupted and a message appears. As soon as the monitored measured value is again within the limits (including hysteresis) reagent dosing can be resumed by pressing the **[Continue]** button in this message box.

Wait for limit ok

Reagent dosing in the current **STAT** command is interrupted. As soon as the monitored measured value is again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value is exceeded.

[New]

Opens the dialog window **Track call #** in which the parameters for the track call can be entered (*see Chapter 5.6.3.8.4, page 801*).

[Properties]

Opens the dialog window **Track call #** in which the parameters for the track call can be edited (*see Chapter 5.6.3.8.4, page 801*).

[Delete]

Deletes the track call selected in the table.

5.6.3.8.7.8 STAT U - Evaluations

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

Input	25 characters

The following methods for the evaluation of titration curves can be activated and defined on this tab:

Rate evaluation

Rate evaluation

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

If this check box is activated, than a maximum of 9 time slots can be defined in which the mean dosing rate can be determined by linear regression. The defined time slots are shown in the window table and can be edited with the following buttons:

[New]

Opens the dialog window **Evaluation window #** in which the parameters for a new time slot can be entered (see Chapter 5.6.3.8.3, page 801).

[Properties]

Opens the dialog window **Evaluation window #** in which the parameters for the new time slot can be edited (*see Chapter 5.6.3.8.3, page 801*).

[Delete]

Deletes the time slot selected in the table.

Range	1.0 ... 2000.0 mV/mL
Default value	25.0 mV/mL

5.6.3.8.7.9 STAT U - Additional measured values

Tab: **Method** ▶ **STAT U** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.3.8.7.10 STAT U - Fix endpoint evaluation

Dialog window: **Method ▶ STAT U ▶ Properties... ▶ Additional evaluations ▶ Fix endpoint evaluation ▶ [New]/[Properties] ▶ Fix endpoint evaluation #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time Volume
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value

Range	-2000.0 ... 2000.0 mV

Time

Range	0.0 ... 999999.9 s

Volume

Range	0.00000 ... 9999.99 mL

5.6.3.9 Evaluation**5.6.3.9.1 pK value and Half neutralization potential**

Parameters: **Method ▶ DET/MET ▶ Properties... ▶ Additional evaluations ▶ pK/HNP evaluation**

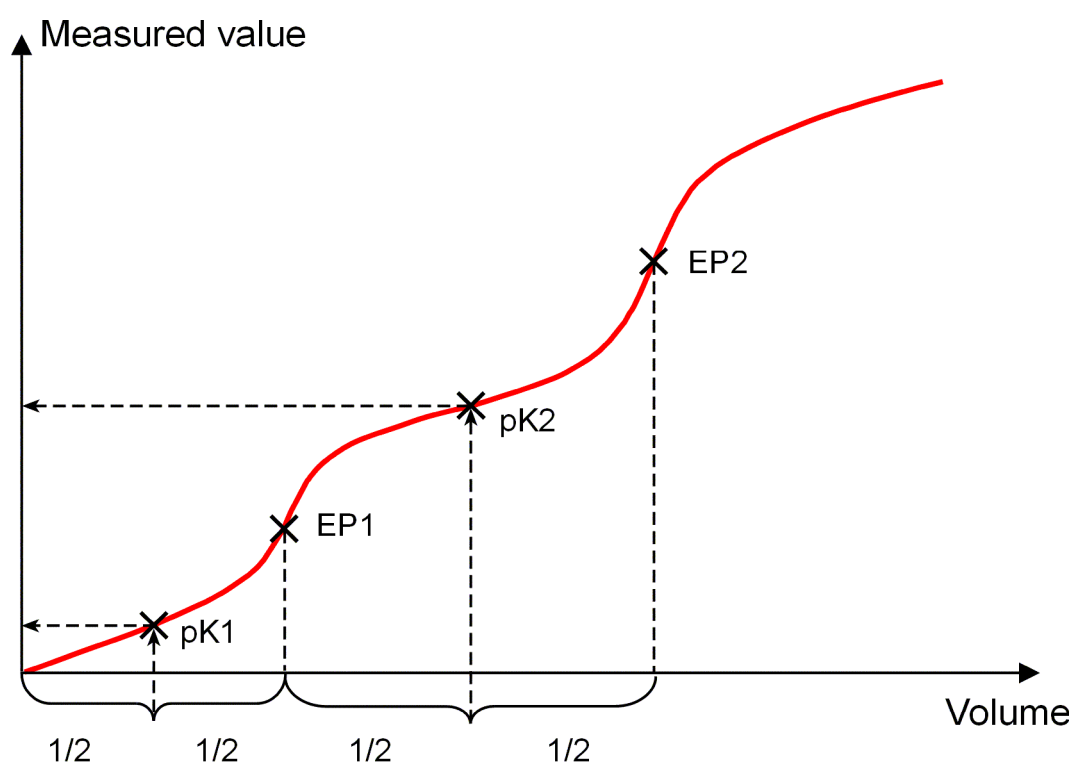
The **pK value** can be determined for pH titrations (DET and MET) and the **half neutralization potential** can be determined for U titrations.

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 $pH = pK_a$. This is the value at the half neutralization point and can be extrapolated from the titration curve. A careful pH calibration is necessary for pK evaluations. Nonetheless, the determined pK value is only an approximation, as the ionic strengths are not taken into account. In order to obtain more accurate values, titrations must be carried out with decreasing ionic strengths and the results extrapolated to the ionic strength zero. pK evaluation in aqueous solution is limited to the range $3.5 < pK < 10.5$ because of the leveling effect of strong acids and the lack of jumps with very weak acids. pK values of mixtures of acids and polyvalent acids can also be determined.

In non-aqueous solutions the **half neutralization potential (HNP)** is frequently used instead of the pK value. The HNP is evaluated in the same way as the pK value.



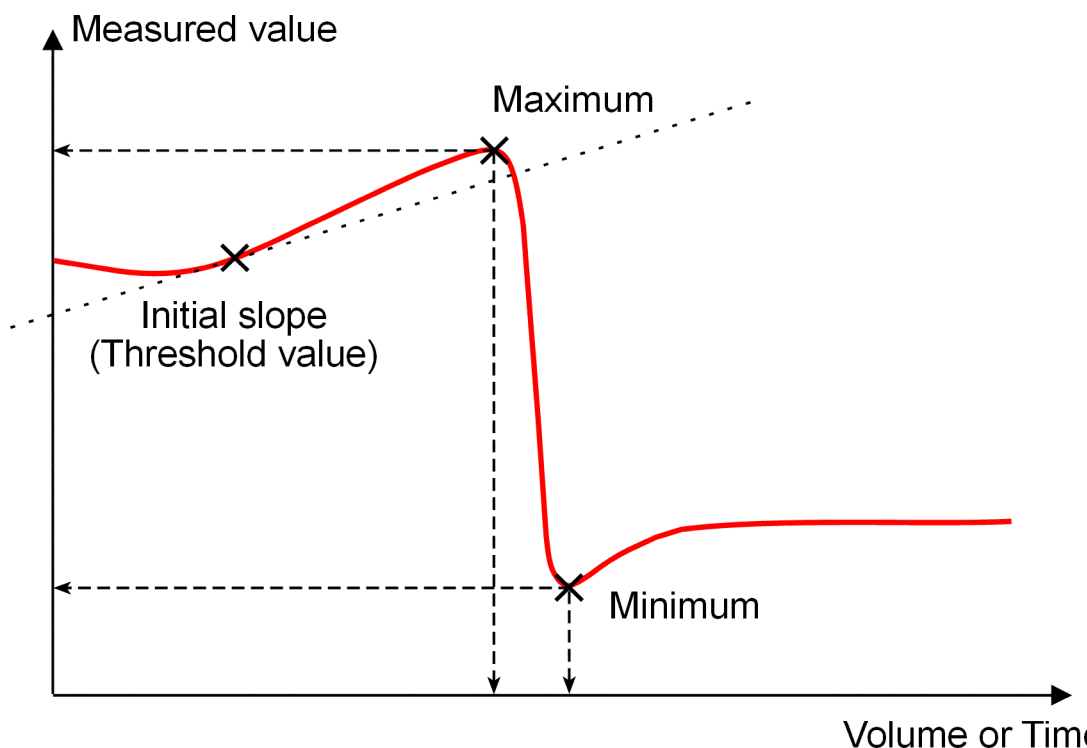
Note

If a start volume is to be added then it must be smaller than $1/2 V(EP1)$.

5.6.3.9.2 Minimum/Maximum evaluation

Parameters: **Method** ▶ DET/MET/SET/KFT/KFC/MEAS ▶ Properties... ▶ Additional evaluations ▶ Minimum/Maximum evaluation

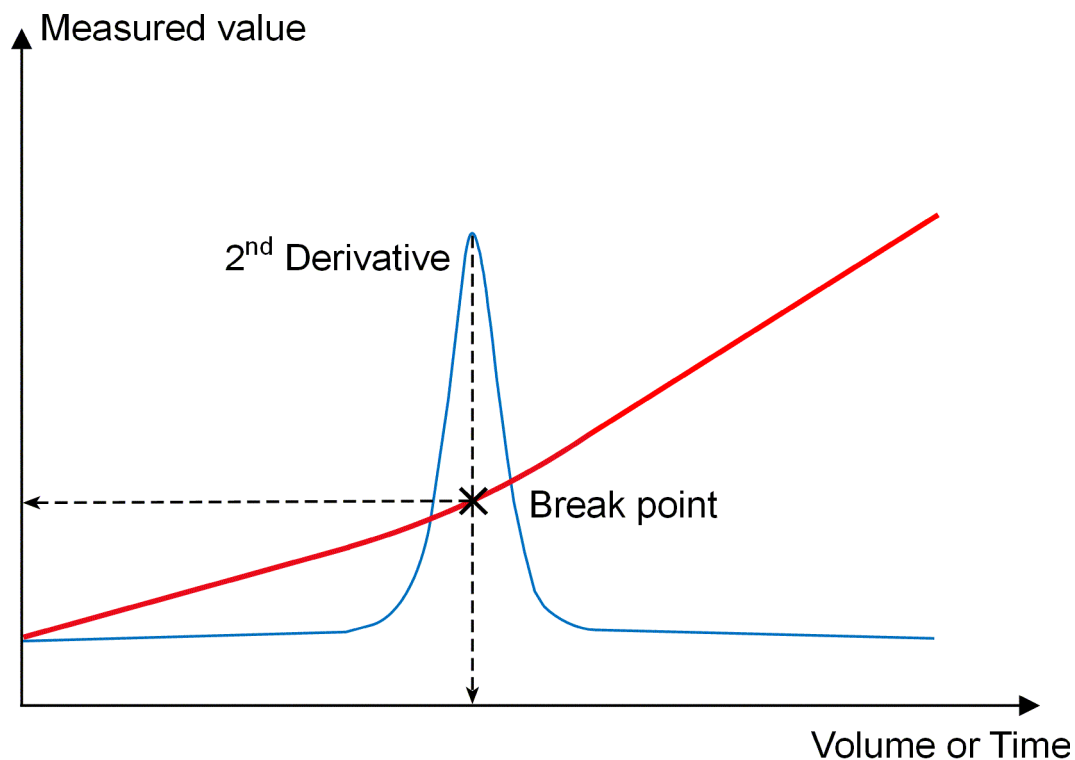
For the minimum or maximum measured value the associated **volume**, **time** and **temperature** are interpolated from the measuring point list. The evaluation begins as soon as the slope of the curve exceeds a particular threshold value.



5.6.3.9.3 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.



5.6.3.9.4 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 *5.6.3.2MET 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.

5.6.4 Measuring commands

5.6.4.1 Measuring commands - Overview

Menu item: **Method** ► **Insert** ► **New command...** ► **Measure**

Commands for **measurements** with different measured quantities.

The following measuring commands can be selected:

- *MEAS pH*
Potentiometric pH measurement with pH electrodes.
- *MEAS U*
Potentiometric voltage measurement with metal electrodes.
- *MEAS Ipol*
Amperometric measurement with selectable polarization voltage (measured value current I).
- *MEAS Upol*
Voltametric measurement with selectable polarization current (measured quantity voltage U).
- *MEAS T*
Temperature measurement.
- *MEAS T/Flow*
Temperature and gas flow measurement.
- *MEAS Conc*
Concentration measurement (direct measurement).
- *MEAS Cond*
Conductivity measurement.
- *MEAS TC Cond*
Measurement of the temperature coefficients of the conductivity.
- *MEAS Ref*
Measurement of a reference spectrum.
- *MEAS Spec*
Measurement of the sample spectrum
- *MEAS Opt*
Adsorption measurement
- *STDADD man*
Standard addition with manual addition of the standard addition solution.
- *STDADD dos*
Standard addition with addition of the standard addition solution from a dosing device.
- *STDADD auto*
Standard addition with automatic addition of the standard addition solution from a dosing device in such a way that a constant potential difference results.

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 never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once , 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point on the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value in the unit of the measured value

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

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.

Titrando, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.



off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

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.

Titrandu, 855, 867

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this check box is activated, the stirrer will be switched off automatically when the command has finished. This parameter is displayed only for Titrando, 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:

Signal 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.

Titrande, 855, 867

Range	0 ... 999999 s
Default value	0 s

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 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.

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

Titrimo

Range	-170.0 ... 500 °C
Default value	25.0 °C

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 fixed endpoint (see *Chapter 5.6.4.2.6, page 872*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.4.2.6, page 872).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/s
Default value	1.0 pH/s

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 pH/s
Default value	1.0 pH/s

Break-point evaluation

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break point. The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer break-points will be found.

Range	2 ... 20
Default value	5

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 5.6.3.10.1, page 857*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

Deletes the calculated measured value selected in the table.

Additional external measured values

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**'-

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.10.2, page 858*).

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

Deletes the external measured value selected in the table.

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS U** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BLV	Blank value of the sensor used for the command (only for ISE sensors)
.BP{x}.MEA	Measured value for the break point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1...9) in °C
.BP{x}.TIM	Time for the break point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode slope of the sensor used for the command (in mV for ISE sensors)
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once , 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached

Identification	Description
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point on the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list
.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 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

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.

5.6.4.3.3 MEAS U - Measuring parameters

Tab: **Method** ▶ **MEAS U** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Measurement

The two measuring modes **Measurement with drift control** or **Measurement without drift control** can be selected.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

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.

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.

Titrando, 855, 867

Range	-20.0 ... 150 °C
Default value	25.0 °C

Titrimo

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 fixed endpoint (see Chapter 5.6.4.3.6, page 884).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.4.3.6, page 884).

[Delete]

Deletes the selected line.

Minimum evaluation**Minimum evaluation**

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

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Maximum evaluation**Maximum evaluation**

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

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Break-point evaluation**Break-point evaluation**

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the

measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	Measured value time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Range	1 ... 999999 s
Default value	999999 s

5.6.4.3.5

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 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

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

5.6.4.4 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:

Titrand: 808, 809, 835, 836, 841, 852, 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 Ipol** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Ipol** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1...9) in °C
.BP{x}.TIM	Time for the break point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point on the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.NMP	Number of measuring points in the measuring point list

Identification	Description
.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.

<i>Titrando, 852, 867</i>	
Selection	1 2
Default value	1

851, 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 an amperometric measurement.

Titrandu, 855, 867

Range	-125.0 ... 125.0 μA (Increment: 0.5)
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

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

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.

5.6.4.4.3 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.

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	-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.

Titrandu, 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.

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.

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.

Titrandu, 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 fixed endpoint (see Chapter 5.6.4.4.6, page 897).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.4.4.6, page 897).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated volume, time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	1.0 ... 2000.0 mV/s
Default value	25.0 mV/s

Break-point evaluation

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	Measured value time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Window = Time

Range	1 ... 999999 s
Default value	999999 s

5.6.4.4.5 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 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value time
Default value	Measured value

Fix value

Value of the fixed endpoint.

Measured value (Titrando, 867, 855)

Range	-2000.0 ... 2000.0 mV

Measured value (Titrino)

Range	-2000 ... 2000 mV

Time

Range	0.0 ... 999999.9 s

5.6.4.5 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:

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on the measuring point list
.LP.EXx	External value x (1...3) for the last measuring point of the measuring point list
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (U_{ind}) in mV
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (U_{ind}) in mV
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)
.NMP	Number of measuring points in the measuring point list

851, 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

U(pol)

The polarization voltage is the voltage applied to the polarized electrode during an amperometric measurement.

Titrando, 855, 867

Range	-1250 ... 1250 mV (Increment: 25)
Default value	400 mV

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.

Titrando, 855, 867

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

Stirrer

Selection of the stirrer.

Titrandu, 855, 867

Selection	1	2	3	4	off

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

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.

5.6.4.5.3 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.

Selection	Measurement with drift control Measurement without drift control
Default value	Measurement with drift control

Measurement with drift control

The measurement is carried out drift-controlled if this option is enabled. The measurement is stopped as soon as the defined **Signal drift** or the **Stop measured value** is reached or a **waiting time** has elapsed. The corresponding parameters are not visible if this option is disabled.

Measurement without drift control

The measurement is carried out without drift control if this option is enabled. The measurement continues until one of the stop criterions **Measuring time** or **Stop measured value** is met. The corresponding parameters are not visible if this option is disabled.



Note

A constant measured value is often only achieved after a certain time, as mixing and possibly the reaction itself require a certain time. The response time of an electrode can also increase with time, i.e. reaching a constant measured value takes longer and longer. **Drift-controlled measurement** is particularly advisable in such cases, as the measured values are not applied until equilibrium has almost been achieved.

Measurement with drift control

If the option **Measurement with drift control** has been selected, then the following parameters will be displayed:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Titrande, 855, 867

Range	0.01 ... 99.90 $\mu\text{A}/\text{min}$
Default value	10.00 $\mu\text{A}/\text{min}$

Titrimo

Range	0.05 ... 99.9 $\mu\text{A}/\text{min}$
Default value	10.0 $\mu\text{A}/\text{min}$

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.

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 meas. 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.

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

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 fixed endpoint (see *Chapter 5.6.4.5.6, page 910*).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.4.5.6, page 910).

[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 Titrand, 855 and 867.

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Tab: **Method** ▶ **MEAS Upol** ▶ **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 with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

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 5.6.3.10.1, page 857*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

Deletes the calculated measured value selected in the table.

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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fix endpoint.

Measured value	
Range	-200.0 ... 200.0 μ A

Time	
Range	0.0 ... 9999999.9 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, 851, 852, 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

Robotic Titrosampler: 855

Conductometer: 856

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS T** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS T** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value (temperature) for the break point x (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1...9) in °C
.BP{x}.TIM	Time for the break point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point of the sensor used for the command (dimensionless)

Identification	Description
.ETE	End temperature (temperature following processing of the command) in °C
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value (temperature) for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value x (1...3) for the last measuring point on 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 in the unit of the measured value of the measuring point list
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MA.MEA	Maximum measured value (temperature) in the unit of the measured value
.MA.TEM	Temperature for the maximum measured value in °C
.MA.TIM	Time in s until the maximum measured value is reached
.MI.MEA	Minimum measured value (temperature) in the unit of the measured value
.MI.TEM	Temperature with minimum measured value in °C
.MI.TIM	Time for the minimum measured value in s
.MTE	Temperature measurement with sensor; 1 = on, 0 = off)

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.

<i>Titrando, 867</i>	
Selection	1 2
Default value	1

851, 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 Titrando, 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:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Stop meas. value

Stops when the preset measured value has been reached since the start of the measurement.

Titrande, 855, 867

Range	-20.0 ... 150.0 °C
Selection	off
Default value	off

off

No stop.

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

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 meas. value

Stops when the preset measured value has been reached since the start of the measurement.

Titrande, 855, 867

Range	-20.0 ... 150.0 °C
Selection	off
Default value	off

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fixed endpoint selected in the table (see Chapter 5.6.4.6.6, page 922).

[Delete]

Deletes the selected line.

Minimum evaluation**Minimum evaluation**

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

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

Maximum evaluation**Maximum evaluation**

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

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 20.0 °C/s
Default value	1.0 °C/s

Break-point evaluation**Note**

This evaluation method is possible only with Titrando, 855, 856 and 867.

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.



EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Selection	Measured value time off
Default value	off

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	-20.0 ... 150.0 °C
Default value	150.0 °C

Window = Time

Range	1 ... 999999 s
Default value	999999 s

5.6.4.6.5 MEAS T - Additional measured values

Tab: **Method** ▶ **MEAS T** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined here which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list.

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (*see Chapter 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

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

5.6.4.7 MEAS T/Flow

5.6.4.7.1 MEAS T/Flow - Overview

Dialog window: **Method** ► **MEAS T/Flow** ► **Properties...** ► **MEAS T/Flow - 'Command name'**

Command for **Temperature and gas flow measurements**.

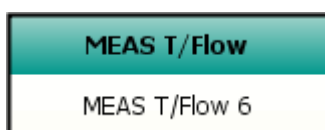
Devices

This command can be executed with the following devices:

Sample Processor: 774, 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS T/Flow** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for device.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluation*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS T/Flow** and can be used in formulas under the designation '**Command name.Variable designation**':

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

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

Identification	Description
.MI.TIM	Time for the minimum measured value in s
.MN.MEA	Average of the measured value in the unit of the measured value
.NMP	Number of measuring points in the measuring point list
.STY	Type of stop with which the command was stopped: 1 = normal; 0 = manual or after error

5.6.4.7.2 MEAS T/Flow - General/Hardware

Tab: **Method** ▶ **MEAS T/Flow** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	774 Oven Sample Processor 874 Oven Sample Processor
Default value	874 Oven Sample Processor

5.6.4.7.3 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 5.6.3.10.1, page 857*).



[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (see Chapter 5.6.3.10.1, page 857).

[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 5.6.3.10.2, page 858).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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

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.

Titrand, 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.

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.

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 5.6.3.10.1, page 857*).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.4.9 MEAS Cond

5.6.4.9.1 MEAS Cond - Overview

Dialog window: **Method ▶ MEAS Cond ▶ Properties... ▶ MEAS Cond - 'Command name'**

Command for **Conductivity** measurements.

Devices

This command can be executed with the following devices:

Conductometer: 712, 856

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MEAS Cond** are configured on the following 4 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.

- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Evaluations*
Defining further methods for evaluating measurement curves.
- *Additional measured values*
Defining further measured values which can be saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **MEAS Cond** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BP{x}.MEA	Measured value for the break point (1...9) in the unit of the measured value
.BP{x}.TEM	Temperature for the break point x (1...9) in °C
.BP{x}.TIM	Time for the break point x (1...9) in s
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.CLC	Cell constant of the sensor used in the command for conductivity measurement cells
.DBL	Total duration for the processing of the command in s
.EME	End measured value (measured value after processing of the command) in the unit of the measured value
.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 ended at least once , 0, invalid (variable not available) = Command has never ended
.FP{x}.MEA	Measured value for the fixed endpoint x (1...9) in the unit of the measured value
.FP{x}.TEM	Temperature for the fixed endpoint x (1...9) in °C
.FP{x}.TIM	Time in s until the fixed endpoint x (1...9) is reached
.IME	Initial measured value (measured value before start conditions are processed) in the unit of the measured value

Identification	Description
.ITE	Initial temperature (temperature before start conditions are processed) in °C
.LP.CAx	Calculated value $\times (1...3)$ 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
.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 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.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 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:

Signal drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

856

Range	0.001 ... 999.000 (mS/cm)/min
Default value	10.0 (mS/cm)/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

856

Range	0 ... 999999 s
Default value	0 s

Max. waiting time

If the signal drift has not yet been reached, then the measured value will be accepted when the maximum waiting time has elapsed. 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

Stops when the preset measured value has been reached since the start of the measurement.

Range	0.0000 ... 2000.00 mS/cm
Selection	off
Default value	off

No stop.

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

Stops when the preset measured value has been reached since the start of the measurement.

Range	0.0000 ... 2000.00 mS/cm
Selection	off
Default value	off

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated time and temperature for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.001 ... 10.0 (mS/cm)/s
Default value	5.0 (mS/cm)/s

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated time and temperature for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.001 ... 10.0 (mS/cm)/s
Default value	5.0 (mS/cm)/s

Break-point evaluation

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value modification, even small changes in the measured value can be evaluated as a break point for a small measured value range.

Range	0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

Selection	Measured value time off
Default value	off

off

A range (window) can be defined on the measured value axis or on the time axis. The break point evaluation will only be carried out in the defined window. Only the first break point in the defined window will be recognized.

Lower limit

Value for the lower limit of the window.

Time for the lower limit of the window.

Window = Measured value

Range	0.0000 ... 2000.0 mS/cm
Default value	0.0000 mS/cm

Window = Time

Range	0 ... 999999 s
Default value	0 s

Upper limit

Value for the upper limit of the window.

Value for the upper limit of the window.

Window = Measured value

Range	0.0000 ... 2000.0 mS/cm
Default value	2000.0 mS/cm

Window = Time

Range	1 ... 999999 s
Default value	999999 s

5.6.4.9.5 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 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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 #**

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Selection	Measured value Time
Default value	Measured value

Fix value

Value of the fixed endpoint.

Measured value

Range	0.0000 ... 2000.00 mS/cm

Time

Range	0.0 ... 999999.9 s

5.6.4.10 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**.

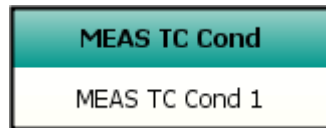
Devices

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 $\times (1 \dots 9)$ 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 $\times (1 \dots 3)$ 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
.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.

Range	0 ... 999999 s
Default value	3000 s

Measuring interval

Time interval for entering a measuring point in the measuring point list.

712

Range	0.4 ... 999999 s
Default value	2.0 s

856

Range	0.1 ... 999999 s
Default value	2.0 s

Sample solution

Selection of the sample solution from the table **Sample solutions (TC conductivity)**.

Selection	DIN Table entries
Default value	DIN

Start temperatur

Temperature at the time of the start of the measurement.

Range	-20.0 ... 150.0 °C
Default value	20.0 °C

Stop temperature

Temperature at the time of the end of the measurement.

856

Range	-20.0 ... 150.0 °C
Default value	40.0 °C

5.6.4.10.4 MEAS TC Cond - Additional measured values

Tab: **Method** ▶ **MEAS U** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together with the measured values present in the default settings in additional measured value columns **Calculated #** or **External #** in the measuring point list .

Additional calculated measured values

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 5.6.3.10.1, page 857*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

Deletes the calculated measured value selected in the table.

Additional external measured values

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**'-

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be entered (*see Chapter 5.6.3.10.2, page 858*).

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

Deletes the external measured value selected in the table.

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

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

- *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

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.

5.6.4.12.4 MEAS Spec - Evaluations

Tab: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **Evaluations**

Command name

Name of the command.

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 962*).

[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 962).

[Delete]

Deletes the selected line.

5.6.4.12.5 MEAS Spec - Evaluation window

Dialog window: **Method** ▶ **MEAS Spec** ▶ **Properties...** ▶ **Evaluations** ▶ **[New]/[Properties]** ▶ **Evaluation window #**

Start wavelength

Lower limit of the evaluation range.

Range	200.0 ... 1100.0 nm
Default value	400.0 nm

End wavelength

Upper limit of the evaluation range.

Range	200.0 ... 1100.0 nm
Default value	1000.0 nm

5.6.4.13 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.

Fix endpoint evaluation

Fix endpoint evaluation

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

If this option is activated, then the associated values for the other measured quantities will be interpolated with a fixed measured quantity (**Measured value** or **Time**) for the fix endpoint from the measuring point list.



Moves the selected line up (changes the sequence).



Moves the selected line down (changes the sequence).

[New]

Opens the dialog window **Fix endpoint evaluation #** to enter a new fix endpoint (see Chapter 5.6.4.13.5, page 969).

[Properties]

Opens the dialog window **Fix endpoint evaluation #** to edit the fix endpoint selected in the table (see Chapter 5.6.4.13.5, page 969).

[Delete]

Deletes the selected line.

Minimum evaluation

Minimum evaluation

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

If this option is enabled, then the associated time for the minimum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the minimum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 1000.0 mAU/s
Default value	20.0 mAU/s

Maximum evaluation

Maximum evaluation

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

If this option is enabled, then the associated time for the maximum measured value will be interpolated from the measuring point list.

Threshold value

The evaluation of the maximum begins as soon as the slope of the curve exceeds the set threshold value.

Range	0.1 ... 1000.0 mAU/s
Default value	20.0 mAU/s

Break-point evaluation

Break-point evaluation

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

If this option is enabled, then sharp, almost 90° changes in directions in the measurement curve will be evaluated.

EP criterion

Measure of the minimum sharpness of the break-point. The smaller the EP criterion set, the more break-points will be found. As this is a relative value related to the total measured value alteration, even small changes in the measured value can be evaluated as a break-point for a small measured value range.

Range	0.0 ... 1.0
Default value	0.3

Slope

Minimum difference between the slope before and after the break-point.
The smaller the difference, the more break-points will be found.

Range	0.0 ... 10.0
Default value	0.9

Smoothing factor

The higher the smoothing factor, the fewer endpoints will be found.

Range	2 ... 20
Default value	5

Window

A range (window) can be defined on the measured value axis or on the time axis. The break-point evaluation will only be carried out in the defined window. Only the first break-point in the defined window will be recognized.

Selection	Measured value Time off
Default value	off

Lower limit

Value for the lower limit of the window.

Window = Measured value

Window = Time

Upper limit

Time for the upper limit of the window.

Window = Measured value

Window = Time

5.6.4.13.5

MEAS Opt - Fix endpoint evaluation

Quantity

Selection of the fixed measured quantity to which the associated values for the other quantities are to be interpolated from the list of measured points.

Fix value

Value of the fix endpoint.

Measured value

Time

tiamo 2.1

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:

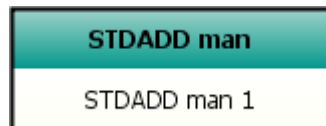
Titrandos: 808, 809, 835, 836, 857, 904, 905, 906, 907

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.

continuous

automatic

off

Stirrer

Selection of the stirrer.

off

Stirring rate

Switch off automatically

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

Tab: **Method** ▶ **STDADD man** ▶ **Properties...** ▶ **Standard addition**

Name of the command.

The parameters for the standard addition can be defined on this tab

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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

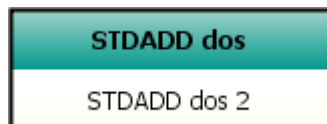
Range	0 ... 999999 s
Default value	52 s

pH/Ion - Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **STDADD dos** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
Parameters for standard addition.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve with its associated evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations ► Show calibration curve...** or the symbol

Command variables

The following command variables are generated in the method run by the command **STDADD dos** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value

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 Titrando
Default value	Titrando

Dosing device**Dosing device**

Selection of the dosing device (exchange or dosing unit) to be used for dosing the addition solution.

Titrando, 867

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

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.

<i>Titrand, 867</i>	
Selection	1 2
Default value	1
<i>855</i>	
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

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 auto** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Standard addition*
Parameters for standard addition.
- *Measuring parameters*
Parameters for setting the measurement procedure.

Standard addition curve

The standard addition curve with its associated evaluation data for a determination is shown in the program part **Database** in the dialog window **Calibration curve**, which is opened with the menu item **Determinations ► Show calibration curve...** or the symbol

Command variables

The following command variables are generated in the method run by the command **STDADD auto** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value

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 Titrando
Default value	Titrando

Dosing device**Dosing device**

Selection of the dosing device (exchange or dosing unit) to be used for dosing the addition solution.

Titrando, 867

Selection	1 2 3 4
Default value	1

855

Selection	1 2 3
Default value	1

Solution

Input of a solution name or selection of a solution from the solutions defined in the solution table. If intelligent exchange or dosing units are used, then a check will be made in the method sequence to see whether the correct solution has been set on the selected dosing device and whether the dosing device type is correct. With non-intelligent exchange or dosing units, only the cylinder volume is checked. At the start of the command, a check is made of the working life, the validity of the titer and the GLP test interval for the selected solution.

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.

Titrandu, 867

Selection	1 2
Default value	1

855

Selection	1
Default value	1

Sensor

Selection of a sensor of type **ISE electrode** from the sensors configured in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement.

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer**Stirrer**

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

No stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the command has finished.

5.6.4.16.3 STDADD auto - Standard addition

Tab: **Method ▶ STDADD ▶ Properties... ▶ Standard addition**

Command name

Name of the command.

Input	25 characters

The parameters for the standard addition can be defined on this tab

Number of additions

Number of times the standard solution is added.

Range	1 ... 19
Default value	3

Volume auxiliary solution

Volume of the auxiliary solution (e.g. buffer) which was added to the sample before the first standard addition.

Range	0.0000 ... 9999.999 mL
Default value	0.0000 mL

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



Note

Displayed only for **Solution** = not defined.

Concentration of addition solution.

Range	0.001 ... 999999.999
Default value	1.000

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

Speed at which the volume increments are added.

Selection	slow medium fast
Default value	fast

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**

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

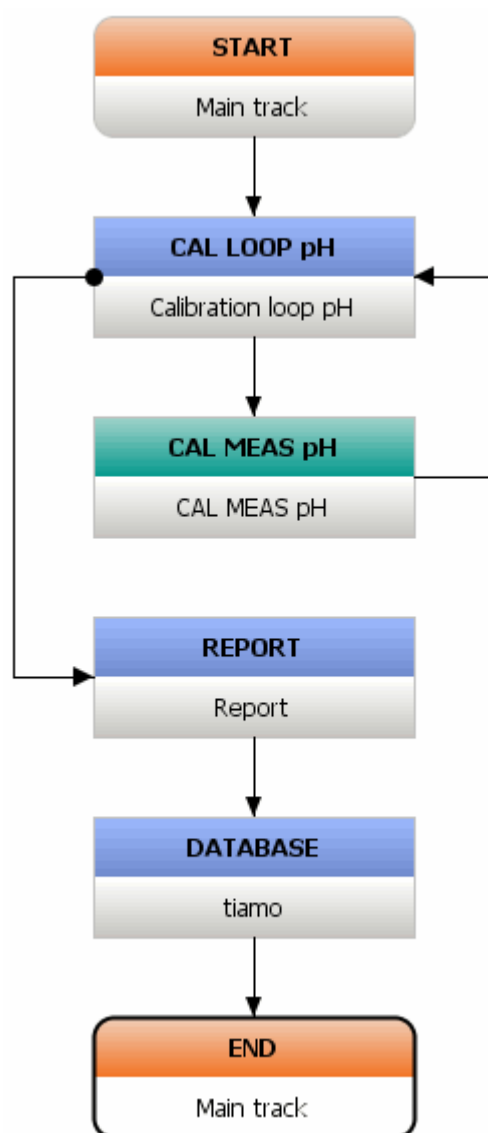
Menu item: **Method ▶ Insert ▶ New command... ▶ Calibrate**

Commands for **calibration** of pH- and ion-selective sensors.

General

The commands **CAL LOOP** and **CAL MEAS** are available for calibrating electrodes. The number and type of buffers or standards, respectively, is defined in the loop command **CAL LOOP**, which is to be measured subsequently with the command **CAL MEAS**. After each looping pass, the validity of the measurement is checked, and at the end the calibration data for the electrode is calculated.

The basic structure of a calibration method looks as follows:



The calibration can be carried out with both manual and automatic solution changes with the aid of a Sample Processor.

Commands

The following commands can be selected for calibration:

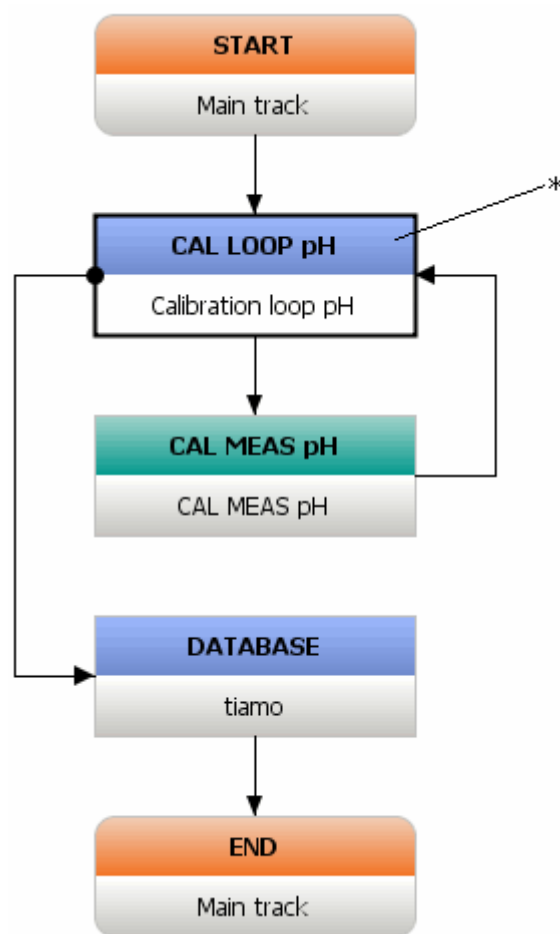
- *CALL LOOP pH*
Calibration loop for the calibration of pH electrodes.
- *5.6.5.CAL MEAS pH*
Measurement of buffers for the calibration of pH electrodes.
- *CAL LOOP Conc*
Calibration loop for the calibration of ion-selective electrodes (ISE electrodes).

- *CAL MEAS Conc*
Measurement of standards for the calibration of ion-selective electrodes (ISE electrodes).
- *CAL Cond*
Measurement of conductivity standards for the determination of the cell constant of conductivity measurement cells.
- *CAL Spec*
Measuring command for wavelength calibration.

5.6.5.2 Calibrating with manual solution changing

Program part: **Method ▶ Calibration commands**

The basic structure of a calibration method with manual solution exchange looks as follows:



* Definition of the number of calibration solutions and the type of solution exchange.

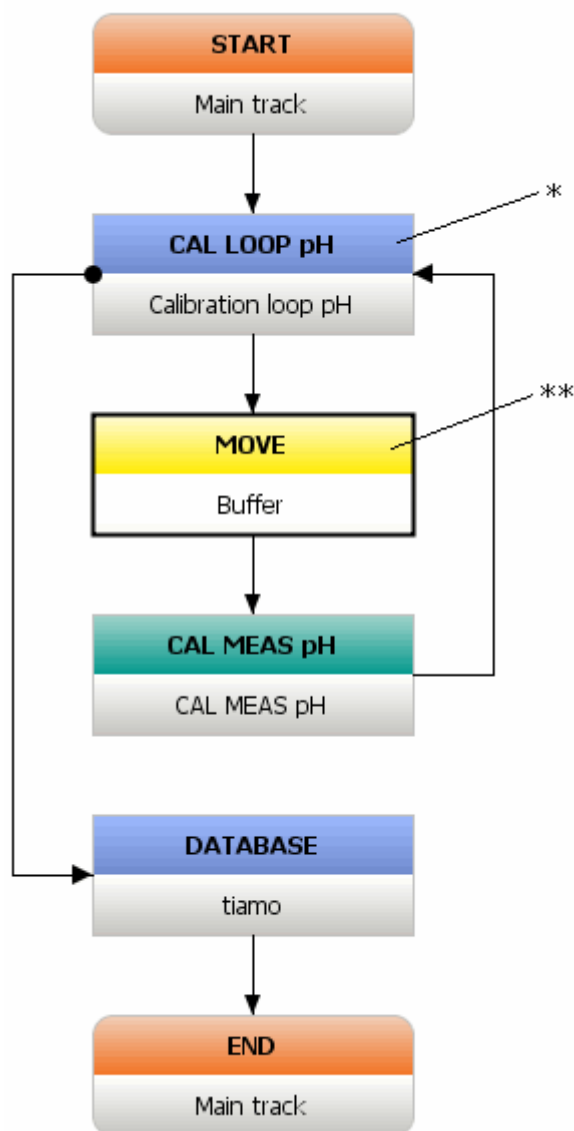
The request for changing the buffer or the standard must be **activated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. During the

method run, a request for specifying the next the buffer or standard is displayed after each measurement.

5.6.5.3 Calibrating with manual solution changing

Program part: **Method ► Calibration commands**

The basic structure of a calibration method with automatic solution exchange on a Sample Processor looks as follows:



* Definition of the number of calibration solutions and the type of solution exchange.

** Move to the next calibration solution.

The request for changing the buffer or standard must be **deactivated** in the command **CAL LOOP pH** or **CAL LOOP Conc**, respectively. No request for changing the buffer or standard is then displayed during the run.

For the automatic move to the next calibration solution on the Sample Processor, a **MOVE** command must be inserted between the loop command **CAL LOOP** and the measuring command **CAL MEAS**. The positions of the calibration solutions on the rack are defined in this command. The following three possibilities are available to do so:

- **Defining rack positions for calibration solutions in the method**
Starting from a rack position **###** defined for the first calibration solution in the **MOVE** command, the other calibration solutions will be used in sequential order at the subsequent positions. The following settings must be implemented for this purpose in the command **MOVE** under the **Target** parameter:
Move: Rack position
Number: = **### - 1 + 'Command name.LCO'** (entry with formula editor, e.g. = **19 + 'Calibration loop pH.LCO'** for the above sample method with the first calibration solution at position **20**).
- **Defining special beakers for calibration solutions in the method**
Starting from a first special beaker **###** for the first calibration solution defined in the command **MOVE**, other calibration solutions will be used in sequential order at the subsequent special beaker positions. The same number of special beakers must be defined for the rack that is set up as the number of calibration buffers used. The following settings must be implemented in the command **MOVE** under the parameter **Target**:
Move: Special beaker
Number: = **### + 'Command name.LCO'** (input via formula editor, e.g. = **5 + 'calibration loop pH.LCO'** for the sample method above with the first calibration solution at special beaker position **6**).
- **Defining rack positions for calibration solutions in the sample data**
Starting from the **Sample position** defined in the sample data (variable **'MV.Sample position'**) for the first calibration solution, the other calibration solutions will be used in sequential order at the subsequent rack positions. The following settings must be implemented for this purpose in the command **MOVE** under the **Target** parameter:
Move: Rack position
Number: = **'MV.Sample position' - 1 + 'Command name.LCO'** (entry with formula editor, e.g. = **'MV.Sample position' - 1 + 'Calibration loop pH.LCO'** the above sample method).

The variable '**Command name.LCO**' (index number of the calibration loop) is increased by **+1** after each pass of the loop.

**Note**

The formula editor is opened with a right click in the input field.

5.6.5.4 CAL LOOP pH

5.6.5.4.1 CAL LOOP pH - Overview

Dialog window: **Method** ► **CAL LOOP pH** ► **Properties...** ► **CAL LOOP pH** - 'Command name'

Loop command for the **calibration of pH electrodes** which is used together with the command **CAL MEAS pH**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL LOOP pH** are configured in the following dialog window:

- *CAL LOOP pH - Properties*

Command variables

The following command variables are generated in the method run by the command **CAL LOOP pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifi- cation	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)



pH value of the special buffers (this parameter is only displayed for **Buffer type = Special**).



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

Dialog window: **Method ▶ CAL LOOP pH ▶ Properties... ▶ CAL LOOP pH - 'Command name'**

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

Baker

Hamilton DURACAL

1008 ■■■■■■

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**':

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
.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

Titrande, 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.

Titrande, 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.

Titrande, 855, 867

Selection	1 2 3 4 off
Default value	1

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	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:

$$\text{Wartezeit} = 150 / \sqrt{\text{Drift} + 0.01} + 5$$

Titrande, 855, 867

Range	0 ... 999999 s
Default value	110 s

Titrimo

Range	0 ... 9999 s
Default value	110 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

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 - 'Command name'**

The number of standards and their concentration are defined in the dialog window **CAL LOOP Conc - 'Command name'**.

Command name

Name of the command.

Input	25 characters

Standards

Number of standards

Selection of the number of standards with which the concentration calibration is to be carried out.

Selection	1 2 3 4 5
Default value	2

Unit conc.

Selection of the concentration unit for the standards.

Selection	mol/L mmol/L ppm % g/L mg/L µg/L µg/mL mg/mL
Default value	ppm

Conc. standard

Enter the corresponding concentration for each standard used.

Range	0.001 ... 999999.999

Request for standard exchange

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

If this option is enabled, a request for manual standard exchange is displayed after each measurement. This option must be disabled for automatic solution exchange when calibrating with a Sample Processor.

5.6.5.7 CAL MEAS Conc

5.6.5.7.1 CAL MEAS Conc - Overview

Dialog window: **Method ▶ CAL MEAS Conc ▶ Properties.. ▶ CAL MEAS Conc - 'Command name'**

Measuring command for **calibration with ISE electrodes**, which is used together with the command **CAL LOOP Conc**.

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 Titrand
Default value	Titrand

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

Sensor

Selection of an ISE sensor from the ISE sensors available in the sensor table.

Selection	'Sensor name' ISE electrode
Default value	ISE electrode

Temperature measurement

Type of temperature measurement

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** will be used.

off

The temperature will not be measured. The temperature entered manually under **Temperature** will be used.

Stirrer

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this check box is activated, the stirrer will be switched off automatically when the command has finished.

5.6.5.7.3 CAL MEAS Conc - Measuring parameters

Tab: **Method** ▶ **CAL MEAS Conc** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The measuring parameters for the calibration are defined on this tab.

Measurement with drift control

The ISE calibration is carried out drift-controlled. The measurement is stopped as soon as the **Signal drift** is reached or a defined **waiting time** has elapsed.

Measured value drift

The measured value is only accepted if the signal drift defined here has been fallen short of.

Range	0.1 ... 999.0 mV/min
Default value	2.0 mV/min

Min. waiting time

The measured value is not accepted until the minimum waiting time has elapsed, even if the signal drift has already been reached. The drift continues to be checked while the waiting time is elapsing.

Range	0 ... 999999 s
Default value	10 s

Parameters

The parameters for the command **CAL Cond** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for devices, sensors and stirrers.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Conductivity standard*
Defining the values or the type of the input for calibration with one standard.

Command variables

The following command variables are generated in the method run by the command **CAL Cond** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifica- tion	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has not ever been started
.CLC	Cell constants determined by calibration for the sensor used in the command with conductivity sensors (only MEAS Cond and CAL Cond)
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ETE	End temperature (temperature following processing of the command) in °C for the last measurement
.FIN	Command status: 1 = Command has been ended at least once , 0 = Command was started but not ended , invalid = Command was not started (variable not available) .
.IME	Initial measured value (measured value at the start of the command) in the unit of the measured value for the last measurement
.ITE	Initial temperature (temperature before processing of the command) in °C for the last measurement
.LP.MEA	Measured value for the last measuring point in the measuring point list in the unit of the measured value

Identification	Description
.LP.TEM	Temperature for the last measuring point of the measuring point list in °C
.LP.TIM	Time in s until the last measuring point in the measuring point list is reached
.MTE	Temperature measurement with sensor; 1 = on, 0 = off
.NMP	Number of measuring points in the measuring point list
.RTE	Reference temperature in °C (only MEAS Cond and CAL Cond)
.STY	Type of stop with which the command was stopped: 1 = stopped normally, 0 = stopped manually with [Quit] or [Stop] .
.TC	Temperature coefficient in %/°C

5.6.5.8.2 CAL Cond - General/Hardware

Tab: **Method** ▶ **CAL Cond** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type.

Selection	712 Conductometer 856 Conductivity Module
Default value	856 Conductivity Module

Sensor

Sensor

Selection of a conductivity sensor from the conductivity sensors available in the sensor table.

Selection	'Sensor name' Conductivity sensor
Default value	Conductivity sensor

Temperature measurement

Type of temperature measurement.

856

Selection	continuous automatic off
Default value	automatic

continuous

A temperature sensor must be connected. The temperature will then be measured continuously.

automatic

If a temperature sensor is connected then the temperature will be measured continuously. Otherwise, the temperature entered manually under **Temperature** on the **Measuring parameters** tab will be used.

off

The temperature will not be measured. The temperature manually entered under **Temperature** on the **Measuring parameters** tab will be used.

Stirrer

This section is visible only if the 856 Conductivity Module was selected as device type.

Stirrer

Selection of the stirrer.

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Range	-15 ... 15
Default value	8

**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

Measurement without drift control

If the option **Measurement without drift control** has been selected, then the following parameters will be displayed:

Measuring time

Maximum period of time for measurement.

Range	0 ... 999999 s
Default value	120 s

Measuring interval

Time interval for entering a measuring point in the measuring point list. Max. number of entries?

712

Range	0.4 ... 999999 s
Default value	2.0 s

856

Range	0.1 ... 999999.0 s
Default value	2.0 s

Temperature

Measurement temperature

Temperature of the solution to be measured. If a temperature sensor is connected, the temperature entered here is ignored.

Range	-20.0 ... 150.0 °C
Default value	20.0

5.6.5.8.4 CAL Cond - Conductivity standard

Tab: **Method** ▶ **CAL Cond** ▶ **Properties...** ▶ **Conductivity standard**

Command name

Name of the command.

Input	25 characters

Definition of the conductivity standard

Selection of the type as to how the data are to be defined for the conductivity standard.

Selection	Input Request Template
Default value	Input

Input

If this option is selected, then the values for the conductivity standard can be entered directly.

Request

If this option is selected, then first the current temperature of the solution is measured after the start of the determination. Afterwards, the dialog window **Data Conductivity standard** will appear (*see Chapter 5.6.5.8.5, page 1030*). The method continues running after the data has been entered.

Template

If this option is selected, then a conductivity standard can be selected, and its data will be used to calculate the temperature coefficient for the specified reference temperature.

Parameters for input

If the option **Input** has been selected, then the following parameters will be displayed:

Reference temperature

Input of a temperature for which a calibration point of the conductivity standard is known. It should be as close as possible to the temperature at which measurements are carried out.

Range	-20.0 ... 150.0°C
Default value	20.0

Conductivity

Input of the conductivity of the standard at the reference temperature.

Range	0.00000 ... 2000.00 mS/cm
Default value	11.66 mS/cm

Temperature coefficient

Temperature coefficient of the standard with the reference temperature.

Range	0.00 ... 9.99 %/°C
Default value	2.07 %/°C

Parameters for template

If the option **Input** has been selected, then the following parameters will be displayed:

Name standard

List box with conductivity standards. The data of one of these standards is used to calculate the temperature coefficient for the specified reference temperature.

Selection	'Conductivity standard'
1	1000
2	1000
3	1000
4	1000
5	1000
6	1000
7	1000
8	1000
9	1000
10	1000
11	1000
12	1000
13	1000
14	1000
15	1000
16	1000
17	1000
18	1000
19	1000
20	1000
21	1000
22	1000
23	1000
24	1000
25	1000
26	1000
27	1000
28	1000
29	1000
30	1000
31	1000
32	1000
33	1000
34	1000
35	1000
36	1000
37	1000
38	1000
39	1000
40	1000
41	1000
42	1000
43	1000
44	1000
45	1000
46	1000
47	1000
48	1000
49	1000
50	1000
51	1000
52	1000
53	1000
54	1000
55	1000
56	1000
57	1000
58	1000
59	1000
60	1000
61	1000
62	1000
63	1000
64	1000
65	1000
66	1000
67	1000
68	1000
69	1000
70	1000
71	1000
72	1000
73	1000
74	1000
75	1000
76	1000
77	1000
78	1000
79	1000
80	1000
81	1000
82	1000
83	1000
84	1000
85	1000
86	1000
87	1000
88	1000
89	1000
90	1000
91	1000
92	1000
93	1000
94	1000
95	1000
96	1000
97	1000
98	1000
99	1000
100	1000

5.6.5.8.5 CAL Cond - Data Conductivity standard

Dialog window: **Method ▶ CAL Cond ▶ Data Conductivity standard**

Current temperature

Display of the currently measured temperature of the conductivity standard.

Data transmission from standard

Input of the data of the conductivity standard, which should be as close as possible to the **Current temperature**. This data is as a rule contained in the Data Sheet/Certificate for the conductivity standard.

Reference temperature

Input of a temperature for which a calibration point of the conductivity standard is known. It should be as close as possible to the temperature at which measurements are carried out.

Range	-20.0 ... 150.0°C
Default value	20.0

Conductivity

Input of the conductivity of the standard at the reference temperature.

Range	0.00000 ... 2000.00 mS/cm
Default value	1.0 mS/cm

Temperature coefficient

Temperature coefficient of the standard with the reference temperature.

Range	0.00 ... 9.99 %/°C
Default value	1.00 %/°C

5.6.5.9 CAL Spec

5.6.5.9.1 CAL Spec - Overview

Dialog window: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **CAL Spec - 'Command name'**

Command for **wavelength calibration**.

Devices

This command can be executed with the following devices:

Spectrometer: Avantes

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CAL Cond** are configured on the following 3 tabs:

- *General/Hardware*
Parameters for device.
- *Measuring parameters*
Parameters for setting the measurement procedure.
- *Calibration wavelengths*
Input of the reference wavelengths. Definition of the behavior of the calibration.

Command variables

The following command variables are generated in the method run by the command **CAL Spec** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR ; 0 = READY ; invalid (variable not available) = Command has never been started
.C0	Coefficient c0 of the calibration curve
.C1	Coefficient c1 of the calibration curve
.C2	Coefficient c2 of the calibration curve
.C3	Coefficient c3 of the calibration curve
.CAL	Status of the calibration: 1 = calibrated normally , 0 = canceled , because reference wavelength was not found.
.DBL	Total duration for the processing of the command in s
.STY	Type of stop with which the command was stopped: 1 = stopped normally , 0 = stopped manually with [Quit] or [Stop] .

5.6.5.9.3 CAL Spec - Measuring parameters

Tab: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **Measuring parameters**

Command name

Name of the command.

Input	25 characters

The parameters for the measuring procedure can be defined on this tab.

Integration time

Integration time for spectrum recording.

Range	0.01 ... 600000 ms
Default value	6 ms

Averaged spectra

The number of spectra that are recorded and averaged.

Range	1 ... 10000
Default value	10

5.6.5.9.4 CAL Spec - Calibration wavelengths

Tab: **Method** ▶ **CAL Spec** ▶ **Properties...** ▶ **Calibration wavelengths**

Command name

Name of the command.

Input	25 characters

The reference wavelengths with which the spectrometer is calibrated can be entered on this tab.

Tolerance

Tolerance for the preset wavelength when assigning the highest peak maximum found during the calibration measurement to the reference wavelength. If a peak is outside the range **Wavelength +/- Tolerance**, the calibration will be canceled. The existing calibration in the configuration remains in effect.

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 1034*).



[Properties]

Opens the dialog window **Calibration wavelength #** to edit the values selected in the table (see Chapter 5.6.5.9.5, page 1034).

[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:

Titrand: 808, 809, 835, 836, 841, 842, 851, 852, 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

Conductometer: 856

Dosing Interface: 846

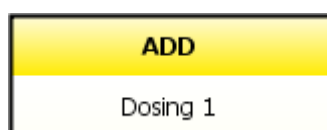
pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **ADD** are configured on the following 2 tabs:

- *General/Hardware*
Parameters for devices, dosing devices and stirrers.
- *Dosing parameters*
Parameters for the dosing settings.

Command variables

The following command variables are generated in the method run by the command **ADD** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

Identification	Description
.TITER	Titer value of the solution used for the command
.VOL	Currently dosed volume

5.6.6.2.2 ADD - General/Hardware

Tab: **Method** ▶ **ADD** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

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.

Titrando, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789, 814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

730, 774

Selection	1 2 3 4 5 6 7 8 9 10 11 12
Default value	1

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.

Titrandos, 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.

Titrandos, 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.

Titrandos, 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.

Titrandos, 846, 856, 867, 814, 815, 855, 864, 874

Selection	1 2 3 4 off
Default value	1

off

Means that no stirrer will be used.

Stirring rate

Setting the stirring rate. The algebraic sign of the stirring rate changes the direction in which the stirring is done.

Titrandos, 846, 856, 867, 814, 815, 855, 864, 874

Range	-15 ... 15
Default value	8

Switch off automatically

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

If this option is enabled, the stirrer will be switched off automatically when the dosing has finished. This parameter is displayed only for Titrandos, 846, 856, 867, 814, 815, 855, 864 and 874.

5.6.6.2.3 ADD - Dosing parameters

Tab: **Method ▶ ADD ▶ Properties... ▶ Dosing parameters**

Command name

Name of the command.

Input	25 characters

The volume to be added and the dosing and filling rate are defined on this tab.

Volume

Fixed volume that is to be dosed.

Titrandos, 846, 814, 815, 855, 864, 874

Range	0.00000 ... 99999.9 mL
Default value	10.0000 mL

Titrimo

Range	0.0001 ... 9999.0 mL
Default value	10.0000 mL

730, 778, 789

Range	0.001 ... 999.999 mL
Default value	10.0000 mL

774

Range	0.01 ... 999.999 mL
Default value	10.0000 mL

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:

$$\text{Volume} = \text{Dosing time} \cdot \text{Dosing rate}$$

If continuous dosing is required, a tandem dosing setup can be used, i.e. dosing is carried out with a combination of two dosing devices. The second dosing device is dosing while the first one is being filled and vice-versa.

Commands

Depending on the measured value, one of the following two **DOS** commands can be selected:

- 5.6.6.3.4DOS pH
Controlled dosing with the measured quantity pH.
- 5.6.6.3.5DOS U
Controlled dosing with the measured quantity voltage U.

5.6.6.3.2 **DOS - Monitored dosing**

Tab: **Method** ▶ **Commands** ▶ **DOS** ▶ **Dosing parameters**

Command name

Name of the command.

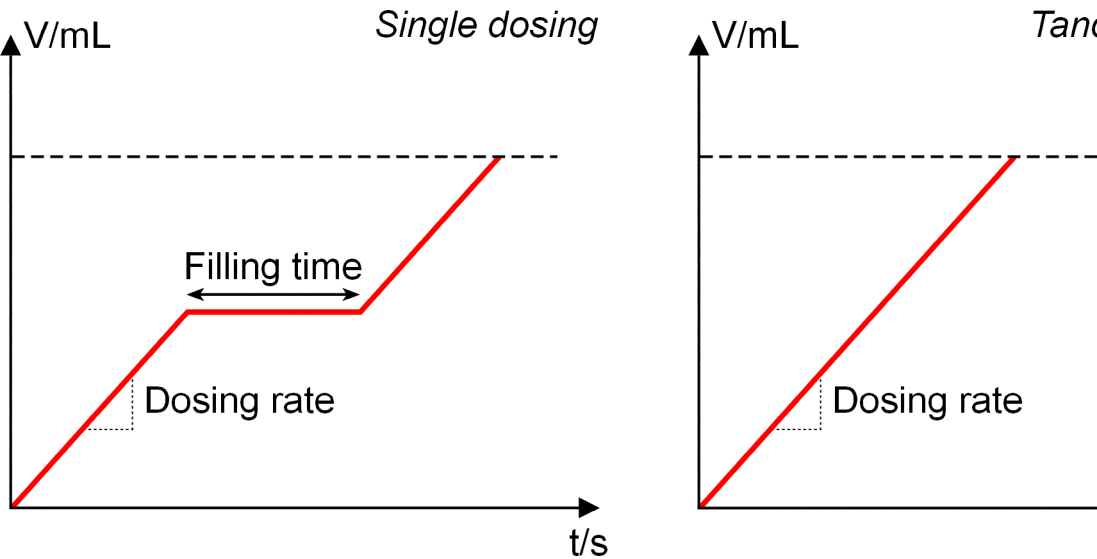
Input	25 characters

Dosing criterion

Selection	Volume/dosing rate Volume/dosing time Dosing rate/dosing time
Default value	Volume/dosing rate

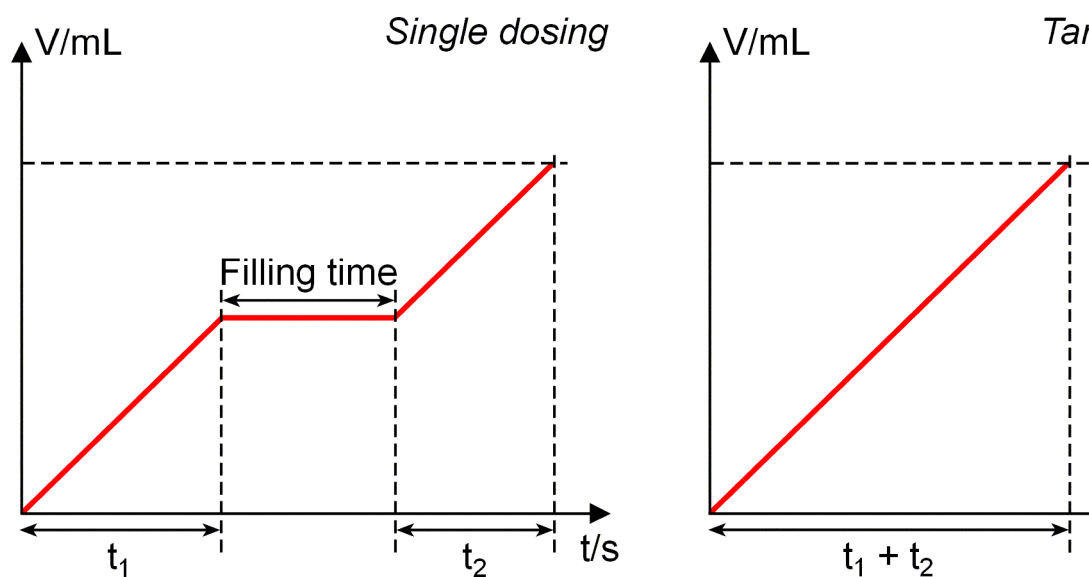
Specification of volume and dosing rate

You define the volume to be dosed and the desired dosing rate. The filling times prolong the dosing process.



Specification of volume and dosing time

You define the volume and the time in which this volume is to be dosed (particularly suitable for synthesis applications). The dosing rate is automatically optimized.



The time defined as Dosing time corresponds to the net dosing time $t_1 + t_2$, i.e. the filling time of the exchange or dosing unit is included in the total.

If the specifications with the maximum dosing rate cannot be achieved, then dosing is carried out at the maximum rate. The following formula can be used to estimate whether the maximum dosing rate is used or not:

Dosing rate = desired flow rate in mL/min $\cdot$ 2.22



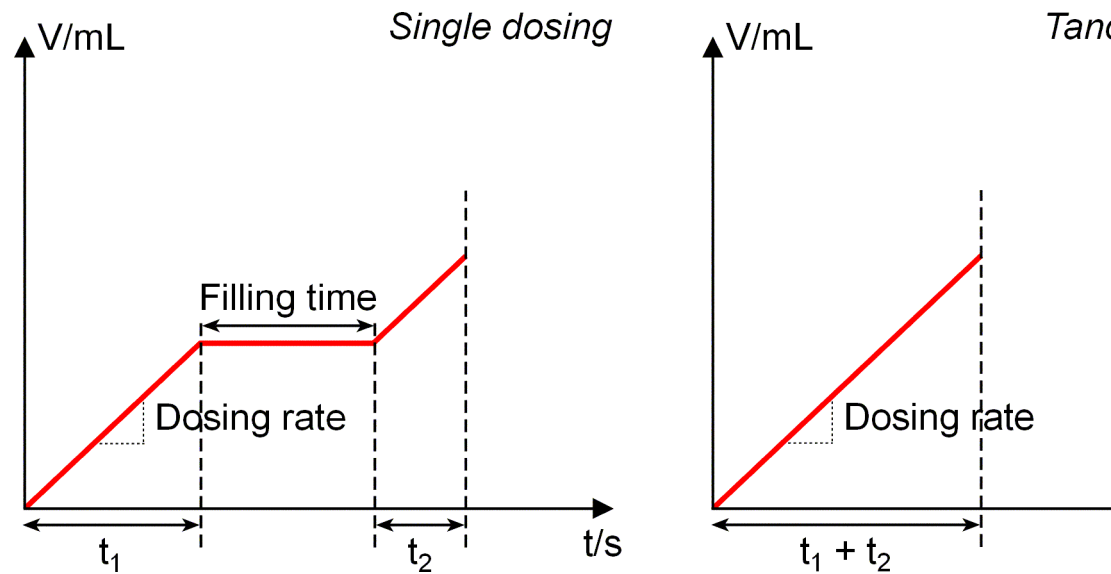
Note

This formula applies only for using a single dosing device. The dosing rate is equal to the flow rate in the case of tandem dosing.

If the required dosing rate exceeds the maximum dosing rate for the selected exchange or dosing unit (or cylinder volume, respectively), then a larger cylinder volume must be selected.

Specification of dosing rate and dosing time

You define the dosing rate with which dosing is to be carried out during a particular time. As in the previous case, the filling times are not included in the total, and dosing is prolonged accordingly.



Flow rate of a single dosing device

The cylinder volume and the filling time of the exchange or dosing unit must be taken into account for the calculation of the effective flow rate.

Cylinder volume	Max. flow rate	
	Exchange unit	Dosing unit
1 mL	approx. 80 mL/h	---
2 mL	---	approx. 170 mL/h
5 mL	approx. 400 mL/h	approx. 430 mL/h
10 mL10 mL	approx. 800 mL/h	approx. 860 mL/h
20 mL	approx. 1.6 L/h	approx. 1.7 L/h
50 mL	approx. 4.0 L/h	approx. 4.3 L/h

Filling times

Filling times are not included in the calculation of the dosing rate. The filling times (including valve switching) can be estimated according to the following formula:

Filling time in s = (max. filling rate/current filling rate) • t + 4 s

t = 20 s (for exchange units) or 18 s (for dosing units)

The maximum filling rate is dependent on the cylinder volume of the exchange/dosing unit that has been put into use. The approximate filling times (including valve switching) are given in the table below for various cylinder volumes (exchange and dosing unit) at different filling rates:

Cylinder volume	Filling time in s			
	max.	100 mL/min	50 mL/min	10 mL/min
1 mL	24/---	---	---	---
2 mL	---/22	---	---	---
5 mL	24/22	---	---	34
10 mL 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:

Titrandos: 835, 836, 842, 857, 902, 906, 907

Titrimo: 718, 736, 751, 799

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **DOS pH** are configured in the following 5 tabs:

- *General/Hardware*
Parameters for devices, dosing devices, sensors and stirrers.
- *Dosing parameters*
Parameters for the dosing settings.
- *Stop conditions*
Definition of conditions which cause the stop of the dosing.
- *Monitoring*
Definition of measured value and temperature monitoring.
- *Additional measured values*
Definition of additional measured values of other measuring commands which are saved as additional columns in the measuring point list.

Command variables

The following command variables are generated in the method run by the command **DOS pH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identifica- tion	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.DBL	Total duration for the processing of the command in s
.EME	Final measured value (measured value after processing of the command) in the unit of the measured value
.ENP	Electrode zero point 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

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

5.6.6.3.4.2 DOS pH - General/Hardware

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input	25 characters

The general parameters for the control device, the dosing device, the sensor and the stirrer are defined on this tab.

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the dosing device to be used for the dosing. All the dosing device connections which are possible with the selected device type are displayed.

Titrandu

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

Titrimo

Selection	1 2 diff.
Default value	1

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.

Titrandu, 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.

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.

Titrande, 855

Range	0.1 ... 999999 s
Default value	5.0 s

Titrimo

Range	1 ... 999999 s
Default value	5 s

5.6.6.3.4.4 DOS pH - Stop conditionsTab: **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.

Titrande, 855

Range	0.00000 ... 9999.99 mL
Default value	100.000 mL
Selection	off

off

Means that no stop will take place.

Titrimo

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

Titrande, 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.

Titrande, 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.

Titrande, 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.

Titrande, 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 **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.

Titrandu, 855

Range	-20.0 ... 150.0 °C
Default value	-20.0 °C

Titirino

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.

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 **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.

Wait for [Continue]

Reagent dosing in the current **DOS** command is interrupted and a message appears. As soon as the monitored temperature is again within the limits (including hysteresis) reagent dosing can be resumed by pressing on **[Continue]** in this message box.

Wait for limit ok

Reagent dosing in the current **DOS** command is interrupted. As soon as the monitored temperature is once again within the limits (including hysteresis), reagent dosing will be resumed automatically.

none

No action will be taken if limits are exceeded.

Track call on limit exceeding

In this table, which cannot be edited directly, max. 20 entries can be defined for the track that is to be started automatically when a particular limit is exceeded.

[New]

Opens the dialog window **Track call** in which the parameters for a new track call can be entered (see Chapter 5.6.6.3.3, page 1045).

[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 1045).

[Delete]

Deletes the track call selected in the table.

5.6.6.3.4.6 DOS pH - Additional measured values

Tab: **Method** ▶ **DOS pH** ▶ **Properties...** ▶ **Additional measured values**

Command name

Name of the command.

Input	25 characters

A maximum of 6 additional measured values can be defined on this tab which can then be saved together in additional measured value columns with the measured values present in the default settings.

Additional calculated measured values

Additional calculated measured values

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

If this option is enabled, then a maximum of 3 new measured values can be calculated from existing measured values and saved, which can also be presented as curves under the designation **Calculated 1...3** and used in formulas as variables '**Command name.CA1...3**'.

[New]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be entered (see Chapter 5.6.3.10.1, page 857).

[Properties]

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).

[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 5.6.3.10.2, page 858*).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[Delete]

Deletes the external measured value selected in the table.

5.6.6.3.5 DOS U**5.6.6.3.5.1 DOS U - Overview**

Dialog window: **Method ▶ DOS U ▶ Properties... ▶ DOS U - 'Command name'**

Command for **controlled dosing** with measured value U.

Devices

This command can be executed with the following devices:

Titrande: 835, 836, 842, 857, 902, 906, 907

Titrimo: 718, 736, 751, 799

pH/Ion Meter: 867

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



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 $\times (1 \dots 3)$ 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 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.

Titrandu

Selection	1 2 3 4
Default value	1

Titrimo

Selection **internal D0**

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

No tests will be carried out.

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

Dosing device

Titrande				
Selection	1	2	3	4
Default value	2			

■■■■■■■■ 1065

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, **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 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 Titrinos.

5.6.6.3.5.3 DOS U - Dosing parameters

Tab: **Method** ▶ **DOS U** ▶ **Properties...** ▶ **Dosing parameters**

Command name

Name of the command.

Input	25 characters

The volume to be added, the dosing rate and the dosing time are defined on this tab.

Dosing criterion

Selects the two parameters that can be preset for dosing. The third parameter is calculated automatically from the formula **Volume = dosing time * dosing rate** and is not shown (*see Chapter 5.6.6.3.2, page 1042*).

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.

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

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.

Titrande, 855

Range	-2000.0 ... 2000.0 mV
Default value	-2000.0 mV

Titrimo

Range	-2000 ... 2000 mV
Default value	-2000 mV

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.

Range	0.0 ... 2000.0 mV
Default value	2.0 mV

Upper limit of the measured value. If the measured value exceeds this limit, then the event **Measured value upper limit exceeded** is triggered.

Range	-2000.0 ... 2000.0 mV
Default value	2000.0 mV

Range	-2000 ... 2000 mV
Default value	2000 mV

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.

Range	0.0 ... 2000.0 mV
Default value	2.0 mV

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

The running **DOS** command is quit, then the exit track (if present) is started and the determination is stopped.

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.

Titrand, 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.

Titrand, 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

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, a maximum of 20 entries can be defined as to which track is to be started automatically when a particular limit value 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 1045*).

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 1045*) .

Deletes the track call selected in the table.

Tab: **Methods** ▶ **Commands** ▶ **DOS U** ▶ **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 5.6.3.10.1, page 857*).

Opens the dialog window **Calc. measured value #** in which the parameters for the additional measured value can be edited (*see Chapter 5.6.3.10.1, page 857*).



[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 5.6.3.10.2, page 858).

[Properties]

Opens the dialog window **External measured value #** in which the parameters for the external measured value can be edited (*see Chapter 5.6.3.10.2, page 858*).

[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:

Titrand: 808, 809, 835, 836, 841, 842, 851, 852, 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

Appearance

The command has the following appearance:



Parameters

The parameters for the command **LQH** are configured on the following 2 tabs:

- *General/Hardware*
Parameters for device and dosing device.
- *Parameters*
Parameters for adjusting the Liquid Handling function.

Command variables

The following command variables are generated in the method run by the command **LQH** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.CONC	Concentration of the solution used for the command
.CYL	Cylinder volume of the exchange or dosing unit used for the command
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.TITER	Titer value of the solution used for the command
.VOL	Currently dosed volume

5.6.6.4.2 LQH - General/Hardware

Tab: **Method** ▶ **LQH** ▶ **Properties...** ▶ **General/Hardware**

Command name

Name of the command.

Input **25 characters**

The general parameters for the device and for the dosing device are defined on this tab.

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.



Exchange position

With this function the cylinder is filled via the given port first. The valve disc is then turned to **Port 2** and the dosing unit can be removed from the dosing drive.

Change port

With **Change port** the valve disc is only moved to the given port; no piston movement takes place.

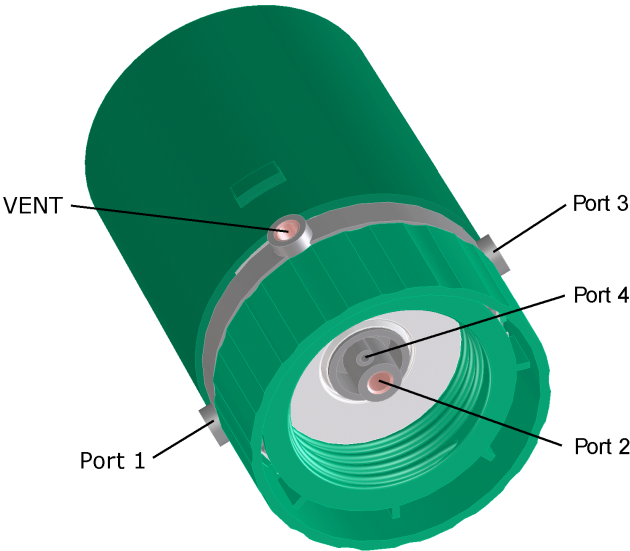
Compensate

As the dosing units are exchangeable, the coupling of the Dosino piston rod (spindle) has a low mechanical tolerance that can be noticed when the piston changes its direction of movement. This tolerance can be compensated for with the **Compensate** function. A short piston movement is first made in the same direction as the previous movement, which is then followed by a piston movement in the reverse direction.

Port

The port where each function is to be carried out needs to be defined for each liquid handling command.

Selection	1	2	3	4
1	Default setting for Dosing and Aspirate			
2	Default setting for Fill, Exchange position and Change port			
4	Default setting for Eject to stop, Eject to end volume and Compensate			



Volume

Enter the volume to be moved. This parameter is available only for the **Functions Dosing or Aspirate**.

Range	0.00000 ... 99999.9 mL
Default value	10.0000 mL

Range	0.00000 ... 50.0 mL
Default value	10.0000 mL

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

5.6.6.5.1 PREP - Overview

Command for **Rinsing cylinder and tubing** of an exchange or 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:



Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Dosing device

Dosing device

Selection of the dosing device to be prepared. All the dosing device connections which are possible with the selected device type are displayed.

Titrando, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789, 814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

730, 774

Selection	1 2 3 4 5 6 7 8 9 10 11 12
Default value	1

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.

Identifi- cation	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

5.6.7 Automation commands

5.6.7.1 Automation commands - Overview

Menu item: **Method ▶ Paste ▶ New command... ▶ Automation**

Commands for the operation of Sample Processors.

The following eight automation commands can be selected:

- *MOVE*
Moving to a rack position or an external position.
- *SWING*
Swinging of the robotic arm (with Swing Head only).
- *LIFT*
Moving to a lift position.
- *PUMP*
Switching on/off the connected or built-in pumps.
- *STIR*
Controlling a connected stirrer.
- *RACK*
Initialization of the rack attached.
- *HEATER*
Controlling the oven temperature of the 774 Oven Sample Processor.
- *FLOW*
Regulation of the gas flow of the 774 Oven Sample Processor.

5.6.7.2 MOVE

5.6.7.2.1 MOVE - Overview

Dialog window: **Method ▶ MOVE ▶ Properties... ▶ MOVE - 'Command name'**

Command for **moving to a rack position** (sample position or special beaker).

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **MOVE** are configured in the following dialog window:

- *MOVE - Properties*

Command variables

The following command variables are generated in the method run by the command **MOVE** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.RAN	Current, absolute rotation angle of the rack in ° in relation to the axis of the selected tower (entry when ending the command)
.RPO	Current rack position (entry at time of ending the command); 0 means 'not defined'
.SAN	Current, absolute swing angle of the robotic arm in ° (entry upon ending the command)

5.6.7.2.2 MOVE - Properties

Dialog window: **Method ▶ MOVE ▶ Properties... ▶ MOVE - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Target

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	1 2
Default value	1

Move

Selecting the target position on the rack:

Selection	Sample position Rack position Special beaker Relative angle
Default value	Sample position

Sample position

Position defined for the current determination in the **Run** subwindow of the program part **Workplace** as the **Sample position** parameter.

Rack position

Absolute position on the rack.

Special beaker

Special position on the rack defined in the rack properties of the **Configuration** program part.

Relative angle

The sample rack can be rotated by a certain angle relative to the current position independently of rack positions. This can be used for example to remove vial caps automatically.

Number

Specification of the number of the rack position. This parameter is only visible for **Move = Rack position** or **Special beaker**. The rack position can be entered as a formula as well, which is necessary for the automatic calibration of electrodes, for example. The formula editor is opened by right-clicking on the input field.

Move = Rack position

Range	1 ... 999
Default value	1

Move = Special beaker (for 778, 789, 814, 815, 855, 864, 874)

Range	1 ... 16
Default value	1

Move = Special beaker (for 730)

Range	1 ... 8
Default value	1

Move = Special beaker (for 774)

Input	1

Move angle

This parameter specifies the angle by which the sample rack should be rotated relative to the current position. It is only visible for **Move = Relative angle**.

778, 789, 814, 815, 855, 864, 874

Range	-259.90 ... 259.90 °
Default value	5.00 °

Beaker test

Selection of the action to be carried out if the beaker sensor defined for the rack does not detect any beakers at the target position. If the **robotic arm** is selected as the beaker sensor, then a Swing Head must be installed. A work position also defined in the rack data must also be defined in such a way that a contact exists between beaker sensor and beaker. This work position will be approached automatically for beaker recognition after the command **MOVE**. This section is not visible when **Move = Relative angle**.

Selection	Display message Stop determination Stop determination and series
Default value	Display message

Display message

A message is displayed and the determination is stopped.

Stop determination

The determination is stopped and the next determination of the series is started.

Stop determination and series

The determination as well as the series are stopped. An Exit track will be started if there is one defined.

Parameters

Shift rate

Selection of the speed at which the sample rack rotates.

Range	3 ... 20 °/s
Default value	20 °/s

Shift direction

Selection of the shift direction of the sample rack.

Selection	auto + –
Default value	auto

auto

The direction of rotation with the smallest angle of rotation is selected automatically.

+

Rack rotates counterclockwise.

–

Rack rotates clockwise.

Swing rate

Selects speed of the robotic arm when moving to a rack position or a special beaker (only with multiple row sample racks).

778, 789, 814, 815, 855, 864, 874

Range	10 ... 55 °/s
Default value	55 °/s

5.6.7.3 SWING

5.6.7.3.1 SWING - Overview

Dialog window: **Method ▶ SWING ▶ Properties... ▶ SWING - 'Command name'**

Command for **swinging the robotic arm**. This command is only executable if the Sample Processor is equipped with a **786 Swing Head** with a robotic arm.

Devices

This command can be executed with the following devices:

Sample Processor: 778, 789, 814, 815, 855, 864

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Target**Tower**

Selecting the tower of the Sample Processor for moving the robotic arm to the required position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	1 2
Default value	1

Swing

Selecting the target position for the robotic arm.

Selection	External position Maximum angle Relative angle
Default value	External position

External position

Swinging to one of the 4 external positions available for each tower. They are defined in the Tower properties of the Sample Processor.

Maximum angle

Swinging outwards to the maximum permissible angle (*see Chapter 7.11.7, page 1370*).

Relative angle

Swinging by the specified swing angle relative to the current position. This can be used for example to remove vial caps automatically.

Number

Indicates the number of the external position which is to be swung to. This parameter is only visible for **Swing = External position**.

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
.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.

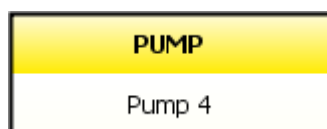
If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types 814 USB Sample Processor
Default value	814 USB Sample Processor

Range	5 ... 25 mm/s
Default value	25 mm/s

Range	3 ... 25 mm/s
Default value	25 mm/s

Range	3 ... 12 mm/s
Default value	12 mm/s



Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.7.5.2 PUMP - Properties

Dialog window: **Method ▶ PUMP ▶ Properties... ▶ PUMP - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined

Default value **not defined**

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection **Device types** 814 USB Sample Processor

Default value **814 USB Sample Processor**

Pumps

Tower

Selection of the tower of the Sample Processor for moving to the required lift position. Both Tower 1 and Tower 2 can always be selected even if the Sample Processor has only one tower.

Selection	1 2
Default value	1

Pump(s)

Selection of the pump that is to be actuated. The pump(s) can either be built-in or externally connected. With **1+2** both pumps at the selected tower will be switched at the same time.

Selection	1 2 1+2
Default value	1

1

Pump 1 is actuated.

2

Pump 2 is actuated.

1+2

Both pumps at the selected tower will be switched at the same time.

Actions

Selection	Switch on Switch off Duration
Default value	Switch on

Switch on

Switch on the pump(s).

Switch off

Switch off the pump(s).

Duration

Switch on the pump(s) for a particular period.

Range	0 ... 9999.9
Default value	10.0

Selection	s min
Default value	s

5.6.7.6 STIR

5.6.7.6.1 STIR - Overview

Dialog window: **Method ▶ STIR ▶ Properties... ▶ STIR - 'Command name'**

Command for **controlling a connected stirrer**.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 890, 901, 902, 904, 905, 906, 907

Titrim: 751, 758, 784, 785, 795, 798, 799

Conductometer: 856

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.

Titrande, 730, 846, 856, 867

Selection	1 2 3 4
Default value	1

778, 789

Selection	T1 T2 (tower stirrer) 1 ... 3 (MSB stirrer)
Default value	T1

814, 815, 855, 864, 874

Selection	1 2 3
Default value	1

Titrimo, 756, 831

Selection	1



Stirrer type

Display of the stirrer type. **Unknown** is displayed either with devices unable to read out the stirrer type or if no stirrer is connected

Selection	801 Magnetic Stirrer 802 Rod Stirrer 803 Ti Stand magnetic stirrer 804 Ti Stand rod stirrer unknown

Stirring rate

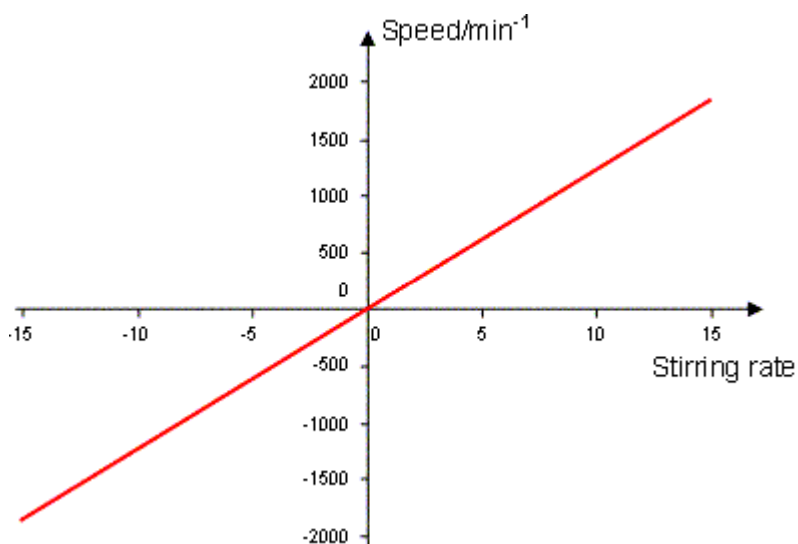
Setting the stirring rate or rotational speed. The algebraic sign of the stirring rate changes the direction in which the stirring is done. The default setting **8** corresponds to a rotational speed of 1000 rpm.

Titrandos, 814, 815, 846, 855, 856, 867, 864, 874

Range	-15 ... 15
Default value	8

730, 778, 789

Range	0 ... 15
Default value	8



Action

Selection	Switch on Switch off Period of operation
Default value	Switch on

Switch on

Switch on the stirrer. The stirrer keeps switched on after the command has finished.

Switch off

Switch off the stirrer.

Period of operation

The stirrer can be switched on for a particular period.

Range	0 ... 9999.9
Default value	10.0
Selection	s min
Default value	s

5.6.7.7 RACK

5.6.7.7.1 RACK - Overview

Dialog window: **Method ▶ RACK ▶ Properties... ▶ RACK - 'Command name'**

Command for **initialization of the attached sample rack**. The rack, lift and robotic arm (if present) are reset, the rack code is read off and the corresponding rack data is transferred to the Sample Processor.

Devices

This command can be executed with the following devices:

Sample Processor: 730, 774, 778, 789, 814, 815, 855, 864, 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **RACK** are configured in the following dialog window:

- *RACK - Properties*

Command variables

The following command variables are generated in the method run by the command **RACK** and can be used in formulas under the designation '**Command name.Variable designation**':

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

5.6.7.8 HEATER

5.6.7.8.1 HEATER - Overview

Dialog window: **Method ▶ HEATER ▶ Properties... ▶ HEATER - 'Command name'**

Command for **controlling the oven temperature**.

Devices

This command can be executed with the following devices:

Sample Processor: 774 and 874

Appearance

The command has the following appearance:



Parameters

The parameters for the command **HEATER** are configured in the following dialog window:

- *HEATER - Properties*

Command variables

The following command variables are generated in the method run by the command **HEATER** and can be used in formulas under the designation '**Command name.Variable designation**':

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) = Com- mand has never been ended

5.6.7.8.2 HEATER - Properties

Dialog window: **Method ▶ HEATER ▶ Properties... ▶ HEATER - 'Command name'**

Command name

Name of the command.

Input **25 characters**

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	774 Oven Sample Processor 874 Oven Sample Processor
Default value	874 Oven Sample Processor

Heater

Target temperature

Temperature to which the oven has to be heated. With **init.temp.** the oven heating is switched on at the same time as the device and the oven is heated up to this temperature. The initial temperature must be defined on the device itself and is displayed only in the device configuration.

Range	50 ... 250 °C
Selection	Initial temp.
Default value	Initial temp.



Note

It is advisable to define an initial temperature if you work always at the same temperature.

Heating time

The target temperature has to be reached within this time. The heating rate can be modified with the heating time in order to program temperature ramps or entire temperature profiles (with several **HEATER** commands).

Off causes heating at the maximum possible heating rate (see device manual).

Range	1 ... 999 min
Selection	off
Default value	off

Timeout

If the **Target temperature** is not reached within the defined **Heating time** then this waiting time will start. This parameter is only visible if a **Heating time** has been defined.

Range	1 ... 999 min
Selection	off
Default value	off

Action if timeout expires

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

If this option is enabled, then an action can be defined which is to be carried out if the target temperature has not yet been reached after expiry of the maximum waiting time (is displayed only when **Timeout** $\neq$ **off**).

Selection	Display message Stop determination Stop determination and series
Default value	Display message

Display message

A message is displayed and you can choose whether you want to continue the run or cancel it.

Stop determination

The determination is stopped and the next determination of the series is started.

Stop determination and series

Both the determination and the series are stopped and the exit track will be started (if available).

5.6.7.9 FLOW

5.6.7.9.1 FLOW - Overview

Dialog window: **Method** ▶ **FLOW** ▶ **Properties...** ▶ **FLOW - 'Command name'**

Command for **controlling the gas flow**.

Devices

This command can be executed with the following devices:

Sample Processor: 774, 874

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead.

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	774 Oven Sample Processor 874 Oven Sample Processor
Default value	874 Oven Sample Processor

Gas

Gas type

Gas type of the carrier gas.

Selection	Air Nitrogen other gas
Default value	Air

Gas flow factor

Factor for the correct determination of the gas flow. This parameter is only visible for **Gas type = other gas**. The values for frequently used carrier gases are listed in the device manuals.

Range	0.001 ... 9.999
Default value	1.000

Gas flow

Inlet

Selection of the inlet of the carrier gas

Selection	Pump Valve
Default value	Pump

Pump

Use of ambient air as carrier gas.

Valve

Use of gas out of a compressed gas cylinder.

Flow rate

<i>874</i>	
Range	10 ... 150 mL/min
Default value	50 mL/min

Gas flow

Selection	Switch on Switch off
Default value	Switch on

Switch on

Switches on the gas flow.

Switch off

Switches off the gas flow.

5.6.8 Result commands

5.6.8.1 Result commands - Overview

Menu item: **Method ▶ Paste ▶ New command... ▶ Results**

Commands for the **calculation, storage and output of results.**

The following four result commands can be selected:

- *CALC - Overview*
Calculation of intermediate and end results, titer values and common variables.
- *DATABASE - Overview*
Storage of the determination data in data bases.
- *REPORT - Overview*
Output of a report defined by a report template.
- *EXPORT - Overview*
Export of determination data.

5.6.8.2 CALC

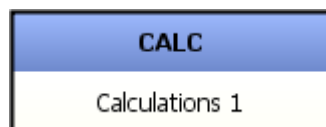
5.6.8.2.1 CALC - Overview

Dialog window: **Method** ► **CALC** ► **Properties...** ► **CALC - 'Command name'**

Command for the **calculation of intermediate and end results** and the assignment of titer values and common variables.

Appearance

The command has the following appearance:



Result table

All defined results are displayed in the Result table in the properties window of the command **CALC**.

Result parameters

The parameters for the individual results on the results table are configured on the following 3 tabs:

- *Definition*
Entering the formula, assigning the unit and switching the statistics on/off.
- *Monitoring*
Settings for result monitoring.
- *Options*
Saving the result as common variable or as titer.

Command variables

The following command variables are generated in the method run by the command **CALC** and can be used in formulas under the designation '**Command name.Variable designation**':

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

Result variables

The following result variables are defined in the **CALC** command and can be used in formulas under the designation '**RS.ResultName.Variable designation**':

Identifica- tion	Description
.VAL	Result value, optional, i.e. ' RS.RS01 ' = ' RS.RS01.VAL '
.ASD	Absolute standard deviation for the result
.MAX	Maximum value of the result
.MIN	Minimum value of the result
.MNV	Mean value of the result
.NSR	Statistics actual counter for the result
.NST	Statistics setpoint counter for the result

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 1113).

[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 1115*).

[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 1120*).

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 1114).

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 1115).

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.	

Select result variable

All of the result variables of the formula template will be listed.

'Variable'

Selection of the result variable.

Selection	'Result variable'
'Result variable'	
Selection of a result variable defined in the method.	

Enter constant

All of the constants of the formula template will be listed.

'Constant'

Entering the constants.

Range	-1.0E+99 ... 1.0E+99 (max. 15 places)
Default value	'empty'



Opens molar mass calculator for entering molar masses (*see Chapter 2.4.5, page 78*).

5.6.8.2.5 CALC - Result properties

5.6.8.2.5.1 Result - Definition

Tab: **Method** ► **CALC** ► **Properties...** ► **[New]** ► **[Continue]** ► **Result - Definition**

The result calculation is defined on this tab.

Result name

Name of the result. This name will be shown in the result display as well as in the report. The result name can be used in further calculations as variable **RS.Result name.VAL**.

Input	50 characters
Default value	Res01 ... Res025

Formula

Display of the calculation formula of the result. The formula editor to enter the calculation formula is opened with a click on  or by double-clicking in the window in which the formula can be entered (*see Chapter 2.4, page 23*). The result of the calculation formula defines the result type (**Number**, **Text** or **Date/time**).

Input	1000 characters



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!

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

Description

Input	1024 characters

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 1121*).

5.6.8.2.5.2 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

into the text field (see *Chapter 2.5.2, page 79*). The formula editor can also be called up inside the text field (see *Chapter 2.4, page 23*).

Input	Text (unlimited)

Display message

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

If this option is enabled, all active tracks are stopped and the message defined in the text box will be displayed in the event that the limits are exceeded. You can choose whether you want to continue the stopped tracks with **[Continue]** or - if defined - to execute the **Action** listed below.

Record message

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

If this option is enabled, the message defined in the text box will be documented in the determination if the limits are exceeded. The run will not be stopped.

Message by E-mail

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

If this option is enabled, the message defined in the text box will be sent to the address defined under **[E-mail]** in the event that the result limits are exceeded.

[E-mail]

Opens the dialog window Send E-mail for defining the E-mail parameters (see Chapter 2.6.1, page 81).

Acoustic signal

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

If this option is enabled, an acoustic signal will be emitted in addition to the message defined above when a limit is exceeded.

Action

Action

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

If this option is enabled, one of the following actions will be executed in the event that limit values are exceeded.

Selection	Stop determination Stop determination and series
Default value	Stop determination

The determination is stopped and the next determination of the series is started.

The current determination and the series are terminated.

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 1121*).

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.

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 1280*). 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.

The result is saved as new value for this common variable.

Selection	List of all the common variables defined



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 1280).



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 27*).

Save result as titer

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

If this option is enabled, then the result will be saved as a titer under the selected name. If statistics is activated for this result, then the current mean for this result will automatically be saved as titer.

Solution name

Name of the solution for which the result is to be saved as titer.

Selection	List of all the solutions defined



Note

If no solutions have been defined, then the combo box will be empty. The creation of solutions is described in the configuration (*see Chapter 6.6.1, page 1233*).

[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 1121*).

5.6.8.2.6 **CALC - Result templates**

5.6.8.2.6.1 **Manage result templates**

Dialog window: **Method ▶ CALC ▶ Properties... ▶ [Templates]**

Result templates can be renamed and deleted in the **Managing templates** dialog window.

Templates

A result template can be renamed or deleted.

Selection	'Result templates' 'empty'
Default value	'empty'

Description

Displaying the description of the selected result template.

[Rename]

Renames the selected result template.

[Delete]

Deletes the selected result template.

5.6.8.2.6.2 Save result template

Dialog window: **Method** ► **CALC** ► **Properties...** ► **[New]** ► **[Continue]** ► **[Save as template]** ► **Save result template**

Name of result template

The result template is saved under this name in the configuration database.

Input	100 characters
Default value	'Result name'

Description

Freely definable description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

Input	1000 characters

5.6.8.2.6.3 Rename result template

Dialog window: **Method ▶ CALC ▶ Properties... ▶ [Templates] ▶ [Rename] ▶ Rename result template**

Name of result template

New name under which the result template is saved globally in the configuration database.

Input	100 characters
Default value	'Name of result template'

Description

Freely definable description of the result template. This description is displayed in the dialog windows **New result** and **Manage templates**.

Input	1000 characters

5.6.8.3 DATABASE

5.6.8.3.1 DATABASE - Overview

Dialog window: **Method** ▶ **DATABASE** ▶ **Properties...** ▶ **DATABASE - 'Command name'**

Command for the storage of determination data in one or more **databases**.



Note

Several **DATABASE** commands can be inserted in a method, but only one **DATABASE** command may be processed in a determination, otherwise the determination will be stopped.

Name of the database in which the determination data is stored.

Opens the dialog window **Database - New** for the selection of a new database.

The dialog window **Database - 'Database name'** in which a different database can be selected.

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.

5.6.8.4.1 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.

PDF file

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

The report is stored as PDF file in the directory selected if this option is activated. A click on  opens the dialog window **Save**, in which the desired directory is selected and a name for the PDF file can be entered.

Send E-mail

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

The PDF file is additionally sent to the E-mail address defined under **[E-mail]** if this option is activated.

[E-Mail]

Opens the window **Send E-mail** for defining the E-mail parameters (see Chapter 2.6.1, page 81).

5.6.8.5 EXPORT

5.6.8.5.1 EXPORT - Overview

Dialog window: **Method ▶ EXPORT ▶ Properties... ▶ EXPORT - 'Command name'**

Command for the **Exporting determination data**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **EXPORT** are configured in the following dialog window:

- *EXPORT - Properties*

Command variables

The following command variables are generated in the method run by the command **EXPORT** and can be used in formulas under the designation **'Command name.Variable designation'**:

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started

Identification	Description
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.8.5.2 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 244).

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.

5.6.9.2 CTRL

5.6.9.2.1 CTRL - Overview

Dialog window: **Method** ► **CTRL** ► **Properties...** ► **CTRL** - 'Command name'

Command for **Setting remote output lines**.

Devices

This command can be executed with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 851, 852, 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 (* devices with only 3 output lines)

Dosing Interface: 846

Coulometer: 756, 831

pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Spectrometer: Avantes

Appearance

The command has the following appearance:



Parameters

The parameters for the command **CTRL** are configured in the following dialog window:

- 5.6.9.2.2 CTRL - Properties

Command variables

The following command variables are generated in the method run by the command **CTRL** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started

Set lines

Output signal

Input of the binary pattern for the output signal or selecting a predefined signal pattern.

It is possible to enter the following characters:

0 = line inactive

1 = line active

***** = any line status

p = set pulse (pulse length = 200 ms). If an impulse with a different length is to be emitted, a corresponding template must be defined.

Titrande, 855, 856, 867, 751, 756, 758, 784, 785, 795, 798, 799, 831, Sample Processor

Selection	Bit-pattern with exactly 14 characters (0, 1, *, p) ***** Signal pattern
Default value	*****

702, 716, 718, 719, 720, 721, 736, 794

Selection	Bit-pattern with exactly 8 characters (0, 1, *, p) ***** Signal pattern
Default value	*****

Spectrometer

Selection	Bit-pattern with exactly 10 characters (0, 1, *, p) ***** Signal pattern
Default value	*****

The bits are numbered from right to left:

Output 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Bit 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Example:

*******1*** sets the output line 1 to enabled (= set), which would result in a stop command for a connected Titrino, for example. *******0*** sets the line to inactive.



Note

We recommend masking the irrelevant output lines with an asterisk * so as not to modify these line conditions.



Note

For Titrinos with 3 output lines: only the first 3 characters are used.

5.6.9.3 SCAN

5.6.9.3.1 SCAN - Overview

Dialog window: **Method ▶ SCAN ▶ Properties... ▶ SCAN - 'Command name'**

Command for **scanning** remote input lines.

Devices

This command can be executed only with the following devices:

Titrand: 808, 809, 835, 836, 841, 842, 851, 852, 857, 888, 890, 901, 902, 904, 905, 906, 907

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

Dosing Interface: 846

Coulometer: 756, 831

Conductometer: 856

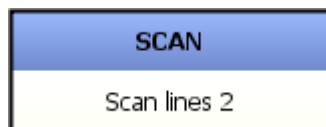
pH/Ion - Meter: 867

Sample Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Appearance

The command has the following appearance:



Parameters

The parameters for the command **SCAN** are configured in the following dialog window:

- *SCAN - Properties*

Command variables

The following command variables are generated in the method run by the command **SCAN** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has never been started
.FIN	Command status; 1 = Command has ended at least once, 0, invalid (variable not available) = Command has never ended
.TOU	Timeout status: 1 = Timeout expired; 0 = Timeout not expired

5.6.9.3.2 SCAN - Properties

Tab: Method ▶ SCAN ▶ Properties... ▶ SCAN - 'Command name'

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types Titrando
Default value	Titrando

Remote box

Selection of the remote box at which the lines are to be scanned.

Titrandos, 856, 867, 814, 815, 855, 864, 874

Selection	1	2	3	4
Default value	1			

Scan lines

Input signal

Input of the binary pattern for the expected input signal or selecting a pre-defined signal pattern.

It is possible to enter the following characters:

0 = line inactive

1 = line active

* = any line status

Selection	Bit-pattern with 8 characters (0, 1, *) *****
	 Signal pattern
Default value	*****

The bits are numbered from right to left:

Input 7 6 5 4 3 2 1 0

Bit	7	6	5	4	3	2	1	0

Example:

*******1** expects an active input line 0 (**1** = set). For example, this line is set by a Titrimo after a titration has been completed and the Titrimo can accept a start signal again.



Note

Input lines that are of no interest or for which no defined condition can be predicted should also be masked with an asterisk *.

Max. waiting time

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

If this option is activated, then a maximum waiting time can be entered for the input signal.

Range	0 ... 9999.9
Default value	10

Selection	min s
Default value	s

5.6.9.4.1 SEND - Overview

Command for **Sending event messages** to commands, tracks or to *tiago*.

The command has the following appearance:

The parameters for the command **SEND** are configured in the following dialog window:

The following command variables are generated in the method run by the command **SEND** and can be used in formulas under the designation '**Command name.Variable designation**':

Dialog window: **Method** ▶ **SEND** ▶ **Properties...** ▶ **SEND - 'Command name'**

Name of the command.

Input	25 characters



Note

A maximum of 10 event messages can be entered.

[New]

Opens the dialog window **Send event message** for entering a new event message (see *Chapter 5.6.9.4.3, page 1134*).

[Properties]

Opens the dialog window **Send event message** to edit the event message selected in the table (see *Chapter 5.6.9.4.3, page 1134*).

[Delete]

Deletes the selected event message.

5.6.9.4.3 SEND - Send event message

Dialog window: **Method ▶ SEND ▶ Properties... ▶ [New]/ [Properties] ▶ Send event message**

Recipient

Selection of the type of recipient.

Selection	System Command
Default value	System

Selection

Selection of the recipient address. All of the command names already defined in the method are available for **Recipient Command**. This field is empty and cannot be edited for **Recipient System**.

Selection	'Command name' 'empty'
Default value	'empty'

Event message

Selection of the event message to be sent. The following event messages can be selected depending on the type of recipient:

System

Selection	Quit Hold Stop
Default value	Quit

Command

Selection	Quit Hold Continue Start Titration
Default value	Quit

Recipient	Selection	Event message	Significance
System	-	Hold	Hold determination (all tracks). This corresponds to the [Hold] button in the dialog window Run in the program part Workplace .
System	-	Quit	Cancel determination (Series continues).
System	-	Stop	Stop determination and series. This corresponds to the [Stop] button in the dialog window Run in the program part Workplace .
Command	All track commands	Hold	Hold selected track.
Command	All track commands	Continue	Continue selected track.
Command	All track commands	Quit	Cancel selected track. If the selected track contains a command being conditioned, conditioning is only stopped if the option Automatic conditioning is disabled in the command START .
Command	All commands	Hold	Hold selected command. Also valid for conditioning.
Command	All commands	Continue	Continue selected command. Also valid for conditioning.
Command	All commands	Quit	Cancel selected command. If the selected command is being conditioned, conditioning is only stopped if the option Automatic conditioning is disabled in the command START .

Command variables

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

Dialog window: **Method** ► **RECEIVE** ► **Properties...** ► **RECEIVE - 'Command name'**

Name of the command.

Default value	Wait until all conditions are met

Waits until **all** conditions listed in the table below are fulfilled.

Waits until **one** of the conditions listed in the table below is fulfilled.

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 1138*).



■■■■■■■ 1137



[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 1138*).

[Delete]

Deletes the selected event message.

Timeout

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

If this option is activated, then a maximum waiting time for event messages can be entered. If none of the conditions defined above are fulfilled after this time period, the command is canceled and the next command in the sequence is executed.

Value

Range	0 ... 9999.9
Default value	0

Unit

Selection	min s
Default value	s

Message

This message is displayed in the live window while waiting for the condition defined above. The text editor for entering or changing the message is

opened with or by double-clicking into the text field.

5.6.9.5.3 RECEIVE - Wait for event/status

Dialog window: **Method ▶ RECEIVE ▶ Properties... ▶ [New]/[Properties] ▶ Wait for event/status**

Command

Name of the command whose event message or status is to be waited for.

Selection	Command

Event message

Selection of the event message to be waited for, or of the status to be waited for. The following event messages and statuses can be selected.

Selection	Event message Start
Default value	Start

Event/ Status	Type	Significance	Com- mands
Start	Event	Command has been started.	All
End	Event	Command has been finished.	All
Dosing	Event	The dosing of the titration has been started.	DET, MET
Measure	Event	The measurement of the titration has been started.	DET, MET
Busy	Status	System is in status BUSY, HOLD or ERROR .	All
Finished	Status	Command has been terminated at least once.	All
Cond	Status	The command is currently in Conditioning status (COND BUSY or COND HOLD); the Start drift has not yet been reached.	SET, KFT, KFC
Condok	Status	System is in Conditioning status (COND READY); the Start drift has been reached.	SET, KFT, KFC



Note

An **event** can only be received as such if the **RECEIVE** command has been activated at the time of the event. A **status**, on the other hand, can be queried at any time.

Comment

Comment on the event message

Input	250 characters
Default value	'empty'

5.6.9.6 TRANSFER

5.6.9.6.1 TRANSFER - Overview

Dialog window: **Method** ► **TRANSFER** ► **Properties...** ► **TRANSFER - 'Command name'**

Command for **data transfer via RS-232** to external devices.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **TRANSFER** are configured in the following dialog window:

- *TRANSFER - Properties*

Command variables

The following command variables are generated in the method run by the command **TRANSFER** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.TOU	Timeout status: 1 = Max. waiting time expired; 0 = Max. waiting time not expired

5.6.9.6.2 TRANSFER - Properties

Dialog window: **Method ▶ TRANSFER ▶ Properties... ▶ TRANSFER - 'Command name'**

Command name

Name of the command.

Input	25 characters

Device

Device name

Selection of a device from those available in the device table. The only devices which shall be offered are those with which the command can run.

Selection	'Device name' not defined
Default value	not defined

not defined

In this case, the device name must be assigned by the user at the start of the method.

Device type

Display or selection of the device type. If a device is selected under **Device name**, then this **Device type** field can no longer be edited, and the device type belonging to the selected device is displayed instead

If the option **not defined** is selected as **Device name**, any device types or device groups which are able to execute the command can be selected, independently of the devices in the device table.

Selection	Device types RS-232 device
Default value	RS-232 device

Transfer commands

The **Transfer commands** defined in the dialog window are sent in the sequence in which they are listed. The table cannot be edited directly.



Note

10 transfer commands can be entered at maximum.



Moves the selected command up (changes the sequence).



Moves the selected command down (changes the sequence).

[New]

Opens the dialog window **Transfer command** for entering a new transfer command (see Chapter 5.6.9.6.3, page 1142).

[Properties]

Opens the dialog window **Transfer command** for editing the transfer command selected in the table (see Chapter 5.6.9.6.3, page 1142).

[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



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

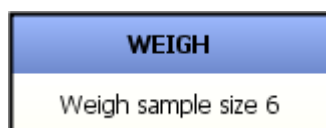
5.6.9.7.1 WEIGH - Overview

Dialog window: **Method** ► **WEIGH** ► **Properties...** ► **WEIGH - 'Command name'**

Command for **calling up the weight from a balance.**

Appearance

The command has the following appearance:



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

Character string that is sent via the RS-232 interface.

AND	
Input	S

Mettler	
Input	S

<i>Ohaus</i>	
Input	1S

Precisa	
Input	P1

Sartorius

Input **\1bP**

Shimadzu

Input **ID08**

Maximum time during which the balance data is waited for.

Range	0.0 ... 9999.9
Default value	1

Selection	min s
Default value	min

5.6.10.1 Miscellaneous commands - Overview

The following five commands can be selected:

5.6.10.2.1 REQUEST - Overview

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-weighting in KF titrations), the **REQUEST** command must be inserted in a track other than the one with the titration command with the option **Return immediately**.

Sample position

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

If this option is enabled, then the position of the sample on the rack will be queried.

ID1 ... ID16

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

If this option is enabled, then the sample identifications **ID1 ... ID16** will be requested. If other names were assigned to this variables in the **START** command, these these names will be displayed in the dialog window **Sample data request**.



Note

Text is selected as type in the default settings for the sample identifications **ID1 ... ID16**. If you wish to enter numbers for these method variables for use in later calculations, then these variables must be switched in the dialog window **Method variable - Sample position** to the type **number**. **START ▶ Properties... ▶ Method variables ▶ [Properties] ▶ Method variables - Sample position**

Sample size

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

If this option is switched on, then the sample size will be queried.

Sample size unit

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

If this option is switched on, then the sample size unit will be queried.

Message

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

If this option is enabled, then the message defined here will appear in the dialog window **Sample data request** in which the sample data is queried during the method run (see *Chapter 5.6.10.2.3, page 1150*). 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 79).

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.



Note

5.6.10.3 CALL

5.6.10.3.1 CALL - Overview

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:

- tiamo 2.1

[Delete]

Deletes the selected call.

Dialog window: **Method** ▶ **CALL** ▶ **Properties...** ▶ **[New]**

Text (can be edited to suit) for designating the call that is shown in the command presentation.

Selecting the track to be called. All the normal tracks defined in the method can be selected (with the exception of the main track).

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 23*).

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).

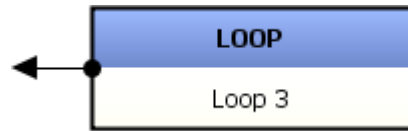
5.6.10.4.1 LOOP - Overview

Dialog window: **Method** ► **LOOP** ► **Properties..** ► **LOOP - 'Command name'**

Command for the **repeated execution of a command sequence**. The loop can be terminated after fulfilling various stop criteria.

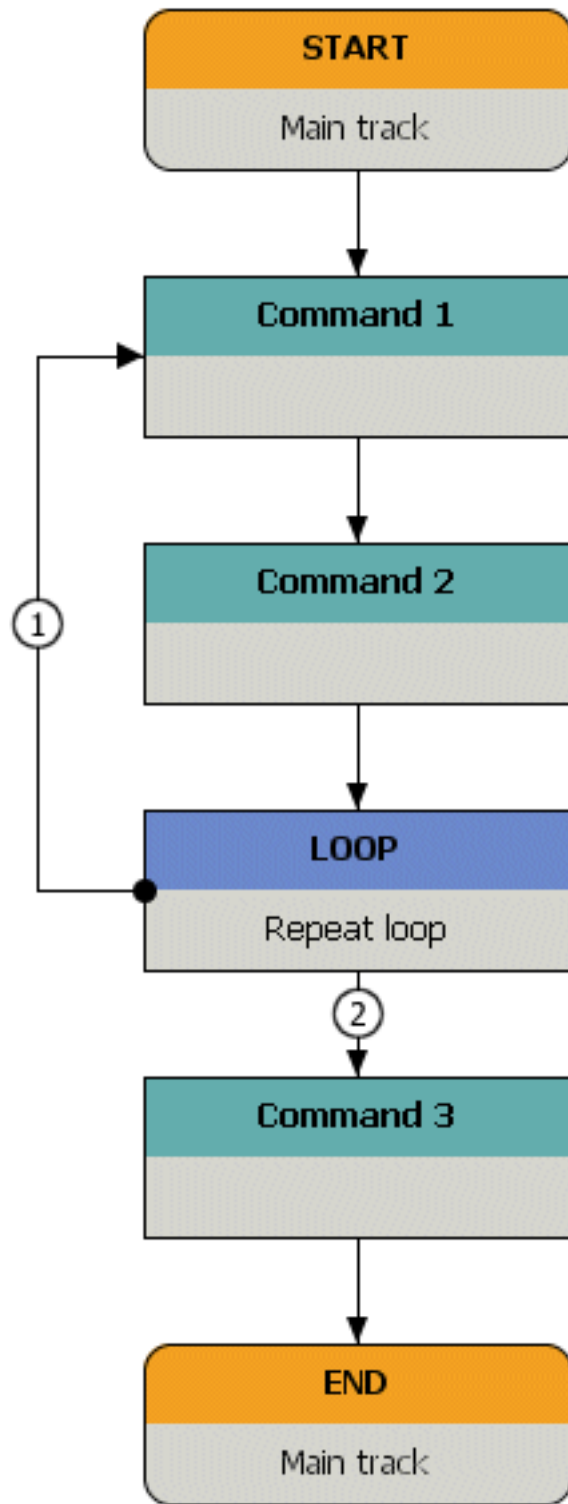
Appearance

The command has the following appearance:



A LOOP command just inserted has an arrow on the left-hand side with which a loop can be created by using the mouse to drag this arrow to the desired command in the same track. **Two different types of loops** will result, depending on whether the arrow has been dragged upward or downward:

Repeat loop



- ① Stop criterion not fulfilled
- ② Stop criterion fulfilled

The LOOP command is at the end of the loop for **Repeat loops**. As soon as one stop criterion is fulfilled (case 2), the command after the LOOP command is carried out. If no stop criterion is fulfilled, (case 1), the loop is run through again. In either case, the loop is run through at least once.

The LOOP command is at the beginning of the loop for **While loops**. If the arrow has been dragged to a command after the LOOP command, another arrow is automatically set from the previous command back to the LOOP command. As soon as one stop criterion is fulfilled (case 2), the command after the loop is carried out. If no stop criterion is fulfilled, (case 1), the loop is run through. It is possible with certain stop criteria that the loop is never run through.



Note

Nested and overlapping loops are not allowed.

Parameters

The parameters for the command **LOOP** are configured in the following dialog window:

- *LOOP*

Command variables

The following command variables are generated in the method run by the command **LOOP** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended
.LCO	Loop counter = current quantity of completed runs, both of Repeat loops and of While loops
.LST	Start time of the loop command (Date/Time)

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 23). If the condition is fulfilled (evaluation of the formula gives the result **1** = true), then the loop will be canceled when the LOOP command is called.

Input	1000 characters
Default value	'empty'

5.6.10.5 WAIT

5.6.10.5.1 WAIT - Overview

Dialog window: **Method** ▶ **WAIT** ▶ **Properties...** ▶ **WAIT - 'Command name'**

Command for halting the method run and for output of **messages**.

Appearance

The command has the following appearance:



Parameters

The parameters for the command **WAIT** are configured in the following dialog window:

- *WAIT*

Command variables

The following command variables are generated in the method run by the command **WAIT** and can be used in formulas under the designation '**Command name.Variable designation**':

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

Command name

Name of the command.

Wait

Selection	Stop track and waiting for [Continue] Stop all tracks and waiting for [Continue] Waiting time
Default value	Stop track and waiting for [Continue]

If this option is enabled, the track containing the **WAIT** command is stopped and a message is displayed. The method run can only be continued by pressing **[Continue]**.

If this option is enabled, all tracks currently running are stopped and a message is displayed. The method run can only be continued by pressing **[Continue]**.

If this option is enabled, the method run will be continued automatically after this waiting time. The text defined below under **Message** is displayed during the waiting time.

This parameter can only be edited for **Wait= Waiting time**

Message

Input	Text (unlimited)

Identification	Description
.BSY	Command status; 1 = BUSY, HOLD or ERROR; 0 = READY; invalid (variable not available) = Command has not ever been started
.FIN	Command status; 1 = Command has been ended at least once, 0, invalid (variable not available) = Command has never been ended

5.6.10.6.2 SEQUENCE - Properties

Dialog window: **Method** ▶ **SEQUENCE** ▶ **Properties...** ▶ **SEQUENCE - Sequence #**

Command name

Name of the command.

Input	25 characters

As many commands as one likes can be inserted in a **SEQUENCE** command. They will then be displayed in the command table, which contains information concerning **Command type** and **Command name**. The table itself cannot be edited. The individual lines in the table can be edited with a context-sensitive menu.



Moves the selected command up (changes the sequence).



Moves the selected command down (changes the sequence).

[New]

Opens the dialog window **New command** for selecting the desired command which is to be inserted at the end of the table (see Chapter 5.2.4.2.1, page 382).

[Properties]

Opens the dialog window for the selected command (see Chapter 5.2.4.2.1, page 382).

[Delete]

Deletes the selected command.

Copy

Cut

Use this context-sensitive menu item to delete the commands selected from the table and copy them onto the clip board.



Paste

Use this context-sensitive menu item to paste the commands at the end of the table that were copied onto the clip board.

6 Configuration

6.1 Configuration - General

6.1.1 Configuration - Definition

Program part: **Configuration**

Definition

Configuration is to be understood as all of the **tiamo** settings for devices, titrants/solutions, sensors, common variables and rack data. Configuration also includes methods, security settings, user administration, program administration, templates, and Audit Trail.

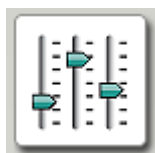
Organization

All configuration data is saved in the **configuration database**. In the local server systems (**tiamo light**, **tiamo full**) these are stored in the program directory of the computer on which the program has been installed. In client/server systems (**tiamo multi**) the configuration database is saved centrally on the server and contains all the configuration data of all computers (clients) that are connected to this server

6.1.2 Configuration - Desktop

Program part: **Configuration**

Configuration symbol



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

Elements

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

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



6.1.3 Configuration - Menu bar

6.1.3.1 Configuration - Main menus

Program part: **Configuration**

The menu bar in the program part **Configuration** includes the following main menu items:

- *File*
Export, import, backup, restore configuration data.
- *View*
Change layout, load view, save view, quick access to subwindows.
- *Tools*
User administration, security settings, program administration, Audit Trail, templates, options.
- *Help*
Open program help, display program information.

6.1.3.2 Configuration - Menu File

Program part: **Configuration**

Export...	Export configuration data (<i>see Chapter 6.3.1.1, page 1194</i>).
Import...	Import configuration data (<i>see Chapter 6.3.1.2, page 1196</i>).
Save ►	
Automatically	Save configuration data automatically (<i>see Chapter 6.3.2.1, page 1199</i>).
Manually	Save configuration data manually (<i>see Chapter 6.3.2.2, page 1200</i>).
Print (PDF)... ►	
 User administration	Outputs user administration data as PDF file (<i>see Chapter 6.2.1.1, page 1171</i>).
 Security settings	Outputs security settings as PDF file (<i>see Chapter 6.2.2.1, page 1180</i>).
 Logout...	Logout user (<i>see Chapter 2.2.3, page 16</i>).
Exit	Exit program.

6.1.3.3 Configuration - Menu View

Program part: **Configuration**

 **Change layout...** Modify layout of loaded configuration view (see Chapter 3.1.7.2, page 88).

 Load view...	Load a saved configuration view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view...	Save current configuration view (<i>see Chapter 3.1.7.4, page 89</i>).
Quick access	Open subwindow not contained in the current configuration view.
☒ Toolbar	Enable/Disable the toolbar display.

6.1.3.4 Configuration - Menu Tools

Program part: **Configuration**

 Manual control	Manually control the devices connected (<i>see Chapter 8.1, page 1417</i>).
 User administration...	Manage users and groups of users with access rights, signature rights and options (<i>see Chapter 6.2.1.1, page 1171</i>).
 Security settings...	Options for login, password protection, Audit Trail and electronic signature (<i>see Chapter 6.2.2.1, page 1180</i>).
Program administration...	General settings on local/server and client/server settings (<i>see Chapter 6.2.3.1, page 1190</i>).
 Audit Trail...	Open Audit Trail (<i>see Chapter 6.4, page 1212</i>).
Templates ►	
Custom calibration buffers...	Definition of own buffer series which will be automatically recognized when calibrating pH electrodes (<i>see Chapter 6.3.3.1, page 1202</i>).
Input lines...	Generate templates for scanning remote lines (<i>see Chapter 6.3.3.2.1, page 1203</i>).
Output lines...	Generate templates for setting remote lines (<i>see Chapter 6.3.3.3.1, page 1204</i>).
Options...	Set program options(<i>see Chapter 6.3.4.1, page 1209</i>).

6.1.3.5 Help Menu

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

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



6.1.4 Configuration - Toolbar

Program part: **Configuration**

 Change layout...	Modify layout of loaded configuration view (<i>see Chapter 3.1.7.2, page 88</i>).
 Load view...	Load a saved configuration view (<i>see Chapter 3.1.7.3, page 89</i>).
 Save view	Save current configuration view (<i>see Chapter 3.1.7.4, page 89</i>).
 User administration...	Manage users and groups of users with access rights, signature rights and options (<i>see Chapter 6.2.1.1, page 1171</i>).
 Security settings...	Options for login, password protection, Audit Trail and electronic signature (<i>see Chapter 6.2.2.1, page 1180</i>).
 Audit Trail...	Open Audit Trail (<i>see Chapter 6.4, page 1212</i>).
 Logout	Logout user (<i>see Chapter 2.2.3, page 16</i>).
 tiamo Help	Open tiamo Help.

6.1.5 Configuration - Subwindows

Program part: **Configuration**

Selection

In the main window the following subwindows can be displayed:

- *Devices*
Shows the automatically recognized and manually added devices.
- *Titrants/Solutions*
Shows the data for the automatically recognized and manually added titrants and auxiliary solutions.
- *Sensors*
Shows the data for all defined sensors.
- *Common Variables*
Shows the data for all defined common variables.
- *Sample solution (TC conductivity)*
Display of the data for the calculation of the temperature coefficient of a sample solution by means of the Chebyshev function.
- *Rack data*
Shows the data for all Metrohm sample racks.

Presentation

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

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

Via the menu item **View ► Quick access...** subwindows that are not in the current configuration view can be shown as a single window.

6.1.6 Configuration - Functions

Program part: **Configuration**

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

Views

- *Modify 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*
- *User*

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
- Save 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.

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

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

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.

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

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

Displays the subwindows that are shown in the view.





Move the selected subwindow upward (modifies sequence).



Move the selected subwindow downward (modifies sequence).

6.1.7.3 Load view

Dialog window: Workplace / Database / Configuration ▶ View ▶ Load view... ▶ Load view

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

Name

Name of the view that should be loaded.

[Rename]

Rename the selected view.

[Delete]

Delete the selected view.

[Load]

Load the selected view.

6.1.7.4 Save view

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

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.

Rename view

Dialog window: Workplace / Database / Configuration ▶ View ▶ Rename view... ▶ Rename view

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

Rename view to

Enter a new name for the view.

Input	50 characters

Delete view

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

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

6.2 Administration

6.2.1 User administration

6.2.1.1 User administration

Dialog window: **Configuration ▶ Tools ▶ User administration**

Overview

User groups and their users can be managed in the dialog window **User administration**. For each user group, access rights can be defined for menu items and functions, signature rights and default views for the individual program parts. For client/server systems, the user administration is globally valid for all connected clients (central user administration).

During installation, the three user groups **Administrators** (with the user **Admin1**), **Users** and **Removed users** (each without any users) are automatically generated. All groups can be renamed; the **Administrators** group is the only group that cannot be deleted.

The user administration data can be exported and imported. In this way this data can be exchanged between different client/server systems.

The user administration data can be output as PDF file using the menu item **File ► Print (PDF) ► User administration**.

Structure

The dialog window **User administration** is divided into two parts, the size of which can be modified with the mouse. In the left-hand part the user groups with their assigned users are listed in tree-form, the right-hand side shows details of the selected items.

Each user group, with the exception of the **Removed users** group, contains the following items:

- *Access rights*
Assigns access rights to the four program parts and their menu bars.
- *Signatures*
Assigns signature rights for methods and determinations.
- *Options*
Defines the view for the individual program parts.
- *Users*
Details of the users.

Functions

In the dialog window **User administration** the following functions can be carried out:

- *Add user groups*
- *Copy user groups*
- *Rename user groups*
- *Delete user groups*
- *Define access rights for user groups*
- *Define signature rights for user groups*
- *Define options for user groups*
- *Add user*
- *Set start password for new user*
- *Deactivate user*
- *Activate user*
- *Remove user*

6.2.1.2 User groups

6.2.1.2.1 User groups - Details

Dialog window: **Configuration ▶ Tools ▶ User administration**

If a user group is selected in the left-hand side of the **User administration** dialog window then details of this user group will be shown on the right-hand side together with a table containing all its members.

Group data

Group name

Shows the name of the user group.

deactivated. If a subitem, e.g. the menu **Tools**, is deactivated in the configuration then the box for the configuration is colored gray. Blocked functions are deactivated for the particular user, i.e. shown in gray.

Meaning of the symbols:

	Enlarge view	P	Program part
	Reduce view	M	Menu item
	Full access to function(s)	F	Function
	Limited access to function(s)		
	No access to function(s)		



Note

In the **Administrators** group all access rights are switched on as standard and cannot be modified.

6.2.1.2.3 User administration - Signatures

Dialog window: **Configuration ▶ Tools ▶ User administration**

If in the left-hand part of the dialog window **User administration** the item **Signatures** is marked for a user group, then the rights of this group will be shown in the right-hand part and can be modified there.



Note

For the version **tiamo light** these rights cannot be edited as no signatures are possible.

Permissions for methods

Signature Level 1

If this check box is enabled then users in this user group can electronically sign methods at Level 1.

Selection	off on
Default value	off

Signature Level 2 (lock)

If this check box is enabled then users in this user group can electronically sign methods at Level 2 and at the same time lock them against further modifications.

Selection	off on
Default value	off

If this check box is enabled then users in this user group can delete all signatures at Level 2. The method can be edited again.

Selection	off on
Default value	off

If this check box is enabled then users in this user group can electronically sign determinations at Level 1.

Selection	off on
Default value	off

If this check box is enabled then users in this user group can electronically sign determinations at Level 2 and at the same time lock them against further modifications.

Selection	off on
Default value	off

If this check box is enabled then users in this user group can delete all signatures at Level 2. The method can be edited again.

Selection	off on
Default value	off

If this check box is enabled then users in this user group can confirm the deletion of Audit Trail entries with their signature.

Selection	off on
Default value	off



In the **Administrators** group all signature rights are switched on as standard, but they can also be switched off.



Note

It is only possible to delete a user group when the group no longer contains any users.

6.2.1.3 User

6.2.1.3.1 User - Details

Dialog window: **Configuration ▶ Tools ▶ User administration**

If in the left-hand side of the dialog window **User administration** a user in a user group has been selected, then details of the user will be shown at the right-hand side.

User

Shows the short name of the user that must be entered in the field **User**. This name is defined when a new user is entered for the first time and cannot be subsequently modified.

Input	24 characters

Full name

Full name of the user.

Input	256 characters

Status

Shows the current status of the user. Only users of the group **Administrators** can modify the status.

Selection	active	inactive	removed

active

Users with the status **enabled** can log in in the usual way. An exception is the first login after a change in status from **disabled** or **removed** to **enabled**. In this case a **Start password** must be issued with which this user can then log in.

inactive

Users with the status **disabled** can no longer log in. They are automatically given this status as soon as the number of incorrect login attempts defined in the **Security settings** has been exceeded.



User

Short name of new user that must be used to log in at program start. After the name has been entered a **Start password** must be issued with which the user is entered in the list of users.

Input	24 characters

6.2.1.3.3 Set start password

Dialog window: **Configuration ▶ Tools ▶ User administration ▶ [Set start password] ▶ Set start password**

Using the **[Set start password]** button in the dialog window **User administration** a start password can be issued for the selected user. It is enabled only for newly added users or for those who have once again achieved **activated** status. The dialog window **Start password** opens:

Start password

Enter a new start password. Password options are not used for the start password.

Input	50 characters

Confirm password

Confirms the start password.

Input	50 characters

6.2.2 Security settings

6.2.2.1 Security settings

Dialog window: **Configuration** ▶ **Tools** ▶ **Security settings**

Overview

In the dialog window **Security settings** the parameters for log-in, password protection, Audit Trail and electronic signatures can be configured. These are primarily used to ensure that work is carried out according to the requirements of FDA Guideline 21 CFR 11.



Note

The version **tiamo light** cannot be configured to be in conformance with FDA guidelines. With the exception of the parameter **User name required** on the tab **Login/Password protection** all the options are inactive (*see Chapter 6.2.2.2, page 1181*).

With client/server systems the security settings are globally valid for all connected clients.

The security settings can be put out as PDF file using the menu item **File ► Print (PDF) ► Security settings**.

The security settings are configured on the following tabs:

- *Login/Password protection*
Settings for login and password protection.
- *Audit Trail/Changes*
Enable/Disable the Audit Trail and comments when methods, determinations or sample data are modified.
- *Signatures*
Options for electronic signatures.
- *Default reasons*
Definition of reasons for signing and modifying methods, determinations and sample data.

6.2.2.2 Login/Password protection

Tab: **Configuration ▶ Tools ▶ Security settings ▶ Login/Password protection**

On the tab **Login/Password protection** is defined whether the user must log in with his/her name or with name and password, and how the password is to be monitored and constructed.

Settings according to 21 CFR 11

[Set]

Sets the parameters to default settings for FDA-compliant work.

Login policies

Enforce login with user name

If this check box is **enabled** then every time that the program starts, the login window will appear in which the user must enter his/her user name. If this check box is **disabled** no login is necessary and the user logged in under Windows will be adopted as user name. In this case all subsequent parameters are deactivated.

Selection	on off
Default value	off
	FDA default: on

Enforce login with password

If this check box is **enabled** then every time that the program starts, the login window will appear in which the user has to enter a password as well

as his/her user name. If this check box is **disabled**, then all subsequent parameters are deactivated.

Selection	on off
Default value	off FDA default: on

Password monitoring by tiamo

If this option is **enabled** then the password will be monitored by **tiamo** according to the following parameters.

Selection	on off
Default value	off
	FDA default: on

Password monitoring by Windows

If this option is **enabled** then the password will be monitored according to the parameters defined in Windows. In this case the parameters for password protection are deactivated.

Selection	on off
Default value	off FDA default: off



Caution

When using password monitoring through Windows, to avoid an unwanted login by the standard defined user **Guest** in Windows, this must also either be provided with a password or (preferably) be deactivated.



Caution

If this option is enabled, the user name in Windows and **tiamo** must correspond with each other otherwise the user in **tiamo** cannot log in any more. In order to ensure this, the dialog window **Test Login** (see *Chapter 6.2.2.3, page 1186*) appears after this option has been selected in which the logged-in user must register with his or her Windows password. If this test login fails, then the **Security settings** dialog window will remain open.



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.

If this check box is **enabled** 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 login attempts is reset to zero for all users at each new start.

Selection	on off
Default value	off FDA default: off
Range	2 ... 5
Default value	3 FDA default: 3

If this check box is **enabled** then an E-mail will be sent to the address defined under **[E-mail]** as soon as the defined number of incorrect login attempts has been exceeded.

Selection	on off
Default value	off
	FDA default: off

This button opens the dialog window **Send E-mail**(see Chapter 6.2.2.7, page 1189) for defining the E-mail parameters.

New login only for same user

If this check box is **enabled** then for manual logout a renewed login is only possible for the same user. Users with administrator rights can always log in. If this option is enabled then the subsequent option is automatically enabled and deactivated.

Selection	on off
Default value	off
	FDA default: off



Note

If the automatic logout is enabled (see below) only the same user or a user with administrator rights can log in again independent of these option settings.

No editing of workplaces in 'BUSY' status

If this check box is **enabled** then, after a user has logged out manually, a newly logged-in user on the workplaces still open with running determinations can neither edit data or trigger actions. Such workplaces will only be available again when all determinations are finished. For running determinations the old user name always applies (Audit Trail entries, Save, Export, etc.). Exceptions are the stop of a determination with **[Stop]** and the emergency stop, which are always possible for all running determinations and series.

If this check box is **disabled** then the newly logged-in user will have all the rights for the opened workplaces that his/her group assignment authorizes him/her to. For running determinations the new user name applies immediately (Audit Trail entries, Save, Export, etc.).

Selection	on off
Default value	off
	FDA default: off

Automatic logout after

If this check box is **enabled** then the user will be logged out automatically when no operating functions have been carried out with the keyboard or the mouse within this time. After this automatic logout, only a member of the same user group as the one to which the previously logged-off user belongs or a user with administrator rights can log in again.

Selection	on off
Default value	off FDA default: off
Range	1 ... 60 min
Default value	10 min FDA default: 10 min



Password policies

If this check box is **enabled** then this ensures that a user can use a given password only once.

If this check box is **enabled** then this ensures that the password must contain at least one special character (@, #, ~ etc.).

If this check box is **enabled** then this ensures that the password must contain the indicated number of characters.

If this check box is **enabled** then this ensures that the user must enter a new password before the validity period expires. When a user logs in whose password will expire within the next 10 days a corresponding message will appear. If the validity period has expired, the user can only log in if he changes the password.

1185

Modifications

Comment on modification of methods

If this check box is **enabled** then each time that a method is modified a modification reason and a modification comment must be entered; these are saved in the method and shown in the method history. The reason and comments are also recorded in the Audit Trail.

Selection	on off
Default value	off FDA default: on

Comment on modification of determinations

If this check box is **enabled** then each time that a determination is modified a modification reason and a modification comment must be entered; these are saved in the determination and shown in the database in the subwindow **Information** on the tab **Determination**. The reason and comments are also recorded in the Audit Trail.

Selection	on off
Default value	off
	FDA default: on

Comment on modification of sample data (live)

If this check box is **enabled** then each time that a determination is modified a modification reason and a modification comment must be entered; these are saved in the determination and shown in the database in the subwindow **Information** on the tab **Sample**. The reason and comments are also recorded in the Audit Trail.

Selection	on off
Default value	off
	FDA default: on

6.2.2.5 Signatures

Tab: **Configuration** ▶ **Tools** ▶ **Security settings** ▶ **Signatures**

On the tab **Signatures** the parameters for the electronic signatures can be configured.

Settings according to 21 CFR 11

[Set]

Sets the parameters to default settings for FDA-compliant work.

Inactivity delay

If this check box is **enabled** then the dialog window for signing will be automatically closed when the entered time limit has expired.

Adds a new reason.

Edits the selected reason.

Deletes the selected reason.

Dialog window: **Configuration ▶ Tools ▶ Security settings ▶ Login/Password protection ▶ [E-mail...] ▶ Send E-mail**

E-mail address of the recipient.

Input	200 characters

Title for describing the message.

Input	200 characters

The message defined here will be transmitted as an E-mail if the maximum permitted number of incorrect login attempts is exceeded.

The Text editor for entering or changing the message is opened with  or by double-clicking into the text field.

Selection	Text (unlimited)

E-Mail address of the sender.

Input	200 characters

Address of SMTP mail server.

Input	200 characters

Port number of the SMTP mail server.

Range	1 ... 65536

Default value	25

- ### 6.2.3.2 Backup directories

6.2.3.2.1

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.



[New]

[Edit]

[Delete]

Note

6.2.3.2.2

Name

Input	50 characters

Entry or selection (with) of the path for the backup directory.

Input	1000 characters



Note

If the backup directory is on a network drive the saving date should be added manually to the **Backup name** because the saving date information is not available when the directory is restored.



Note

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

6.2.3.2.3 Edit backup directory

Dialog window: **Configuration** ▶ **Tools** ▶ **Program administration** ▶ **Backup directories** ▶ **[Edit]** ▶ **Edit backup directory**

Name

Name for the backup directory.

Input	50 characters



Note

The **Default backup directory** generated during installation cannot be renamed.

Directory

Entry or selection (with ) of the path for the backup directory.

Input	1000 characters



Note

If the backup directory is on a network drive the saving date should be added manually to the **Backup name** because the saving date information is not available when the directory is restored.



Note

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

Clients

Tab: **Configuration** ▶ **Tools** ▶ **Program administration** ▶ **Clients**

Table with information about the computers on which **tiamo** is installed. The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.

Client ID

Shows the ID for the client that has been entered for the client/server installation.

Computer name

Shows the name of the computer on which the client has been installed.

Status

Shows whether **tiamo** has been started (**activated**) or not (**deactivated**).



Note

The contents of the tab **Clients** can be displayed, even if **tiamo** is not running, by using the shortcut  **Clients** in the directory `..\Metrohm\tiamo\bin` (only available on the server).

6.2.3.4 Licenses

Dialog window: **Configuration** ▶ **Tools** ▶ **Program administration** ▶ **Licenses** ▶ **[Add licenses]**

The menu **Tools ▶ Program administration ▶ Licenses ▶ [Add licenses]** in the program part **Configuration** opens the dialog window **Add licenses** in which the new license code can be entered.

License code

Entry of the license code.

6.2.3.5 Licenses

Tab: **Configuration** ▶ **Tools** ▶ **Program administration** ▶ **Licenses**

Table with the licenses that are installed on the server (for **tiamo multi**) or local server (for **tiamo light** and **tiamo full**). The table cannot be edited. With a click on the column title the table can be sorted according to the selected column in either increasing or decreasing sequence.



Note

In client/server systems this tab is only visible on the server and only for members of the **Administrators** user group.

License code

Shows the entered license code.

Number of licenses

Shows the number of clients to have been enabled with the license code.

[Add licenses]

Adds new, additional licenses. The dialog window **Add licenses** opens.

License code

Entry of the license code.

6.3 Configuration data

6.3.1 Export/Import

6.3.1.1 Export configuration data

Dialog window: **Configuration** ▶ **File** ▶ **Export...** ▶ **Export configuration data**

With **File ► Export...** the dialog window **Export configuration data** opens, in which the following parts of the configuration database can be selected for export:

Devices

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

Exports configuration data for devices (see *Chapter 6.5.1, page 1227*).

Titrants/Solutions

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

Exports configuration data for titrants and solutions (see Chapter 6.6.2.1, page 1234).

Sensors

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

Exports configuration data for sensors (see Chapter 6.7.2.1, page 1257).



Buffer data

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

Exports configuration data for custom buffers (see "Buffer table", page 1202).

Conductivity standards

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

Exports configuration data for conductivity standards (see *Chapter 6.3.3.4.1, page 1206*).

E-mail templates

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

Exports saved E-mail templates (see Chapter 6.3.3.5, page 1207).

Security settings

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

Exports saved security settings (see *Chapter 6.2.2.1, page 1180*).

User administration

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

Exports saved user administration (see *Chapter 6.2.1.1, page 1171*).

[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.



Result templates

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

Imports saved result templates (see [Chapter 5.6.8.2.6.1](#), page 1120).

Control chart templates

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

Imports saved control card templates (see Chapter 4.4.2.1, page 234).

Curve overlay templates

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

Imports saved curve overlay templates (see Chapter 4.4.3.1, page 238).

Buffer data

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

Imports configuration data for custom buffers (see "Buffer table", page 1202).

Conductivity standards

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

Imports configuration data for conductivity standards (see Chapter 6.3.3.4.1, page 1206).

E-mail templates

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

Imports saved E-mail templates (see Chapter 6.3.3.5, page 1207).

Security settings

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

Imports security settings (see Chapter 6.2.2.1, page 1180).

User administration

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

Imports user administration (see *Chapter 6.2.1.1, page 1171*).

[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 1191*).



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 Managing the templates for input lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Input lines... ▶ Templates for input lines**

In the dialog window **Templates for input lines**, client-specific bit-patterns for scanning remote input signals can be defined which can be selected with the command **SCAN** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

[New]

Generates a new template (see *Chapter 6.3.3.2.2, page 1203*).

[Edit]

Edits the selected template (see Chapter 6.3.3.2.2, page 1203).

[Delete]

Deletes the selected template.

6.3.3.2.2 Editing the templates for input lines

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Input lines...** ▶ **Templates for input lines** ▶ **[New]/[Edit]** ▶ **New template/Edit template**

With **[New]** or **[Edit]** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

Signal name

Name of the pattern for the input signal.

Input	25 characters

Input signal

Entry of the bit-pattern for the input signal with exactly 8 characters. It is possible to enter the characters

0 = Line inactive,

1 = Line active and

* = Any line status.

Selection	Bit-pattern with 8 characters (0, 1, *) *****
Default value	*****

The input lines and bits are numbered from right to left:

Input 7 6 5 4 3 2 1 0

Bit	7	6	5	4	3	2	1	0

Example: ***1** expects an active input line 0 (**1** = set). For example, this line is set by a Titrino after a titration has been completed and the Titrino can accept a start signal again.



Note

Input lines that are of no interest or for which no defined condition can be predicted should also be masked with an asterisk *.

6.3.3.3 Templates for output lines

6.3.3.3.1 Managing templates for output lines

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Output lines... ▶ Templates for output lines**

The client-specific bit-pattern for setting remote output signals can be defined in the dialog window **Templates for output lines**; these can be selected with the command **CTRL** and in Manual Control. The table with the defined templates cannot be edited, although it can be sorted according to the selected column in increasing or decreasing sequence by clicking on the column title

[New]

Generates a new template (see Chapter 6.3.3.3.2, page 1204).

[Edit]

Edits the selected template (see *Chapter 6.3.3.3.2, page 1204*).

[Delete]

Deletes the selected template.

6.3.3.3.2 Editing templates for output lines

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **Output lines...** ▶ **Templates for output lines** ▶ **[New] / [Edit]** ▶ **New template / Edit template**

With **[New]** or **[Edit]** the dialog window **New template** or **Edit template** opens for entering a new template or for editing an existing template.

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.

It is possible to enter the characters

0 = Line inactive,

1 = Line active,

* = Any line status and

p = Set pulse

Selection	Bit-pattern with exactly 14 characters (0, 1, *, p) *****
0	00000000000000
1	00000000000001
2	00000000000010
3	00000000000011
4	00000000000100
5	00000000000101
6	00000000000110
7	00000000000111
8	00000000001000
9	00000000001001
10	00000000001010
11	00000000001011
12	00000000001100
13	00000000001101
14	00000000001110
15	00000000001111
16	00000000010000
17	00000000010001
18	00000000010010
19	00000000010011
20	00000000010100
21	00000000010101
22	00000000010110
23	00000000010111
24	00000000011000
25	00000000011001
26	00000000011010
27	00000000011011
28	00000000011100
29	00000000011101
30	00000000011110
31	00000000011111
32	00000000100000
33	00000000100001
34	00000000100010
35	00000000100011
36	00000000100100
37	00000000100101
38	00000000100110
39	00000000100111
40	00000000101000
41	00000000101001
42	00000000101010
43	00000000101011
44	00000000101100
45	00000000101101
46	00000000101110
47	00000000101111
48	00000000110000
49	00000000110001
50	00000000110010
51	00000000110011
52	00000000110100
53	00000000110101
54	00000000110110
55	00000000110111
56	00000000111000
57	00000000111001
58	00000000111010
59	00000000111011
60	00000000111100
61	00000000111101
62	00000000111110
63	00000000111111
64	00000001000000
65	00000001000001
66	00000001000010
67	00000001000011
68	00000001000100
69	00000001000101
70	00000001000110
71	00000001000111
72	00000001001000
73	00000001001001
74	00000001001010
75	00000001001011
76	00000001001100
77	00000001001101
78	00000001001110
79	00000001001111
80	00000001010000
81	00000001010001
82	00000001010010
83	00000001010011
84	00000001010100
85	00000001010101
86	00000001010110
87	00000001010111
88	00000001011000
89	00000001011001
90	00000001011010
91	00000001011011
92	00000001011100
93	00000001011101
94	00000001011110
95	00000001011111
96	00000001100000
97	00000001100001
98	00000001100010
99	00000001100011
100	00000001100100
101	00000001100101
102	00000001100110
103	00000001100111
104	00000001101000
105	00000001101001
106	00000001101010
107	00000001101011
108	00000001101100
109	00000001101101
110	00000001101110
111	00000001101111
112	00000001110000
113	00000001110001
114	00000001110010
115	

Default value *****

The output lines are numbered from right to left:

Output 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Bit 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Example: *****1* sets the output line 1 to active (= set), which would result in a Stop command for a connected Titrino, for example.
*****0* sets the line to inactive.



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

Examples for 765 Dosimat

Parameters	Binary pattern	Function

Start Dos1	*****p*****	Starts Dosimat 1 (Titrino via "activate")
Start Dos2	*****p*****	Starts Dosimat 2 (Titrino via "activate")
Start Dos*	*****p*p*****	Starts Dosimat 1 and 2 (Titrino via "activate")

6.3.3.4 Templates - Conductivity standards

6.3.3.4.1 Manage conductivity standards

Dialog window: **Configuration ▶ Tools ▶ Templates ▶ Conductivity standards ▶ Conductivity standards**

Conductivity standards can be defined in the dialog window, which can be selected with the command **CAL Cond**. The table cannot be edited.

[New]

Creation of a new conductivity standard. The window **Edit conductivity standard** opens, in which a new conductivity standard can be defined (*see Chapter 6.3.3.4.2, page 1206*).

[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 1206*).

[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 1207*).

[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 1207*).

[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 1208*).

[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 1208*).

[Delete]

Deletes the selected template.

[Copy]

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

6.3.3.5.2 Edit E-mail templates

Dialog window: **Configuration** ▶ **Tools** ▶ **Templates** ▶ **E-mail templates...** ▶ **E-mail templates** ▶ **[New]** / **[Properties]** ▶ **Edit E-mail template**

With **[New]** or **[Edit]** in the **E-mail templates** dialog window, the dialog window **Edit E-mail template** opens for entering a new template or for editing an existing template.

E-mail template

Name of the E-mail template.

Input	1 ... 16 characters

Receiver

E-mail address

E-mail address of the receiver.

Input	1 ... 200 characters

Sender

E-mail address

E-mail address of the sender.

Input	1 ... 200 characters

SMTP server

Address of SMTP mail server.

Input **1 ... 200 characters**

Port

Port number of the SMTP mail server.

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



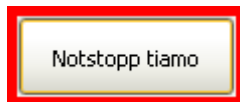
Note

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.

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

Database settings

Switches Save database view on/off when exiting the program.

Tab: **Configuration** ▶ **Tools** ▶ **Options** ▶ **Options** ▶ **PDF**

Content copying or extraction allowed

If this option is **switched off** none of the PDF file contents can be copied or extracted.

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

If this option is **switched off** the PDF file cannot be printed out.

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

If this option is **switched off** comments and form fields can neither be added nor altered.

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

If this option is **switched off** no changes can be made to the PDF file.

6.4 Audit Trail

6.4.1 Audit Trail - General

6.4.1.1 Audit Trail - Definition

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

Definition

The term **Audit Trail** means the FDA-compliant logging of all user actions with which in **tiamo** data is generated, altered or deleted. Each of these actions is saved as a line in the Audit Trail table together with the date, time and name of the logged-in user.

Organization

All the Audit Trail data is saved in the configuration database and can be backed up and restored together with this database. In the **local server systems (tiamo light, tiamo full)** these are stored in the program directory of the computer on which the program has been installed. In the **client/server systems (tiamo multi)** the Audit Trail data is stored centrally on the server and contains all the actions taking place on all the computers (clients) that are connected to this server.

Configuration

Recording the Audit Trail actions can be switched on and off in the Security settings (see *Chapter 6.2.2.4, page 1186*).

6.4.1.2 Audit Trail - Desktop

Program window: **Configuration** ▶ **Tools** ▶ **Audit Trail...** ▶ **Audit Trail**

Elements

The desktop of the **Audit Trail** program window contains the following elements:

- *Menu bar*
- *Toolbar*
- *Filter selection*
- *Audit Trail table*
- *Navigation bar*

6.4.1.3.1 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 1226</i>).
Export...	Exports Audit Trail data sets (<i>see Chapter 6.4.2.5, page 1223</i>).
Archive...	Archives Audit Trail data sets (<i>see Chapter 6.4.2.6, page 1224</i>).
Delete	Deletes archived Audit Trail data sets (<i>see Chapter 6.4.2.7, page 1225</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 1223</i>).
Column display	Defines the columns for the Audit Trail table (<i>see Chapter 6.4.2.2, page 1218</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 1219</i>).
 Quick filter	Uses the quick filter (<i>see Chapter 6.4.2.3.3, page 1219</i>).



 Special filter...	Defines and uses special filter (<i>see Chapter 6.4.2.3.4.1, page 1219</i>).
 Remove filter	Removes current filter (<i>see Chapter 6.4.2.3.5, page 1223</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 1226</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 1227</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 1213</i>).
 Last filter	Uses the last quick or special filter again (<i>see Chapter 6.4.2.3.2, page 1219</i>).
 Quick filter	Uses the quick filter (<i>see Chapter 6.4.2.3.3, page 1219</i>).
 Special filter...	Defines and uses special filter (<i>see Chapter 6.4.2.3.4.1, page 1219</i>).
 Remove filter	Removes current filter (<i>see Chapter 6.4.2.3.5, page 1223</i>).
 Update	Updates Audit Trail table (<i>see Chapter 6.4.2.4, page 1223</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

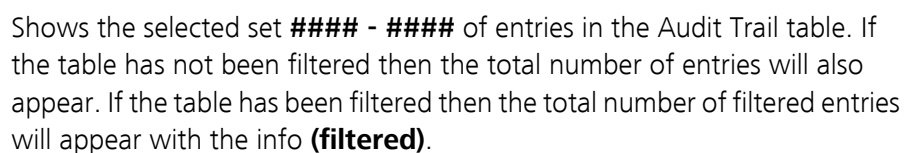
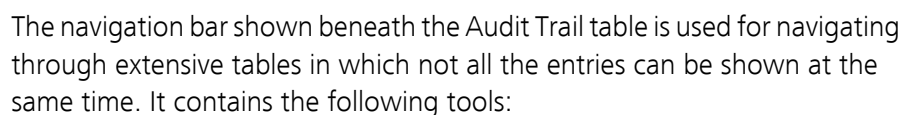
Quick filter

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 1219).

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 previously used filter is reactivated.

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 1222).

[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 1221</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 1221</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 79*).

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 allows to verify whether the file has been modified later on.

6.4.2.6 Archive Audit Trail

Dialog window: **Audit Trail ▶ File ▶ Archive... ▶ Archive Audit Trail**

With menu item **File ▶ Archive...** the dialog window **Archive Audit Trail** opens.

Target directory

Entry or selection (with ) of the directory in which the Audit Trail entries are to be archived.

Input	1000 characters

Selection

Selection	All records Records until ...
Default value	All records

- All records**
All entries from the filtered Audit Trail table will be archived.
- Records until ...**
Only data sets from the Audit Trail table up to the selected date will be archived.



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:

Instrument name

Designation of the device.

Device type

Type of device.

Device serial number

Serial number of the instrument.

Status

Device status. A device that is ready has the status **ok** shown in green, a device that is not ready has the status **not ok** shown in red.



Start-up

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 mouse button as follows:

- If the contents of a field is larger than the column width then the whole contents will be shown as a Tooltip if the mouse cursor is kept on the field.



Functions

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

New...	Adds manually a new device connected to the PC via an RS-232 interface(see Chapter 6.5.2.2, page 1230).
Delete	Deletes the selected device. Only devices that are not connected can be deleted(see Chapter 6.5.2.3, page 1230).
Properties...	Edits the selected device (see Chapter 6.5.3, page 1232).
Column display...	Defines columns for the device table(see Chapter 6.5.2.4, page 1231).
Print (PDF)...	Outputs the device table as a PDF file (see Chapter 6.5.2.6, page 1232).
Ignored devices...	Opens the list of ignored devices (see Chapter 6.5.2.5, page 1231).
Initialize	Initializes the selected device (only possible for USB devices).

6.5.2.2 Adding new device

Menu item: **Configuration ▶ Devices ▶ [Edit] ▶ New...**

Devices that are connected to the PC via an RS-232 interface must be added manually to the device table with **[Edit] ▶ New.....** This opens the dialog window **Device selection**.

The required new device must be selected from the tree-form list that is shown, which contains all the devices known to the program (arranged according to device type). When the dialog window has been closed with **[OK]** the Properties window opens automatically for entering additional device data.

When the Properties window has been closed the new device with its set parameters is entered in the Device table and the connection is tested. If the connection is **ok**, then the further device information is read in from the device.

6.5.2.3 Deleting device

Menu item: **Configuration ▶ Devices ▶ [Edit] ▶ Delete**

With **[Edit] ▶ Delete**, the device selected in the device table is deleted.



Note

Only devices that are not connected can be deleted.

Devices - Column display

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Column display... ▶ Column display**

With **[Edit] ► Column display...**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the device table.

Available columns

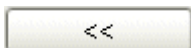
Shows all the fields that can be shown as columns in the device table.

Displayed columns

Shows all the fields that will be shown as columns in the device table. The default position is that the columns **Device name**, **Device type**, **Device serial number**, **Status**, **Set to work**, **Next GLP test** and **Remarks** will be shown. The columns **Device name** and **Device type** are always present and cannot be removed.



Adds the selected column to the table.



Removes the selected column from the table.



Modifies the sequence of displayed columns by moving the selected column up.



Modifies the sequence of displayed columns by moving the selected column down.

Editing ignored devices

Dialog window: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Ignored devices...** ▶ **Ignored devices**

The dialog window **Ignored devices** is opened with **[Edit] ► Ignored devices...**. Here the list of ignored devices can be edited.

Ignored devices are devices which are recognized automatically upon connection but are ones which the user does not wish to have permanently displayed in the device table. Ignored devices will no longer be recognized automatically at the time of the next program start.



Table contents

The following information concerning the ignored devices is shown in the table:

Device type

Type of device.

Device serial number

Serial number of the instrument.

[Delete]

The highlighted device is removed from the list. It will be recognized automatically again at the time of the next program start and can be included in the list of devices.

6.5.2.6 Printing device list

Dialog window: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Print (PDF)...** ▶ **Print list of devices (PDF)**

With **[Edit] ► Print (PDF)...** the dialog window **Print list of devices (PDF)** opens.

Orientation

Selection	Portrait Landscape
Default value	Portrait

Portrait

Prints the device table in portrait format.

Landscape

Prints the device table in landscape format.

[OK]

The table of devices is shown in the required format as a PDF file and can be opened directly with the Acrobat Reader; it can then be printed out and/or saved.

6.5.3 Device properties

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

With the menu item **[Edit] ► Properties...** in the subwindow **Devices** the properties window opens for the device selected in the device table in which the parameters of the device can be edited. It consists of several tabs. The tabs **General** and **GLP** are always present, the remaining tabs depend on the selected device. Properties can be set for the following devices:

- *Titrand*
- *Titrimo*

- 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 1235</i>).
Delete	Deletes selected solution (<i>see Chapter 6.6.2.3, page 1236</i>).
Properties...	Edits selected solution (<i>see Chapter 6.6.3.1, page 1237</i>).
Column display...	Defines the columns for the solution table (<i>see Chapter 6.6.2.4, page 1236</i>).
Print (PDF)	Shows the solution table as a PDF file (<i>see Chapter 6.6.2.5, page 1237</i>).

Menu item: Configuration ▶ Titrants/Solutions ▶ [Edit] ▶ New...

■■■■■■■ 1235



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

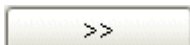
With **[Edit] ► Column display...**, the dialog window **Column display** opens. Here you can define the columns that are to be shown in the solution table..

Columns available

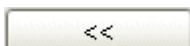
Shows all the fields that can be shown as columns in the solution table.

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

6.6.3.3 Properties - Titer

Tab: **Configuration** ▶ **Titrimetric 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.

Relative standard deviation for the titer determination in %.

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

Validity of the titer in days. If a value is entered here then the date for the **Next titer determination** will be automatically adapted.

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 79). After the date has been entered, the **Validity** field will be adapted automatically.

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 81).

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 titer monitoring it is found that the validity period of the titer has expired then one of the following actions will be triggered automatically at Start test.



Note

This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are written into the solutions table from the IEU/IDU.

User

Short name of the user logged in during titer determination or when the titer was entered manually. If work is not carried out using login then the user logged in under Windows will be entered automatically.



Note

This parameter is not saved on the data chip of intelligent exchange/dosing units, i.e. this parameter will be empty if the data are written into the solutions table from the IEU/IDU.

History graph

The graph shows the last 10 titer values for the selected solution. The titer values are shown in different colors in the history table:

- **Blue**, if the titer has been determined automatically by a method.
- **Black**, if the titer has been entered manually.

If limits have been defined then the warning limits will be shown in **orange** and the intervention limits in **red**.



Note

The history graph can be copied into the clipboard by using the context-sensitive menu item **Copy**.

[Limits]

Opens the dialog window Limits for titer, in which the warning and intervention limits can be defined for the titer (*see Chapter 6.6.3.5, page 1244*). These limits apply only to the graph, no monitoring is carried out during the titer determination.

[Delete history]

Deletes titer history.

Tab: **Configuration** ▶ **Titration/solutions** ▶ **Properties** ▶ **Exchange unit**

Name

Input	24 characters
Default value	'empty'

Selection **EU | IEU**

Input	24 characters
Default value	'empty'

Input	10 characters
Default value	'empty'

Selection	1 mL 5 mL 10 mL 20 mL 50 mL
Default value	20 mL

IEU

Input	8 characters
Default value	'empty'

EU

Input	10 characters
Default value	'empty'

Parameters for preparation

Configures the parameters to be used in the command **PREP**.

Volume

Volume to be dosed in during preparation.

Range	0.00000 ... 99999.99999 mL
Selection	Cylinder volume
Default value	Cylinder volume

Cylinder volume

The whole contents of the cylinder will be dosed in.

Cycles

Number of rinsing cycles during preparation.

Range	1 ... 9
Default value	2

Dosing rate

Speed at which the solution is to be dosed. The maximum dosing rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

Filling rate

Speed at which the cylinder is to be filled. The maximum filling rate depends on the cylinder volume of the exchange unit used (see below). When the function is carried out the speed will automatically be reduced to the largest possible value.

Range	0.01 ... 150.00 mL/min
Selection	maximum
Default value	maximum

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 tubing see **Products/Accessories and columns** under <http://products.metrohm.com>.

Length

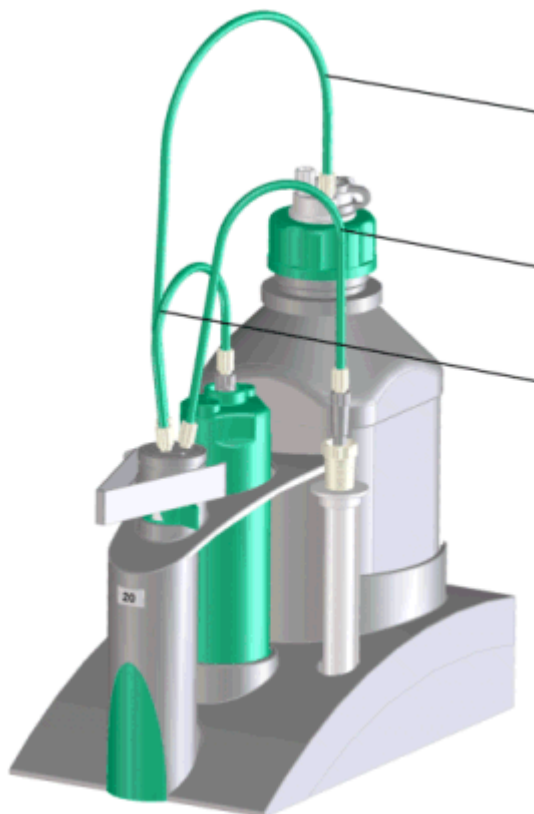
Length of the tubing connecting the cock to the dosing tip.

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 2.1



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

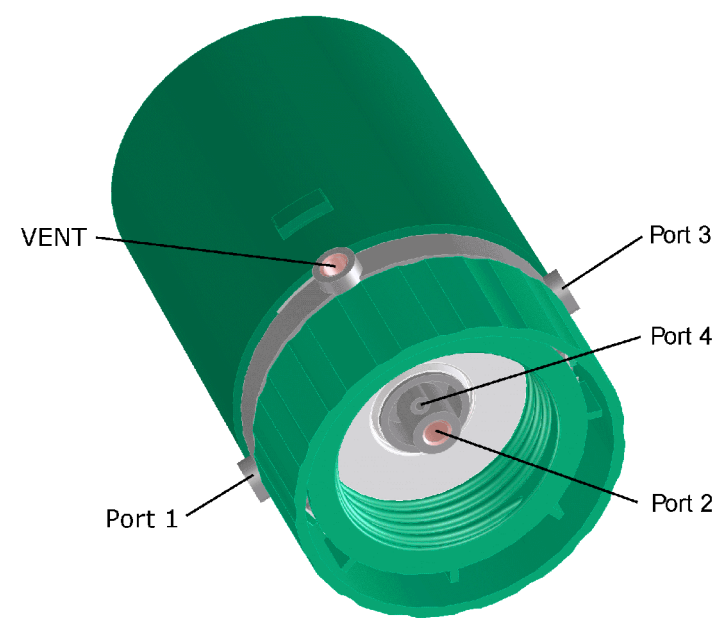
Range	0.0 ... 999.9 cm
Default value	0.0 cm

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 79).

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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]**.

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 1259</i>).
Delete	Deletes the selected sensor (<i>see Chapter 6.7.2.4, page 1260</i>).
Properties...	Edits the selected sensor (<i>see Chapter 6.7.3.1, page 1261</i>).
Column display...	Defines columns for the sensor table(<i>see Chapter 6.7.2.2, page 1259</i>)
Print (PDF)...	Outputs the sensor table as a PDF file(<i>see Chapter 6.7.2.5, page 1260</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

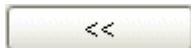
Shows all the fields that can be shown as columns in the Sensor table.

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 1261*). 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.

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**.

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



Can only be edited if monitoring is switched on.

Default value	999 Days

Can only be edited if monitoring is switched on.

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

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

Lower limit

Range	0.001 ... 500 /cm
Default value	0.001 /cm

Range	0.001 ... 500 /cm
Default value	0.001 /cm

1271

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**

The initial calibration data for the intelligent sensor is displayed in the dialog window **Initial sensor data**.

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 limit

Lower intervention limit for the slope.

for pH electrode

Range	-2.147E+9 ... 2.147E+9 %
Default value	95 %

for ISE (+1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	55 mV

for ISE (-1)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-62.4 mV

for ISE (+2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	26.7 mV

for ISE (-2)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-32.7 mV

for ISE (+3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	16.7 mV

for ISE (-3)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-22.7 mV

for ISE (+4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	11.8 mV

for ISE (-4)

Range	-2.147E+9 ... 2.147E+9 mV
Default value	-17.8 mV

Upper limit

Upper intervention limit for the slope.

for pH electrode

Range	-2.147E+9 ... 2.147E+9 %
Default value	105.0 %

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 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

Unit of the common variables.

Date of the last value assignment for the common variable.

Name of the method used to assign the value.

Short name of the user logged in during value 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.

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.

The menu **[Edit]** beneath the table of common variables contains the following menu items:

New...	Adds new common variable manually (<i>see Chapter 6.8.2.2, page 1282</i>).
Delete	Deletes the selected common variable (<i>see Chapter 6.8.2.3, page 1282</i>).
Properties...	Edits the selected common variable (<i>see Chapter 6.8.3.1, page 1283</i>).
Column display...	Defines the columns of the table of Common variables (<i>see Chapter 6.8.2.4, page 1282</i>).
Print (PDF)...	Outputs the table of common variables as a PDF file (<i>see Chapter 6.8.2.5, page 1283</i>).

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**

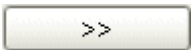
With **[Edit] ▶ Column display...** the dialog window **Column display** opens. Here you can define the columns that are to be shown in the Common variables table.

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.



6.8.2.5 Print list of common variables

Orientation

Portrait

Landscape

[OK]

6.8.3 Common variables properties

6.8.3.1 Editing 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:

- 1283

6.8.3.2 Properties - Common variable

Tab: **Configuration** ▶ **Common variables** ▶ **[Edit]** ▶ **Properties...** ▶ **Common variable**
- **'Name'** ▶ **Common variable**

Name

Name of common variable.

Input	50 characters

Type

Selection of the type for a new common variable. For existing common variables the type will only be shown; it cannot be edited.

Selection	Number Text Date/Time
Default value	Number

Value

Value of common variables. This value can be assigned in a method by a **CALC** command or entered manually. For methods that use the common variable it is available as the variable '**CV.Name.VAL**' or '**CV.Name**' (short form) for calculations.

For type **Date/Time** variables, the date can be selected by pressing  in the dialog window **Select date**.

Type = Number	
Range	-1E+99 ... 1E+99 (max. 15 places)

Type = Text	
Input	256 characters

Type = Date/Time

Selection **Date selection**

Value (unit)

Designation of the unit. If a value is assigned automatically then the unit will be automatically entered here. It is available for methods that use the common variable as variable '**CV.Name.UNI**' for calculations.

Input	20 characters
Selection	'empty' mol/L mmol/L μmol/mL g/L mg/L μg/L mg/mL ppm % mEq/L mL μg
Default value	mol/L

Comment

It is possible to enter remarks about the common variable.

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 1291*) .
- Deletes the selected line (*see Chapter 6.9.2.3, page 1291*).
- Edits the selected line (*see Chapter 6.6.3.1, page 1237*).
- Defines the columns for the table (*see Chapter 6.9.2.4, page 1291*).
- Outputs the table as a PDF file (*see Chapter 6.9.2.5, page 1292*).

Menu item: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **New...**

6.9.2.3 Delete line

With **[Edit] ► Delete**, the selected line in the table is deleted.

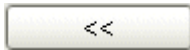
Dialog window: **Configuration** ▶ **Sample solutions (TC conductivity)** ▶ **[Edit]** ▶ **Column display...** ▶ **Column display**

Columns available

Columns displayed

>>

■■■■■■■■ 1291



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 79*). 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 81) 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 mouse button as follows:

- **Drag the border between column titles:**
Sets the column width
- **Double-click on the border between column titles:**
Sets the optimal column width
- **Drag the column title:**
Moves the column to the required location

If the contents of a field is larger than the column width then the whole contents will be shown as a Tooltip if the mouse cursor is kept on the field.

With sample racks that are placed on a Sample Processor and are recognized automatically the corresponding device name will be shown in the **Instrument** column. In addition the line number will be shown with a green background.

If a rack is reserved for a running determination or for manual control then the line will be shown in gray and the rack cannot be edited until the determination has been finished.

Functions

The menu **Edit** beneath the rack table contains the following menu items:

New...	Adds new rack manually (<i>see Chapter 6.10.2.2, page 1297</i>).
Delete	Deletes the selected rack (<i>see Chapter 6.10.2.3, page 1298</i>).
Properties...	Edits the selected rack (<i>see Chapter 6.10.3.1, page 1298</i>).
Print (PDF)...	Outputs the rack table as a PDF file .(<i>see Chapter 6.10.2.4, page 1298</i>)

6.10.2.2 Adding new rack

Dialog window: **Configuration** ▶ **Rack data** ▶ **[Edit]** ▶ **New...** ▶ **New rack**

A new rack can only be generated as a copy of an already existing rack under a new rack name and with a new rack code. **[Edit]** ► **New...** opens the dialog window **New rack**.

Template

Selection of the rack to be used as a template for the new rack.

Selection	All existing racks

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 1356) 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 cannot be edited directly.



Special beakers should preferably be set at high rack positions so that sample series can start from rack position 1. Rack positions which are defined as special beakers are no longer available as sample positions. A specific work position can be defined for each special beaker at Tower 1 and Tower 2 (if present). The shift, rinse and special positions of the affected tower are taken from the general rack positions.

The following columns are shown in the table:

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 6.10.3.5, page 1302*) 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 sample series can start from rack position 1. Rack positions which are defined as special beakers are no longer available as sample positions. They will be skipped during an automatic movement to a sample position.

Work position Tower 1

Work position of the selected special beaker at Tower 1.

Range	0 ... 235 mm

Work position Tower 2

Work position of the selected special beaker at Tower 2.

Range	0 ... 235 mm

Beaker radius

Radius of the selected special beaker on the rack. If the lift is moved to the work position then this value will be compared with the parameter **Min. beaker radius** (see Chapter 7.10.3, page 1356) that can be specifically defined for each tower. If **Beaker radius samples < min. beaker radius** then a corresponding error message will appear. With **off** the beaker radius will not be checked.

Range	1.0 ... 100.0 mm
Selection	off

Beaker sensor

When the selected special beaker is moved to with the command **MOVE** then the beaker sensor (**Tower, Robotic arm**) checks whether the special beaker is present or not. With **off** no check will be made. For the option **Robotic arm** a swing head with beaker sensor must be installed and a suitable work position with beaker contact must be defined for the lift, as this must move to the beaker recognition position.

With the parameter **Beaker test** in the command **MOVE** you can determine whether the determination is to be terminated if a beaker is missing with or without the display of a corresponding message and whether the series is to be continued or also terminated.

Selection	Tower	Robotic arm	off

6.10.3.6 Editing rack properties (774)

Menu item: **Configuration ▶ Rack data ▶ Edit ▶ Properties...**

Rack name

Shows the name of the rack attached. If no rack is in position then "-----" will be shown.

Rack code

Shows the number of positions on the rack in position. The rack code corresponds to the arrangement of magnets on the base of the rack and is read in by the Sample Processor in order to recognize the rack. If no rack is in position then the display will be empty.

Number of positions

Shows the number of positions on the rack. If no rack is in position then the display will be empty.

The parameters for the attached rack are defined on the following 2 tabs:

- *Lift positions*
Defines the work, rinse, shift and special position for Tower 1.



- *Special beakers*
Display of the special beaker for the rack in position.

6.10.3.7 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 1304*).

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 1081) (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 81).

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:

Titrimo	Program version
702 SM Titrimo	5.702.0021
716 DMS Titrimo	5.716.0022
718 STAT Titrimo	5.718.0012
719 S Titrimo	5.719.0021
720 KFS Titrimo	5.720.0021
721 NET Titrimo	5.721.0012
736 GP Titrimo	5.736.0013
751 GPD Titrimo	5.751.0021
758 KFD Titrimo	5.758.0022
784 KFP Titrimo	5.784.0011
785 DMP Titrimo	5.785.0011
794 Basic Titrimo	5.794.0010
795 KFT Titrimo	5.795.0010
798 MPT Titrimo	5.798.0010
799 GPT Titrimo	5.799.0010

7.2.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

Device name

Designation of the device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

At program start

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

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

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

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

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

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

7.2.4 Properties - Ext. Dosing device D#

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Ext. Dosing device D#**

Request for dosing device preparation

Selection when the request for carrying out the **PREP** (prepare) command (see Chapter 5.6.6.5.1, page 1081) is to be shown for the external dosing device **D1** or **D2**.

At program start

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

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

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

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

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

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Connected devices

Here the device (685 or 700) connected to the dosing device connector is displayed with its properties.

Dosing device type

Display of the dosing device type.

7.2.5 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.2.6 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 79).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days

Default value **999 Days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). 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]**.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.3.3 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.3.4 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 79).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range 1 ... 999 Days

Default value **999 Days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). 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 determination
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]**.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.4.3 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Note

These parameters are only editable for devices with status **not ok** (power supply and/or RS connection interrupted).

7.4.4 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on  in the dialog window **Select date** (see Chapter 2.5.1, page 79).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range **1 ... 999 Days**

Default value **999 Days**

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). 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 determination
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]**.

Device serial number

Shows the serial number of the device.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.5.3 Properties - Measuring inputs

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ Measuring inputs**

On the tab **Measuring inputs** the properties of the measuring inputs used on the device are displayed. For each measuring input a group of parameters is displayed.

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

Measuring input 1/2 (iConnect)**ADC type**

Shows the type of analog-digital converter.

Serial number

Shows the serial number of the measuring input interface.

Temperature sensor

Selects the type of temperature sensor connected to the measuring input.

With the 856 Conductivity Module displayed only.

Selection	Pt 1000 NTC
Default value	Pt 1000

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Range	1000 ... 99999 Ohm
Default value	30000 Ohm

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Range	1000 ... 9999
Default value	4100

7.5.4 Properties - MSB

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1081) (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 connector 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 79).

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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 connector 1...4 and the peripheral devices connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

7.6.4 Properties - MSB

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name' ▶ MSB #**

On the tabs **MSB #** the properties of the connector and the devices connected to are displayed.

Request for dosing device preparation

Selection when the request for carrying out the command **PREP** (see Chapter 5.6.6.5.1, page 1081) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

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

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

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

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

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

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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]**.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h

Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.7.4 Properties - GLP

Tab: **Configuration** ▶ **Device** ▶ **[Edit]** ▶ **Properties...** ▶ **'Properties - 'Device type' - 'Device name'** ▶ **GLP**

GLP test date

Date of the last GLP test. This date can be selected by clicking on in the dialog window **Select date** (see Chapter 2.5.1, page 79).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

Acoustic signal

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.

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.

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]**.

7.8.1 730 Sample Changer - Overview

The parameters for the device **730 Sample Changer** are set on the following tabs:

- 1341

- *GLP*
Information on GLP tests and GLP monitoring.

7.8.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

Device name

Designation of the device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1310).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.8.3 Properties - Tower

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Towers**



Note

This tab is only displayed if a PC and a sample changer are connected via an RS-232 interface.

On the tab **Towers** the tower parameters for Tower 1 and Tower 2 (if present) are shown for the **730 Sample Changer**. These cannot be edited, but must be set on the device itself via the keyboard.

Tower 1 / Tower 2

Max. stroke path

Shows the lowest permitted lift position for the two towers. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Beaker sensor

Shows whether the beaker sensor for the two towers is switched on or off. Each time a sample position is moved to the beaker sensor checks whether a beaker is present or not.

Tower 1

Number of pumps

Shows how many pumps are connected to Tower 1.

759 Swing Head

Shows whether a swing head is mounted on Tower 1.

Tower 2

Number of pumps

Shows how many pumps are connected to Tower 1.



Note

A swing head can only be mounted on Tower 1.



s - RS-232

COM Port

COMn
First free COM port.

Selection	1200 2400 4800 9600
Default value	9600

Establishes a connection to the RS-232 device.

Disconnects the connection to the RS-232 device.



7.8.7 Properties - GLP

GLP test date

1345



- *Dosing device*
Properties of the connector and the dosing devices connected to. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Oven*
Shows the oven parameters. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *Gas*
Shows the parameters for the gas flow. This tab is only displayed if the Oven Sample Processor is connected to the PC via an RS-232 interface.
- *RS-232*
Selection of the serial interface the device is connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

7.9.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

Device name

Designation of the device (can be freely defined by user).

Input	50 characters
Default value	Device type number_#

Device type

Display of the device type.

Program version

Shows the program version of the device.

Only visible with devices that have their own firmware.

[Update]

Opens the dialog window **Load new program version** (see Chapter 7.1.6, page 1310).

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.

Shows the date on which the device was automatically added to the device table.

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Remarks about the device.



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 1298) or **Rack data (774)** (see Chapter 6.10.3.6, page 1303) 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 activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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]**.



[Update]

Opens the dialog window **Load new program version** (see *Chapter 7.1.6, page 1310*).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.10.3 Properties - Tower

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1296) 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** (see Chapter 7.11.7, page 1370) in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** (see Chapter 7.11.8, page 1371) 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 1298) or **Rack data (774)** (see Chapter 6.10.3.6, page 1303) 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 1081) (prepare) is to be shown for the dosing device connected to the MSB.

At program start

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

If this option is switched on then at each program start the request to prepare the dosing device will appear.

On attaching an exchange/dosing unit

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

If this option is switched on then at each attaching of an exchange or dosing unit the request to prepare the dosing device will appear.

Time interval

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

If this option is switched on then the request to prepare the dosing device will appear after the time interval defined here.

all

Time interval after which the request to prepare the dosing device will appear.

Range	0.1 ... 999.9 h
Default value	12 h



Connected devices

Information about the following peripheral devices connected to the MSB connector appears here:

Dosing device 1

Dosing device type

Display of the dosing device type.

Dosing device serial number

Display of the serial number of the connected dosing device.

Stirrer 1

Stirrer type

Display of the stirrer type.

Stirrer serial number

Display of the serial number of the connected stirrer.

Remote box 1

Display of the connected remote box.

7.10.6 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission speed. Additionally, this baud rate must be set on the device itself.

Selection	1200 2400 4800 9600
Default value	9600

[Connect]

Establishes a connection to the RS-232 device.

[Disconnect]

Disconnects the connection to the RS-232 device.



Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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]**.

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.11.3 Properties - Tower

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1296) for general **Sample positions**(see Chapter 6.10.3.2, page 1299) and **Special beakers**(see Chapter 6.10.3.4, page 1301) 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** (see Chapter 7.11.7, page 1370) in which the properties of the robotic arm can be editet.

Table for external positions

The properties for the 4 possible external positions for the swing head mounted on the tower are shown in the table. The table is not editable directly.

External position

Number of the external position.

Angle [°]

Swing angle for external position.

Work position [mm]

Work position for external position.

[Edit]

Opens the dialog window **External position #** (see Chapter 7.11.8, page 1371) 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 1298) or **Rack data (774)** (see Chapter 6.10.3.6, page 1303) 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 1081) (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 79). 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 81).

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.

Range	-270.0 ... 270.0 °
Default value	0.0 °

Swing direction

The swing direction of the robotic arm depends on the type of robotic arm.

For a 2-tower model, the robotic arm at Tower 1 must swing to the right, i.e. $-$ and that at Tower 2 must be mounted $+$ so that it swings to the left.

Selection	+ -
Default value	+

+

Clockwise rotation.

Counterclockwise rotation.

7.11.8 External position

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Tower ▶ [Edit] ▶ External position #**

In the dialog window **External position #** a **Swing angle** and a specific **Work position** can be defined for each external position. **Shift position** and **Rinse position** can only be defined for all 4 external positions together. No **Special position** can be defined for external positions.

Angle

Definition of the swing angle for the selected external position. The offset is made up of a design-dependent angle (approximately 8-9°) together with the robotic arm offset from the Robotic arm properties (*see Chapter 7.11.7, page 1370*). The maximum swing range is also defined under Robotic arm properties.

Range	(Offset) ... (Offset + max. swing range) °
Default value	60.0 °

Work position

Definition of the work position for the selected external position.

Range	0 ... 235 mm
Default value	0 mm

Device serial number

Start-up

Data storage under legal control

Only visible and editable with Sartorius balances.

Remarks

Input	1000 characters
Default value	empty

Tab: **Configuration ▶ Devices ▶ [Edit] ▶ Properties...** ▶ **Properties - 'Device type' - 'Device name' ▶ Measuring inputs**

Intelligent measuring inputs (if present and used) are listed separately and labeled with the additive **iConnect**

ADC type

Serial number

Temperature sensor

1373

With the 856 Conductivity Module displayed only.

Selection	Pt 1000 NTC
Default value	Pt 1000

R (25 °C)

Nominal resistance of connected NTC sensor.

Only visible with temperature sensors of the NTC type.

Range	1000 ... 99999 Ohm
Default value	30000 Ohm

B value

Material constant of the NTC resistance referred to measuring the resistance at 25 °C and 50 °C.

Only visible for temperature sensors of the NTC type.

Range	1000 ... 9999
Default value	4100

7.12.4 Properties - Tower

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters

Max. stroke path

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1296) for general **Sample positions**(see Chapter 6.10.3.2, page 1299) and **Special beakers**(see Chapter 6.10.3.4, page 1301) will be compared with the **Min. beaker radius**. If this minimum beaker radius is undercut then the run will be stopped and an error message will appear. With **off** no check will be made.

Selection	1.0 ... 100.0 mm off
Default value	off

Lift rate

Lift speed for manual operation.

Range	3 ... 25 mm/s
Default value	25 mm/s

Axial distance

Distance between the axis of rotation of the sample rack and swing axis of the robotic arm.

Range	100.0 ... 300.0 mm

814 USB Sample Processor XL

Selection	166.0 mm
Default value	166.0 mm

815 Robotic USB Sample Processor XL, 855 Robotic Titrosampler, 864 Balance Sample Processor

Selection	196.0 mm
Default value	196.0 mm

Swing Head

This parameter is only shown when a swing head is mounted on the tower.

Serial number

Shows the serial number of the swing head.

Swing position

Lift position valid for all 4 external positions, at which the swing head turns to the external positions.

Range	0 ... 235 mm
Default value	0 mm

Rinse position

Rinse position valid for all 4 external positions.

Range	0 ... 235 mm
Default value	0 mm

[Configuration]

Opens the dialog window **Configuration** (see Chapter 7.11.7, page 1370) in which the properties of the robotic arm can be edited.

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 79). 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 81).

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 deter- mination
Default value	Display message

The message that the validity period has expired will be automatically saved with the determination.

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 1310).

This button is only displayed with devices that have their own firmware. It is only active if the device has an old program version not supported by **tiamo** and which can be updated by **tiamo** itself.

Device serial number

Shows the serial number of the device.

Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.13.3 Properties - Tower #

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Tower #**

On the tab **Tower** the properties of the tower and of the robotic arm connected to are displayed.

Tower parameters**Max. stroke path**

Entry of the lowest permitted lift position. A lift height of **0 mm** corresponds to the "Home position", i.e. the lift is moved right to the top.

Range	0 ... 235 mm
Default value	235 mm

Min. beaker radius

Definition of the minimum radius which the beakers used on the rack must have. If the lift is moved to the work position the beaker radii defined in **Rack table**(see Chapter 6.10.2.1, page 1296) for general **Sample positions**(see Chapter 6.10.3.2, page 1299) and **Special beakers**(see Chapter 6.10.3.4, page 1301) 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 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]**.

7.14 874 Oven Sample Processor

7.14.1 874 Oven Sample Processor - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties ▶ Properties - 'Device type' - 'Device name'**

The parameters for the device **874 Oven Sample Processor** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *Tower*
Properties of the tower.
- *Rack*
Information on the rack attached.
- *MSB #*
Properties of the MSB connector 1...3 and the peripheral devices connected to.
- *Oven*
Information on the oven.
- *GLP*
Information on GLP tests and GLP monitoring.



[Rack Data]

Opens the dialog window **Rack data** (see Chapter 6.10.3.1, page 1298) or **Rack data (774)** (see Chapter 6.10.3.6, page 1303) 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 1081) (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 connector 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 79).

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**

General properties of the device are displayed on the **General** tab.

Device name

Designation of the 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 1310).

Device serial number

Start-up

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

1395

Selection	continuous pulsed
Default value	continuous

Pulses per integration time

Frequency the light flashes with. This parameter can only be edited for the **Type = pulsed**.

Range	0 ... 1000
Default value	10

Analog output

Analog output

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

If this option is enabled, the measured signal on the analog output of the spectrometer is put out. If the connected spectrometer has no analog output, this option is ignored.

Sensitivity

Only editable when the analog output is switched on.

Range	1 ... 214783647 mAU/mV
Default value	100 mAU/mV

7.15.4 Properties - Detector

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Detector**

On the tab **Detector** information on the detector built in the spectrometer is displayed.

Detector type

Display of the detector type.

Minimum wavelength.

Display of the minimum wavelength of the measurable range in mm.

Maximum wavelength

Display of the maximum wavelength of the measurable range in mm.

Number of pixels

Display of the resolution the spectrum is recorded with.

7.15.5 Properties - Calibration

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Calibration**

On the tab **Calibration** the data of the wavelength calibration is displayed. A specific wavelength, defined by four wavelength coefficients, is assigned to each pixel on the detector. The wavelength calibration is carried out with the command **CAL Spec**, the calibration data is calculated automatically and displayed on this tab.

Date

Display of the time and date of the wavelength calibration.

User

Display of the user logged in at the time of the wavelength calibration.

Method

Display of the method the wavelength calibration has been carried out with.

Selection	Factory settings "Method name"
Default value	Factory settings

[Reset calibration]

Resets the device to factory-adjusted calibration. The **dark spectrum** and **reference spectrum** will be deleted.

Determination ID

ID of the determination the wavelength calibration has been carried out with. With calibration method **Factory setting**, ---- is displayed.

Calibration coefficients

Coefficients of the regression function with which the assignment of the CCD pixels to a wavelength is carried out.

C#

Display of the wavelength coefficients **c1** ... **c4**.

7.15.6 Properties - Dark spectrum

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Dark spectrum**

On the tab **Dark spectrum** information on the dark spectrum stored in the device is displayed.

If no dark spectrum has been recorded yet or the calibration has been reset to factory settings, -- is displayed in the fields.

**Date**

Display of date and time the dark spectrum has been recorded.

User

Display of the user logged in during recording of the dark spectrum.

Method

Display of the method the dark spectrum has been recorded with.

Determination ID

ID of the determination the dark spectrum has been recorded in.

Integration time

Display of the integration time at recording the dark spectrum.

Averaged spectra

Number of spectra recorded and averaged.

Smoothing

Display of the number of neighbor pixels the light intensity of each pixel has been averaged with.

Spectrum

Display of the dark spectrum. The graph can be zoomed with the mouse. By double-clicking the whole spectrum is displayed again.

x axis

Display of the wavelength. Unit mm.

y axis

Display of the intensity. Unit Counts.

7.15.7 Properties - Reference spectrum

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **Reference spectrum**

On this tab information on the reference spectrum stored in the device is displayed.

If no reference spectrum has been recorded yet or the calibration has been reset to factory settings, -- is displayed in the fields.

Date _____

Display of date and time the reference spectrum has been recorded.

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 79).

Comment on GLP test.

Input	1000 characters

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]**.

7.16 RS-232 device

7.16.1 RS-232 device - Overview

Dialog window: **Configuration ▶ Devices ▶ [Edit] ▶ Properties... ▶ Properties - 'Device type' - 'Device name'**

The parameters for a generic **RS-232 device** are set on the following tabs:

- *General*
General device information such as device name, device type, serial number, etc.
- *RS-232*
Selects and configures the serial interface the device is connected to.
- *GLP*
Information on GLP tests and GLP monitoring.

7.16.2 Properties - General

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **General**

General properties of the device are displayed on the **General** tab.

Device name

Designation of the device (can be freely defined by user).

COMn
First free COM port.

Transmission rate. The baud rate selected here must also 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.

Terminator for send in hexadecimal code.



Selection	\0D \0D\0A \0D\0A\0A \0D\0D\0A
Default value	\0D\0A (\0D = CR, \0A = LF)

Terminator for receiving

Final character for receiving in hexadecimal code.

Selection	\0D \0D\0A \0D\0A\0A \0D\0D\0A
Default value	\0D\0A (\0D = CR, \0A = LF)

Code page

Code page used for the data transfer.

Selection	Cp437 Cp850 Cp852 ASCII
Default value	Cp437

Sending characters separately

on | off (Default value: off)

If this option is enabled each character is sent separately. The delay time is allowed to run before sending the next character.

Delay time

Delay time until the sending of the next character.

Range	0 ... 9999 ms
Default value	0 ms

[Connect]

Establishes the connection to the RS-232 device. The dialog window **Establish connection** appears (see Chapter 7.16.5, page 1406).

[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 79).

Comment GLP test

Comment on GLP test.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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]**.

7.16.5 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.



Start-up

Shows the date on which the device was automatically added to the device table.

Data storage under legal control

Indicates whether the balance has its own calibratable data memory.

Only visible and editable with Sartorius balances.

Selection	on off
Default value	off

Remarks

Remarks about the device.

Input	1000 characters
Default value	empty

7.17.3 Properties - RS-232

Tab: **Configuration** ▶ **Devices** ▶ **[Edit]** ▶ **Properties...** ▶ **Properties - 'Device type' - 'Device name'** ▶ **RS-232**

COM Port

Selection of the serial interface on the PC to which the device is connected.

Selection	COM1 COM2 ... COMn
Default value	COMn

COMn

First free COM port.

Baud rate

Transmission rate. The baud rate selected here must also be set on the device itself.

Selection	300 600 1200 2400 4800 9600 19200 38400 57600 115200
Default value	9600

Data bit

Number of data bits.

Selection	7 8
Default value	8

Parity

Type of parity testing.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

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.

A message is displayed and you can choose whether you want to continue the run or cancel it. If the run is continued then the message that the validity period has expired will be automatically saved with the determination.

Stop determination

The running determination will be automatically terminated. The following message must be confirmed with **[OK]**.

7.17.5 Establish a connection to the balance

Dialog window: **Configuration ▶ Devices ▶ Properties ▶ RS 232 ▶ Connect**

In order to establish a connection to a balance the button **[Connect]** has to be pressed on the tab **RS 232**.

If then the print key on the connected balance is pressed, the data provided by the balance will be inserted in the following fields:

Device name

Name of balance.

Sample size

Sample size.

Sample size unit

Sample size unit.

ID1

Sample identification ID1.

ID2

Sample identification ID2.

7.18 Barcode reader

7.18.1 Barcode reader - General

A barcode reader is used to enter sample and other data in **tiamo**.



Note

A barcode reader only needs to be configured as a **device** in **tiamo** if the functions for automatic data import into sample tables are to be used. If a USB barcode reader not configured as a device is connected to the PC, it will be recognized (in the same way as a keyboard) as being an **HID** (Human Interface Device) that can be used for data entries in all fields.

Barcode reader as device



Note

If the functions of a barcode reader for automatic data import into sample tables are to be used, then it must be added to **tiamo** as a device and configured in such a way that during each data transfer the following preamble and postamble check characters are also transmitted:

Preamble #1: **02hex** (^B, STX)

Preamble #2: **02hex - 09hex** (different identification code **02hex - 09hex** for each barcode reader connected)

Postamble #1: **04hex** (^D, EOT)

Finish: <CR> <LF>

Refer to the barcode reader manual for instructions regarding its configuration.

Barcode reader as HID



Note

If a barcode reader is to be used as HID it must be configured in such a way that it does not transmit any preamble check characters.

Refer to the barcode reader manual for instructions regarding its configuration.

Input	1000 characters

Monitoring of GLP validity

Monitoring of GLP validity

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

If this option is switched on then the time interval for the GLP test will be monitored.

Monitoring can only be switched on when a date has been entered in the field GLP test date.

GLP test interval

Time interval to next GLP test. If a value is entered here then the date in the field **Next GLP test** will be adapted automatically.

Only editable when the monitoring is activated.

Range	1 ... 999 Days
Default value	999 Days

Next GLP test

Date on which the next GLP test is to be carried out. The date can be selected by clicking on the symbol  in the dialog window **Select date** (see Chapter 2.5.1, page 79). After the date has been entered, the field **GLP test interval** will be adapted automatically.

Only editable when the monitoring is activated.

Default value	GLP test date + 999 days

Message

The message options can only be edited if monitoring is switched on.

Message by E-mail

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

The message is additionally sent to the e-mail address defined under **[E-mail]** if this option is activated. The message is sent in text format.

[E-mail]

[E-Mail] opens the **Send e-mail** window (see Chapter 2.6.1, page 81).

Acoustic signal

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

If this option is enabled, an acoustic signal will be emitted additionally to the message defined above

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.



This tab is not displayed for external dosing devices on the **Titrimos 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).

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.



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



[Fill]

[Stop]

8.4.1.7 Dosing - Dosing

Dosing rate

Note

Range	0.01 ... 160.00 mL/min

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 1418*), 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

Titrand: 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

Robitic Titrosampler: 855

8.4.2.2 Stirring - Switch on/off

Program part: **Manual Control**

Here stirrers can be switched on and off. This tab appears when selecting a single stirrer as well as with all stirrers.

Stirring rate

Select the stirring rate. This parameter can also be modified live.

Range	-15 ... 15
Default value	8

[Start]

Start stirring for the selected stirrer.

[Stop]

Stop stirring for the selected stirrer.

8.4.2.3 Stirring - Continuous operation

Program part: **Manual Control**

Here stirrers can be switched on for a defined time. This tab only appears if a single stirrer is selected.

Stirring rate

Select the stirring rate. This parameter can also be modified live.

Range	-15 ... 15
Default value	8

Stirring time

Enter the time during which should be stirred. If this parameter is modified after the start of the stirrer, it is not valid until the next stirring procedure.

Range	1 ... 999999 s
Default value	60 s



[Start]

Start continuous operation for the selected stirrer. In the status display the remaining time is shown. The stirrer will be switched off automatically after the stirring time has elapsed

[Stop]

Stop stirring for the selected stirrer.

8.4.3 Remote functions

Program part: **Manual Control**

If in the subwindow for the device selection, a remote box or a remote interface is selected, then the functions and parameters belonging to these elements are displayed in the subwindow Functions/Parameters.

Devices

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

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

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 Processor: 730, 774, 778, 789, 814, 815, 864, 874

Robotic Titrosampler: 855

Spectrometer: Avantes

Input signal

Will not be displayed for the Avantes Spectrometer

Current status

Displays the current status of the 8 input lines.

Templates/Input

If the current status corresponds to one of the defined templates for the inputs, the corresponding name is shown here.



Note

Only templates without asterisks * are recognized.



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	20 °/s

[Initialize rack]

The rack in position is initialized.

**Note**

When initializing the rack, the following actions are carried out:

- Move rack in position to read out rack code.
- Transfer rack data for the rack code to sample changer.
- Move lifts upwards to 0 mm
- Move robotic arm back.

8.4.4.3 Sample changer - Move

Program part: **Manual Control**

Here the moving to desired rack, lift or robotic arm position can be triggered manually.

Rack position

Set rack position.

Current position

Shows the current rack position.

Target position

Select or enter the rack position to be moved to.

Range	1 ... n (depending on rack)
Default value	1
Selection	Special beaker 1...16

[Start]

Start moving to target position. After the start, the button changes to **[Stop]**, the two lower buttons are shown as inactive (gray) and **Move...** instead of **Ready** is displayed as status message.



Move to current rack position - 1.



Move to current rack position + 1.

Lift position

Set lift position for the selected tower.

Current position

Shows the current lift position in mm.

Target position

Enter or select the lift position that is to be moved to for the current rack position (normal beaker, special beaker, external position).

Range	0 ... 235 mm
Default value	0 mm
Selection	Home position Work position Shift position Rinse position Special position

- Shift position**
For normal beakers and external positions only.
- Rinse position**
For normal beakers and external positions only.
- Special position**
For normal beakers and external positions only.



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.

Special position for

Selection	Tower 1+2
Default value	Tower 1+2

Selection	Tower 1+2
Default value	Tower 1+2

Selection	Tower 1+2
Default value	Tower 1+2



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.

Duration

Range	1 ... 999999 s
Default value	60 s

Start pump 2. In the status display the running time since start is shown.

Stop pump 2-

Program part: **Manual Control**

Heater

Temperature

Range	50 ... 250 °C
Default value	50 °C

Selection	Init

Duration of the heating up period until reaching the desired temperature.

Range	1 ... 999 min
Selection	off
Default value	off

Start heater. In the status display the current temperature is shown.

Stop heater.

Gas flow

Inlet

Select the inlet of the carrier gas.

Selection	Pump Valve
Default value	Pump

Pump

Use of ambient air as carrier gas.

Valve

Use of gas out of a compressed gas cylinder.

Flow rate

874

Range	10 ... 150 mL/min
Default value	50 mL/min

Gas type

Gas type of the carrier gas.

Selection	Air Nitrogen Other gas
Default value	Air

Gas flow factor

Factor for the correct determination of the gas flow. This parameter is only displayed for **Gas type = Other gas**. The values for frequently used carrier gases are listed in the manual of the 774 and 874 Oven Sample Processor.

Range	1 ... 9.999
Default value	1.000

[Start]

Switch on gas flow. In the status display the running time since start is shown.

[Stop]

Switch off gas flow.

Gas flow pump

Switch the gas flow pump on the Oven Sample Processor on/off.

[Start]

Switch on gas flow pump. In the status display the running time since start is shown.

[Stop]

Switch off gas flow pump.

Inert gas valve

Switch the inert gas valve on the Oven Sample Processor on/off.

[Start]

Switch on inert gas valve. In the status display the running time since start is shown.

[Stop]

Switch off inert gas valve.

8.4.5 Measure**8.4.5.1 Measure - Overview**

Program part: **Manual Control**

If in the subwindow for the device selection, a **measuring input** for a device is selected, then the functions and parameters belonging to this device are displayed in the subwindow Functions/Parameters.

Measuring functions

The measuring functions are displayed on the following tabs:

- *Measure*
- *Intensity*
- *Sample spectrum*

Devices

The measuring functions can be carried out with the following devices:

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: 0.5)
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

Selection **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

[Measuring]

Start measuring of the intensity. The parameters defined will be used.

8.4.5.4 Measure - Sample spectrum

Program part: **Manual Control**

Here a sample spectrum can be measured and displayed.



Note

Before a sample spectrum can be measured, a reference spectrum has to be recorded in a determination by a spectrometer.

The parameters **Start wavelength**, **End wavelength**, **Integration time**, **Averaged spectra** and **Smoothing** are read out of the reference spectrum and displayed, they cannot be modified.

[Measure]

Start measuring of the sample spectrum. The parameters defined will be used. Only active, if a reference spectrum is available.

8.5 Manual Control - Graphical display

Program window:Manual control

In the subwindow for the graphical display all running, manually triggered functions are displayed graphically.

Double click on the desired field with the left-hand mouse key.



Defining and using special filter

- The dialog window **Special filter** opens for defining user-specific filters.

- 3** Enter the filter criteria and confirm with **OK**.

- The table will be filtered.

- 1 In the **Special filter** dialog window, select the desired special filter from the list box **Filter**.

9.1.3 Exporting Audit Trail

1 Select program part **Configuration**.

- 1443

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.





- 3 Archive desired Audit Trail entries.
- 4 With the menu item **File ► Delete** the dialog window **Delete Audit Trail** opens.
- 5 Under **Selection**, select the desired option (**All archived records** or **Archived records until** including date selection).
- 6 User 1: Enter **User name** and **Password**.
- 7 User 2: Enter **User name** and **Password**.
- 8 Click on **[OK]**.

The archived entries selected in the Audit Trail table will be deleted.

9.2 Backup

9.2.1 Backing up database

How to proceed?

General

In **tiamo**, **determination databases** that in contrast to the **configuration database** can be generated by the user and contain the determination data, are referred to as databases. Included among such determination data is the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**) the databases are stored on the drives administered by the computer and are only available to those users registered 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.

1 Select program part **Database**.

- 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.



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.

1 Select program part **Database**.

- 2 Click on the symbol  or menu item **File ► Database manager...**
The dialog window **Database manager** opens.

- 3** Select desired database and click on **[Properties]**.
- The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.

- 4 On the tab **General** enter a comment on the database in the field **Comment**.
- 5 On the tab **Backup** enable the check box **Backup monitoring**.
- 6 Enter **Interval** for backup monitoring or date for the next backup in the field **Next backup**.
- 7 Activate the **Start backup automatically** check box.
- 8 Select the directory for the backup in the field **Backup directory**.
- 9 Click on **[OK]**.

The dialog window **Properties - Database** is closed and the database will be backed up to the selected directory at the desired time.

9.2.2 Restoring database

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The **Database manager** window opens.
- 3 Click on **[Restore]** in the **Database manager** dialog window.
The **Restore databases** dialog window opens.
- 4 Select the directory in the **Backup directory** in which the desired database was backed up.
- 5 Select or enter the name for the desired backup file in the **Backup name** list box.
- 6 Enter the name under **Save as** under which the database is to be restored.
- 7 Click on **[Start]**.

The database restoring is started.



Note

Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

9.2.3 Backing up configuration data

How to proceed?

General

The configuration data in **tiamo** is saved in the **Configuration database**. 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 1180), **User administration** (see Chapter 6.2.1.1, page 1171), **Program administration** (see Chapter 6.2.3.1, page 1190), templates and **Audit Trail** (see Chapter 6.4, page 1212).

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder of the computer on which the program has been installed. In Client/Server systems (**tiamo multi**) the configuration database is stored centrally on the server and saves and contains all the configuration data of all computers (clients) that are connected to this server.



Note

It is strongly recommended that the configuration database be backed up periodically.

Backing up configuration data manually

- 1 Select program part **Configuration**.
- 2 Click on the menu item **File ► Backup ► Manually**.
The dialog window **Backup configuration data manually** opens.
- 3 Select the directory for the backup in the field **Backup directory**.
- 4 Select or enter a new name for the backup file in the **Backup name** list box. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

- 5** Click on **[Start]**.

The manual backup is started and the configuration database is backed up to the selected directory.

Backing up configuration data automatically

- 1** Select program part **Configuration**.

- 2** Click on menu item **File ▶ Backup ▶ Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the next backup in the field **Next backup**.

- 5 Select the directory for the backup in the field **Backup directory**.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed and the configuration database will be backed up to the selected directory at the desired time.

9.2.4 Restoring configuration data

How to proceed?

Exit tiamo light,tiamo full

- 1** **tiamo.**

- 2 Start the file **ConfigRestore.exe** in the program directory ...**tiamo** \bin.

The dialog window **Restore configuration data** opens.

- 3 Select the directory in the **Backup directory** field in which the desired database was backed up.
- 4 Select or enter the name for the desired backup file in the **Backup name** list box.
- 5 Click on **[Start]**.

The restoring of the configuration database is started.

tiamo multi

- 1 Make sure that **tiamo** is closed on all clients connected to the server and on the server itself.
- 2 Start the file **ConfigRestore.exe** in the program directory... \tiamo \bin on the server.

The dialog window **Restore configuration data** opens.

- 3 Select the directory in the **Backup directory** field in which the configuration database was backed up.
- 4 Select or enter the name for the desired backup file in the **Backup name** list box.
- 5 Click on **[Start]**.

The restoring of the configuration database is started.

9.2.5 Backing up methods

How to proceed?

General

Methods are stored in the configuration database and globally accessible for all clients. This means that in order to save methods the configuration data must be saved manually or automatically. A further possible way is to export the methods and then to save these files externally from **tiamo**.

Backing up configuration data manually

- 1** Select program part **Configuration**.

- 2** Click on the menu item **File** ► **Backup** ► **Manually**.

The dialog window **Backup configuration data manually** opens.

- 3** Select the directory for the backup in the field **Backup directory**.

- 4** Select or enter the name for the desired backup file in the **Backup name** list box. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

- 5** Click on **[Start]**.

The manual backup of the configuration database is started.

Backing up configuration data automatically

- 1** Select program part **Configuration**.

- 2** Click on menu item **File ▶ Backup ▶ Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the **Next backup**.

- 5** Select the directory for the backup in the field **Backup directory**.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed.

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

- The subwindow **Method** shows the method loaded in the first line.



5 On the **Determination series** tab, enable the check box **Statistics**.

- 7** Click on **[Start]**.

1457



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 Filtering 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 Signing determination

How to proceed?

Selecting determination

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open...**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.
The selected database opens and its data sets are displayed in the **Determination overview**.
- 5 Select desired determination.

Signature 1



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 1174*).

- 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 1174*).

- 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.

Selecting 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 the determination version current

How to proceed?

- 1** Select program part **Database**.

- 2 Click on the symbol or the menu item **File ► Open....**

The dialog window **Open database** opens.

- 3** Select desired database or enter name in the field **Database name**.

- 4** Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**.

- 5** Select desired determination.

- 6 Click on the symbol  or menu item **Determinations ▶ Show history...**

Only the currently selected determination in the **determination table** as well as all the previous versions of this determination will be shown.

- 7** Select desired determination that is to be made current.

- 8** Click on the symbol  or the menu item **Determination ► Make current**.

The determination version selected in the determination table will again be made the current determination version. This creates a new determination, the version number of which is increased by **+1** compared with the last version to have been saved.

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.

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.

- Click on the menu item **File ► Print ► Report....**
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.

10 In the dialog window **Report output**, click on **[OK]**.
The reports of the selected determination are put out.

9.3.12 Printing determination overview

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open...**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

- 5 Select desired determinations.
- 6 Click on menu item **File ► Print ► Determination overview...**
The dialog window **Print determination overview (PDF)** opens.
- 7 Under **Selection**, select desired determinations.
- 8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.
- 9 Click on **[OK]**.
The determination overview is opened as PDF file.

9.4 Databases

9.4.1 Database in general

In **tiamo**, **determination databases** that in contrast to the **configuration database** can be generated by the user and contain the determination data, are referred to as databases. Included among such determination data is the method data used for the determination, the measuring data generated during the determination and the results calculated from it.

In local server systems (**tiamo light**, **tiamo full**) the databases are stored on the drives administered by the computer and are only available to those users registered 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.



- 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.

Closing single database

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Close...**
The focused database will be closed.

Closing all databases

- 1 Select program part **Database**.
- 2 Click on menu item **File ► Close all...**.
All opened databases will be closed.

9.4.4 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.

- On the tab **General** enter a comment on the database in the field **Comment**.
- On tab **Access rights**, define access rights for reading and editing the new database for the different user groups.
- On tab **Backup**, define backup monitoring and automatic backup for the new database.

- 9

9.4.5

How to proceed?

Backing up database manually

- 1

- 2

- 3

- 4

- 5



Note

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

- 6

Backing up database automatically

- 1

- 2

- 3 Select desired database.
- 4 Click on **[Properties]**.
The dialog window **Properties - Database - 'Database name'** opens for editing the database properties.
- 5 On the tab **General** enter a comment on the database in the field **Comment**.
- 6 On the tab **Backup** enable the check box **Backup monitoring**.
- 7 Enter **Interval** for backup monitoring or date for the **Next backup**.
- 8 Activate the **Start backup automatically** check box.
- 9 Select the directory for the backup in the field **Backup directory**.
- 10 Click on **[OK]**.
- 11 The dialog window **Properties - Database** is closed.
The database is automatically saved in the selected directory at the desired time.

9.4.6 Restoring database

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or menu item **File ► Database manager....**
The dialog window **Database manager** opens.
- 3 Click on **[Restore]**.
The **Restore databases** dialog window opens.
- 4 Select the directory in the **Backup directory** in which the desired database was backed up.
- 5 Select or enter the name for the desired **Backup file**.

- 7** Click on **[Start]**.



Existing databases cannot be overwritten, i.e. they must first be deleted so that the database can be recovered under its old name.

How to proceed?

- 2 Click on the symbol  or menu item **File ► Database manager...**

3 Select desired database.

- The selected database is deleted.



Databases that are open cannot be deleted.

9.5 Configuration data

9.5.1 Configuration data in general

The configuration data in **tiamo** is saved in the **Configuration database**. 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 1180), **User administration** (see Chapter 6.2.1.1, page 1171), **Program administration** (see Chapter 6.2.3.1, page 1190), templates and **Audit Trail** (see Chapter 6.4, page 1212).

For local server systems (**tiamo light**, **tiamo full**) the configuration database is located in the program folder of the computer on which the program has been installed. In Client/Server systems (**tiamo multi**) the configuration database is stored centrally on the server and saves and contains all the configuration data of all computers (clients) that are connected to this server.

9.5.2 Exporting configuration data

How to proceed?

- 1** Select program part **Configuration**.

- 2 Click on the menu item **File ► Export....**

The dialog window **Export configuration data** opens.

- 3** Select desired configuration data.

- 4** Click on **[OK]**.

The dialog window **Export configuration data** is closed and the dialog window **Save** opened.

- 5** Select or enter name and directory for the export file. If an existing export file is selected it will be overwritten.

- 6** Click on **[Save]**.

The export of the configuration data is started.

The selected configuration data is then saved in a file with the extension **.mcfq**.

9.5.3 Importing configuration data

How to proceed?

- 1 Select program part **Configuration**.
- 2 Click on the menu item **Determinations ► Import...**
The dialog window **Open** opens.
- 3 Select or enter a new name and directory for the import file **MCFG**.
- 4 Click on **[Open]**.
The dialog window **Import configuration data** opens.
- 5 Select desired configuration data.



Note

Data that is not present in the export file cannot be selected.

- 6** Click on **[OK]**.
- The import is started and the selected configuration data is imported.

9.5.4 Backing up configuration data

How to proceed?



Note

It is strongly recommended that the configuration database be backed up periodically.

Backing up configuration data manually

- 1 Select program part **Configuration**.
- 2 Click on the menu item **File ► Backup ► Manually**.
The dialog window **Backup configuration data manually** opens.
- 3 Select the directory for the backup in the field **Backup directory**.



- 4** Select or enter the name for the **Backup file**. If an existing backup file is selected it will be overwritten.



Note

If the backup directory is on a network drive, the backup date should be added manually to the **Backup name** because the backup date information is not available when the directory is restored.

- 5** Click on **[Start]**.

The manual backup is started and the configuration database is backed up to the selected directory.

Backup configuration data automatically

- 1** Select program part **Configuration**.

- 2** Click on menu item **File ► Backup ► Automatically**.

The dialog window **Backup configuration data automatically** opens.

- 3** Activate the **Automatic backup** check box.

- 4** Enter **Interval** for backup monitoring or date for the **Next backup**.

- 5** In the field **Backup directory** select a directory for the backup.

- 6** Click on **[OK]**.

The dialog window **Backup configuration data automatically** is closed.

The configuration database is automatically saved in the selected directory at the desired time.

9.5.5 Restoring configuration data

How to proceed?

Exit tiamolight,tiamo full

- 1 tiamo.**

- 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.

tiamomulti

- 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

9.6 Methods

9.6.1 Open method

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or the menu item **File ► Open....**
The dialog window **Open method** opens.
- 3 In the list box **Method group** select the desired method group.
- 4 Select the desired method from the table or enter a name in the field **Method name**.
- 5 Click on **[Open]**.

The selected method is opened in the main window in the place of a method that is already opened. The method name is displayed in the title bar of the program; the number of currently opened methods is displayed in the left upper corner of the method symbol.



Note

A maximum of 9 methods can be opened, but only 2 can be displayed at the same time.

9.6.2 Closing method

How to proceed?

Close single method

- 1 Select program part **Method**.
- 2 Click on the symbol  or the menu item **File ► Close**.

The selected method will be closed. If the method has been modified, there will be a request to save the method as a new version.

All opened methods will be closed. A request to save the method as a new version will appear for each method having been modified.

How to proceed?

- Opens the selected method template for editing.

How to proceed?

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.

The dialog window **Save method** opens.



- In the list box **Method group** select the desired method group.
- Select the desired method from the table or enter a name in the field **Method name**.
- Click on **[Save]**.

The selected method is saved under the desired method name in the selected method group as method version **1**.

If the check box **Comment on modification of methods** is activated in the **Security settings**, the window **Modification comment method** is displayed before the method is saved.

9.6.5 Deleting method

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**

The dialog window **Method manager** opens.

- 3 In the list box **Method group** select the desired method group.
- 4 Select the desired method from the table or enter a name in the field **Method name**.
- 5 Click on the menu item **Edit ► Delete....**

The selected methods with all its **Method versions** are deleted.

If the check box **Comment on modification of methods** is activated in the **Security settings**(see *Chapter 6.2.2.4, page 1186*), 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.

Exporting method

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager...**
The dialog window **Method manager** opens.
- 3 In the list box **Method group** select the desired method group.
- 4 Select the desired method from the table or enter a name in the field **Method name**.
- 5 Click on the menu item **File ► Export...**
The dialog window **Select directory for export** opens.
- 6 Select the directory for the export files.
- 7 Click on **[OK]**.

The selected methods are each exported as files named '**Method name**'.mmet.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

9.6.7 Import methods

How to proceed?

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**
The dialog window **Method manager** opens.
- 3 In the list box **Method group** select the desired method group.
- 4 Click on the menu item **Edit ► Import....**



The dialog window **Select files to import** opens.

- 5 Select desired import files named as '**Method name**'.mmet in the desired directory.

- 6** Click on **[OK]**.

The selected methods are imported in the currently opened method group.

9.6.8 Sign methods

How to proceed?

Select method

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**

The window **Method manager** opens.

- 3** Select desired **Method group**.

- 4** Select desired method.

Signature 1



Note

Methods can only be signed at level 1 if the user belongs to a user group with the corresponding authorization (see *Chapter 6.2.1.2.3, page 1174*).

- 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 1174*).

- 1 Click on the menu item **Sign ► Signature 2....**

The dialog window **Signature Level 2** opens. If the selected method can be signed, **Signature possible** is displayed in the field **Info**.

- 2** Enter or select **User**, **Password**, **Reason** and **Comment**.

- 3** Click on **[Sign]**.

The selected method will be signed on level 2.



Note

Methods signed at level 2 are **locked**, i.e. they can neither be edited nor deleted. In order to be able to edit such methods again the signatures as level 2 must first be deleted (*see Chapter 2.3.5, page 22*).

9.6.9 Making previous method version current

How to proceed?

- 1** Select program part **Method**.

- 2 Click on the symbol  or menu item **File ► Method manager...**



- 3 Activate the **Automatic backup** check box.
 - 4 Enter an interval for backup monitoring in the field **Interval** or a date for the next backup in the field **Next backup**.
 - 5 In the field **Backup directory** select a directory for the backup.
 - 6 Click on **[OK]**.
- The dialog window **Backup configuration data automatically** is closed.

Exporting methods

- 1 Select program part **Method**.
- 2 Click on the symbol  or menu item **File ► Method manager....**
The dialog window **Method manager** opens.
- 3 Select desired **Method group**.
- 4 Select desired methods.
- 5 Click on the menu item **File ► Export...**
The dialog window **Select directory for export** opens.
- 6 Select the directory for the export files.
- 7 Click on **[OK]**.
The selected methods are each exported as files named '**Method name**'.mmet.



Note

The exported methods are stored uncoded but with a checksum. If a file stored in this manner is manipulated, then it cannot be imported again.

- 9

Edit sample table

How

- 1

- 9** Click on the menu item **Edit ► Edit line** in the dialog window **Sample table**.

The dialog window **Edit line** opens.

- 10** Select **Method** from the desired method group, enter **Sample data** and click on **[Apply]**.

The sample data entered will be applied in the respective line of the sample table.

- 11** Repeat step **8** for each desired determination.

- 12** Close the dialog window **Edit line** with **[Close]**.

- 13** In the dialog window **Sample table** click on the menu item **Sample table ► Save as...**

The dialog window **Save sample table** opens.

- 14** In the field **Name**, enter a new name for the sample table or overwrite the old name.

- 15** Click on **[Save]**.

The edited sample table is saved.

9.8.3 Loading working sample table

How to proceed?

- 1** Select program part **Workplace**.

- 2** In subwindow **Run**, click on the **Determination series** tab.

- 3 Click on the menu item **Sample table ▶ Load...**

The dialog window **Load sample table** opens.

- 4** Select desired sample table.

- 5** Click on **[Load]**.

The data of the selected sample table is loaded into the working sample table.

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.

- Define the properties for the determination series.
- Click on **[OK]**.

The dialog window **Properties - Determination series** is closed.

- 7 Select line to be modified in the subwindow **Run**.
- 8 Click on the menu item **Edit ► Edit line**.

The dialog window **Edit line** opens.

- 9** In the list box **Method**, select the desired method and enter sample data.

- 10** Click on **[Apply]**.

The sample data entered will be applied in the respective line of the working sample table.

- 11** Repeat step **8** for each desired determination.

- 12** Click on **[Close]**.

The dialog window **Edit line** is closed.

- 13** If desired, click on the menu item **Sample table ► Save as...** in the subwindow **Run**.

The dialog window **Save sample table** opens.

- 14** In the field **Name** enter a name.

- 15** Click on **[Save]**.

The working sample table will be saved under the name entered as sample table.

9.9 Reports

9.9.1 Creating report template

How to proceed?

- 1** Select program part **Database**.

- 2



Note

A database must be open in order to carry out subsequent steps.

Click on the menu item **Tools ▶ Report templates ▶ New ▶ Form report...** or **Tools ▶ Report templates ▶ New ▶ Tabular Report....**

The program window **Report template** with an empty report template opens.

- 3** Click on the menu item **File ► Page setup...** in the program window **Report template**.

The dialog window **Page setup** opens.

- 4** Define desired settings for the report format.

- 5** Click on **[OK]**.

The dialog window **Page setup** is closed.

- 6** In the program window **Report template**, click on the menu item **Tools ► Options....**

The dialog window **Options for report templates** opens.

- 7** Define desired settings for the report template.

- 8** Close the dialog window with **[OK]**.

- 10

9.9.2

1

- 3

9.9.3 Printing determination report

How to proceed?

1 Select program part **Database**.

2 Click on the symbol  or the menu item **File ► Open...**

The dialog window **Open database** opens.

3 Select desired database or enter name in the field **Database name**.

4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

5 Select desired determinations.

6 Click on the menu item **File ► Print ► Report...**

The dialog window **Report output** opens.

7 Under **Selection**, select desired determinations.

8 Under **Report type**, select the option **Original report** or **Report template**.

9 Under **Output target**, enable the check box **Printer** and/or select **PDF file**.



Note

If several reports are produced simultaneously as a PDF file then an index will be automatically appended to the file name.

- 10** In the dialog window **Report output**, click on **[OK]**.
The reports of the selected determinations are put out.

9.9.4 Printing determination overview

How to proceed?

- 1 Select program part **Database**.
- 2 Click on the symbol  or the menu item **File ► Open....**
The dialog window **Open database** opens.
- 3 Select desired database or enter name in the field **Database name**.
- 4 Click on **[Open]**.

The selected database opens and its data sets are displayed in the **Determination overview**. The database name is displayed in the title bar of the program, the number of currently opened databases is displayed in the left upper corner of the database symbol.



Note

A maximum of 4 databases can be opened, but only 2 can be displayed at the same time. Databases that are open at the time the program is ended will be automatically opened the next time the program is started.

- 5 Select desired determinations.
- 6 Click on menu item **File ► Print ► Determination overview...**
The dialog window **Print determination overview (PDF)** opens.
- 7 Under **Selection**, select desired determinations.

8 Under **Orientation**, select the option **Portrait format** or **Landscape format**.

9 Click on **[OK]**.

The determination overview is opened as PDF file.

Nummern/Symbole

A	
Absolute value	61
Access rights	
Database	194
User groups	1173
ADD	1034
Command variables	1034
Dosing parameters	1039

Absolute value	61
Access rights	
Database	194
User groups	1173
ADD	1034
Command variables	1034
Dosing parameters	1039

General/Hardware	1036
Overview	1034
Add fix volume	1421
Addition	46
Additional evaluations	
448, 474, 500, 527, 554, 579,	
606, 631, 659, 680, 701, 722,	
744, 764, 782, 796	
Additional measured values	
452, 478, 504, 531, 558, 584,	
609, 635, 661, 682, 703, 724,	
745, 766, 782, 797, 827, 852,	
870, 883, 896, 909, 921, 927,	
935, 948, 954, 1060, 1075	
Addition mode	973, 981
Addition solution	973, 981, 989
AND	50
Application note	168, 416
ASCII table	77
Assignment ID	
.....	107, 113, 130, 159
Enter	115
Audit Trail	
Archive	1224, 1444, 1453
Column display	1218, 1442
Definition	1212
Delete	1225, 1445
Desktop	1212
Export	1223, 1443
Filter	1218, 1442
Filter criterion	1221
Filter selection	1214
Functions	1216
General	1212
Last filter	1219
Menu bar	1213
Monitoring	1226
Navigation bar	1215
Open	1216, 1442
Organization	1212
Print	1226
Quick filter	1219
Removing filter	1223
Saving filter	1222
Security settings	1186
Signature rights	1174
Special filter	1219
Table	1216
Toolbar	1214

Update	1223
Verify	1227
Automatic conditioning	414
Automation commands	1087
Autostart	136
Auxiliary lines	304
Avantes Spectrometer	
Overview	1394
Properties	1394
Axial distance	
.....	1356, 1364, 1374, 1381
B	
Backup	195
Backup directories	1191
Configuration data	
.....	1199, 1200
Database	195
Backup directory	
Create	1191
Edit	1192
General	1191
Balance	
Connect	1411
Data import	108, 131, 160
Overview	1407
Properties	1407
RS-232	1408
Barcode reader	
Configuration	1413
Connect	1416
Data import	109, 132, 161
General	1412
Overview	1413
Settings	1414
Beaker radius	
.....	1304, 1356, 1364, 1374, 1381
Rack parameters	1299
Rack table	1296
Special beaker	1301, 1302
Beaker sensor	1304
Rack parameters	1299
Rack table	1296
Special beaker	1301
Beaker test	1088
BRC	784
Additional evaluations	796
Additional measured values	
.....	797

Backup	195
Backup directories	1191
Configuration data	1199, 1200
Database	195
Backup directory	
Create	1191
Edit	1192
General	1191
Balance	
Connect	1411
Data import	108, 131, 160
Overview	1407
Properties	1407
RS-232	1408
Barcode reader	
Configuration	1413
Connect	1416
Data import	109, 132, 161
General	1412
Overview	1413
Settings	1414
Beaker radius	1304, 1356, 1364, 1374, 1381
Rack parameters	1299
Rack table	1296
Special beaker	1301, 1302
Beaker sensor	1304
Rack parameters	1299
Rack table	1296
Special beaker	1301
Beaker test	1088
BRC	784
Additional evaluations	796
Additional measured values	797

- Command variables 784
- Conditioning 794
- Control parameters 791
- Fix endpoint evaluation 798
- Overview 784
- Start conditions 790
- Stop conditions 794
- Titration parameters 793
- Break-point evaluation
 - 448, 474, 500, 527, 554, 579,
 - 606, 631, 855, 868, 880, 893,
 - 906, 918, 945, 966
- Buffer data 999
 - Import 1196
 - Values table 999
- Buffer type 998
- C**
- CAL
 - CAL Cond 1022
 - CAL Spec 1030
- CALC 1110
 - Command variables 1110
 - Overview 1110
 - Result table 1112
- CAL Cond 1022
 - Command variables 1022
 - Conductivity 1028, 1030
 - Conductivity standard
 - 1028, 1030
 - General/Hardware 1024
 - Measuring parameters 1026
 - Overview 1022
 - Reference temperature
 - 1028, 1030
 - Temperature coefficient
 - 1028, 1030
- Calculated measured value 857
- Calculation algorithms 24
- Calibrate 994, 995
 - Automatic solution changing
 - 995
 - Calibration command 992
 - Manual solution changing 994
 - Number of buffers 998
- Calibration 1264
 - Calibration data 1264
 - History 1271
 - History limits 1273
 - Intervention limits 1273
 - Monitoring 1264
 - Warning limits 1273
- Calibration buffer 1202
- Calibration curve 322
- Show 322
- Call 1151, 1153
- CALL 1151
 - Call 1153
 - Command variables 1151
 - Overview 1151
 - Properties 1152
- CAL LOOP Conc 1016
 - Command variables 1016
 - Overview 1016
 - Properties 1017
- CAL LOOP pH 997
 - Buffer data 999
 - Command variables 997
 - Overview 997
 - Properties 998
- CAL MEAS Conc 1017
 - Command variables 1017
 - General/Hardware 1019
 - Measuring parameters 1021
 - Overview 1017
- CAL MEAS pH 1010
 - Command variables 1010
 - General/Hardware 1012
 - Measuring parameters 1014
 - Overview 1010
- CAL Spec 1030
 - Calibration wavelengths . 1033
 - Command variables 1030
 - General/Hardware 1032
 - Measuring parameters 1033
 - Overview 1030
- Case 75
- Change layout 88, 186, 1169
- Client 1193
- Column display
 - Audit Trail 1218
 - Common variables 1282
 - Determination overview ... 277
 - Sample solutions (TC conductiv-
ity) 1291
 - Sensors 1259
 - Solutions 1236
- Command 409
 - Alphabetical overview 410
 - Automation commands .. 1087
 - Cancel 166, 1134
 - Combine 1160
 - Comment 384
 - Copy 383
 - Cut 383
 - Definition 409
 - Delete 384
 - Dosing command 1034
- Edit 382
- Entering formulas 384
- General 409
- Insert 382, 384
- Interrupt 1134
- Measuring commands 859
- Miscellaneous commands
 - 1147
- Move 383
- Presentation 409
- Presentation in the run 164
- Properties 384
- Result commands 1110
- Resume 1134
- Select 383
- Titration commands 427
- Track command 413
- Variables 28
- Command variables 28
 - ADD 1034
 - BRC 784
 - CALC 1110
 - CAL Cond 1022
 - CALL 1151
 - CAL LOOP Conc 1016
 - CAL LOOP pH 997
 - CAL MEAS Conc 1017
 - CAL MEAS pH 1010
 - CAL Spec 1030
 - CTRL 1127
 - DATABASE 1121
 - DET Ipol 482
 - DET pH 430
 - DET U 456
 - DET Upol 509
 - DOS pH 1046
 - DOS U 1061
 - EMPTY 1084
 - ERROR 426
 - EXIT 425
 - EXPORT 1125
 - FLOW 1107
 - HEATER 1105
 - KFC 768
 - KFT Ipol 727
 - KFT Upol 747
 - LIFT 1094
 - LOOP 1153
 - LQH 1076
 - MEAS Conc 928
 - MEAS Cond 936
 - MEAS Ipol 884
 - MEAS Opt 962
 - MEAS pH 860

1504 ■■■■■■

- x axis 308
- y axis 309, 311
- Curve overlay
 - Comment 243
 - Manage templates 238
 - Options 242
 - Properties 239
 - y axis 241
- Curves 353
 - Background 367
 - General 353
 - Grid 367
 - Measuring point list
..... 353, 354, 369
 - Monitoring report 355
 - Options 367
 - Overlay 324
 - Print overlaid curves 325
 - Properties 356
 - Reprocessing 304
 - Scaling 356, 359, 363
 - Show endpoints 367
 - Show evaluation lines 367
 - Smoothing 359, 363
 - x axis 356
 - y1 axis 359
 - y2 axis 363
- Custom calibration buffer 1202
- D**
- Dark spectrum 1397
- Database
 - Access rights 194
 - Backing up 1446, 1475
 - Backup 195, 196
 - Closing 190, 1473
 - Create 192
 - Creating 1474
 - Curves 353
 - Definition 177
 - Deleting 193, 1477
 - Desktop 12, 177
 - Display next to one another
..... 190
 - Display one below the other
..... 190
 - Display single database 190
 - Functions 184
 - General 177
 - General information 193
 - Information 326
 - Introduction 4
 - Manage 191
 - Measuring point list 354
 - Menu bar 178
 - Monitoring 196
 - Monitoring report 355
 - Opening 188, 1456, 1473
 - Organization 177
 - Print report 320
 - Properties 193
 - Rename 192
 - Restore 197
 - Restoring 1448, 1476
 - Save determination data . 1121
 - Select 189
 - Subwindows 184
 - Toolbar 182
 - View 87, 185, 1168
- DATABASE 1121
 - Command variables 1121
 - Overview 1121
 - Properties 1122
- Data import 108, 131, 160
- Date 79
- Default reason 1188
- Delete all data 422
- Delta U 989
- DET 428
 - DET Ipol 482
 - DET pH 430
 - DET U 456
 - DET Upol 509
 - Evaluation 428
 - Overview 428
- Determination
 - Comment 282, 339
 - Configuration 333
 - Continue 119, 134
 - Control chart 323
 - Curve display 353
 - Delete 318
 - Deleting 1464
 - Determination overview ... 276
 - Device information 333
 - Displaying all statistics data
sets 287
 - Displaying history 322
 - Display signatures 294
 - Examples 318
 - Exporting 317, 1462
 - Filter 285
 - Filtering 1458
 - Functions 281
 - Hold 119, 134
 - Import 318
 - Importing 1463
 - Information 326, 327
 - Make old version current .. 322
 - Making current 1465
 - Measuring point list 354
 - Messages 339
 - Modification comment
..... 316, 1186
 - Monitoring report 355
 - Overlay curves 324
 - Printing report 1470
 - Print report 320, 1499
 - Reason for modification 316
 - Repeating automatically ... 130
 - Reprocessing 296, 1466
 - Searching 282, 1458
 - Selection 280
 - Send to 317
 - Sensor information 333
 - Show calibration curve 322
 - Show method 321
 - Signature rights 1174
 - Signatures 327
 - Signing 1460
 - Start 118
 - Starting 134
 - Status 327
 - Stop 118
 - Stopping 134
 - Update 282
 - Variables 42
 - Version 322, 327, 1465
- Determination overview
 - Column display 277
 - Data display 276
 - Data record selection 280
 - Filter selection 278
 - Functions 281
 - General 276
 - Navigation bar 279
 - Print 319, 1500
 - Printing 1471
 - Table navigation 279
 - Update 276, 282
- Determination parameters
 - Determination series 136
 - Display 102, 129, 155
 - Single determination 120
- Determination run
 - Determination series 141
 - Single determination 125
- Determination series
 - Comment 110, 163
 - Data import 108, 160
 - Determination parameters
..... 136

1506 ■■■■■■

- Parameters for preparing 1249
- Prepare 1420
- Tubing parameters 1249
- Valve disk 1249
- Dosino 1077
- DOS pH 1046
- Additional measured values 1060
- Command variables 1046
- Dosing parameters 1053
- General/Hardware 1049
- Monitoring 1056
- Overview 1046
- Stop condition 1055
- DOS U 1061
- Additional measured values 1075
- Command variables 1061
- Dosing parameters 1068
- General/Hardware 1064
- Monitoring 1071
- Overview 1061
- Stop condition 1070
- Drift control
- 864, 877, 889, 902, 915, 932, 975, 983, 990, 1014, 1021
- Drift correction
- 657, 678, 699, 720, 742, 762, 779, 794
- Drift value
- 657, 678, 699, 720, 742, 762, 779, 794
- E**
- Electrode test
- 486, 513, 592, 687, 708, 730, 751, 771, 787, 887, 900
- Electrode zero point 1264
- Electronic signature 1187
- E-mail 1124, 1159
- Edit template 1208
- Export template 1194
- Login 1189
- Manage templates 1207
- Send 81, 421
- Templates 1207
- Emergency stop 1210
- EMPTY 1084
- Command variables 1084
- Overview 1084
- Properties 1085
- Empty 1421
- END 427
- Endpoint
- 651, 672, 693, 714, 736, 756, 774, 791
- Endpoint list 306
- Set manually 304
- Show 367
- EP criterion
- 445, 448, 454, 471, 474, 479, 480, 498, 500, 506, 507, 525, 527, 532, 533, 552, 554, 559, 560, 577, 579, 585, 586, 603, 606, 611, 612, 629, 631, 637, 638, 868, 880, 893, 906, 918, 945, 966
- EP recognition
- 445, 454, 471, 479, 480, 498, 506, 507, 525, 532, 533, 552, 559, 560, 577, 585, 586, 603, 611, 612, 629, 637, 638
- Equal to 52
- ERROR 426
- Command variables 426
- Error (Function) 76
- Error track 407, 426
- Evaluation 853, 855, 856
- Additional evaluations
- 448, 474, 500, 527, 554, 579, 606, 631, 659, 680, 701, 722, 744, 764, 782, 796
- Break-point evaluation
- 448, 474, 500, 527, 554, 579, 606, 631, 868, 880, 893, 906, 918, 945, 966
- Fix endpoint evaluation
- 448, 474, 500, 527, 554, 579, 606, 631, 659, 680, 701, 722, 744, 764, 782, 796, 825, 850, 868, 880, 893, 906, 918, 945, 966
- Gran evaluation
- 448, 474, 500, 527, 554, 579, 606, 631, 659, 680, 701, 722, 744, 764, 825, 850, 855, 868, 880, 893, 906, 918, 926, 945, 966
- Minimum evaluation
- 448, 474, 500, 527, 554, 579, 631, 659, 680, 701, 722, 744, 764, 825, 850, 855, 868, 880, 893, 906, 918, 926, 945, 966
- Potentiometric evaluation
- 445, 471, 498, 525, 552, 577, 603, 629
- Rate evaluation 825, 850
- Show evaluation lines 367
- Evaluation window . 801, 825, 850
- Event message . 1133, 1134, 1138
- Exchange unit 1245
- Configuration 1245
- Fill 1420
- Parameters for preparing 1245
- Prepare 1420
- Tubing parameters 1245
- Exchange units 1233
- EXIT 425
- Command variables 425
- Exit track 407, 425
- Exponential function 59
- Export
- Audit Trail 1223
- Buffer Data 1194
- Configuration data 1194, 1478
- Determination data 1125
- Determinations 317, 1462
- Export templates 244
- Method 1485
- Result Template 1194
- Sensors 1194
- EXPORT 1125
- Command variables 1125
- Overview 1125
- Properties 1126
- Export template
- Editing 245
- Field selection 247
- Managing 244
- Options for for CSV format 248
- Options for measurement point list 248
- Properties 245
- Selection 317, 1126
- External measured value 858
- External position
- 1356, 1364, 1371, 1374, 1381

Ignored devices	
Editing	1231
Import	
Configuration data	
.....	1196, 1479
Determinations	318, 1463
Method	1485
Increment	
440, 466, 493, 519, 546, 572,	
598,	624
Indicator electrode	771, 787
Information	
Comment	339

Configuration 333
 Determination 327
 Messages 339
 Method 330
 Overview 326
 Sample 331
 Initialize rack 1103
 Initial measured value
 437, 463, 490, 516, 543, 569,
 595, 621, 648, 669, 690, 712,
 734, 754, 811, 836
 Input line
 SCAN command 1130
 SEND command 1133
 Template 1203
 Input signal 1131
 Integer 62
 Intersection line evaluation 304

K

KFC 768
 Additional evaluations 782
 Additional measured values
 782
 Command variables 768
 Conditioning 779
 Control parameters 774
 Fix endpoint evaluation 784
 General/Hardware 771, 787
 Overview 768
 Start conditions 774
 Stop conditions 779
 Titration parameters 778
 KFT 725
 KFT Ipol 727
 KFT Upol 747
 Overview 725
 KFT Ipol 727
 Additional evaluations 744
 Additional measured values
 745
 Command variables 727
 Conditioning 742
 Control parameters 736
 Fix endpoint evaluation 747
 General/Hardware 730
 Overview 727
 Start conditions 734
 Stop conditions 741
 Titration parameters 739
 KFT Upol 747
 Additional evaluations 764
 Additional measured values
 766

Command variables 747
 Conditioning 762
 Control parameters 756
 Fix endpoint evaluation 767
 General/Hardware 751
 Overview 747
 Start conditions 754
 Stop conditions 761
 Titration parameters 760

L

Last filter
 Audit Trail 1219
 Determinations 285
 Less than 56
 Less than or equal to 57
 License
 Add 1193
 License code 1193
 Show 1193
 LIFT 1094
 Command variables 1094
 Overview 1094
 Properties 1095
 Lift position 1095, 1431
 Lift rate
 1095, 1356, 1364, 1374, 1381
 Live display
 Application note 168
 Curve display 168
 General 166
 Measured value display 168
 Messages 168
 Properties 168
 Tracks 166, 414
 Live modification
 Method 165
 Sample data 123
 Logarithm 59, 60
 Login
 General 14
 Login 15
 Log out automatically 16
 Log out manually 16
 Sending E-mail 1189
 Log-in
 Security settings 1181
 Logout
 Log out automatically 16
 Log out manually 16
 Loop 1153
 LOOP 1153
 Command variables 1153
 Overview 1153

Properties 1157
 LQH 1076
 Command variables 1076
 General/Hardware 1077
 Overview 1076
 Parameters 1079

M

Main track 403
 Manual Control 1417, 1428
 Device selection 1418
 Dosing 1418
 Functions 1418
 Graphical display 1441
 Heater/Gas 1435
 Measure 1437
 Pump 1434
 Remote functions 1426
 Stirring 1424
 Maximum evaluation
 448, 474, 500, 527, 554, 579,
 606, 631, 659, 680, 701, 722,
 744, 764, 855, 868, 880, 893,
 906, 918, 926, 945, 966
 MEAS 859
 MEAS Conc 928
 MEAS Cond 936
 MEAS Ipol 884
 MEAS Opt 962
 MEAS pH 860
 MEAS Ref 956
 MEAS Spec 958
 MEAS T 910
 MEAS T/Flow 923
 MEAS TC Cond 949
 MEAS U 872
 MEAS Upol 897
 Overview 859
 MEAS Conc 928
 Additional measured values
 935
 Command variables 928
 General/Hardware 930
 Measuring parameters 932
 Overview 928
 MEAS Cond 936
 Additional measured values
 948
 Command variables 936
 Evaluation 945
 Fix endpoint evaluation 949
 General/Hardware 939
 Measuring parameters 941
 Overview 936

1510 ■■■■■■

- Method selection by assignment
ID 130
Method symbol .. 13, 371, 378
Method template 376
Modification comment
..... 387, 1186
Modification reason 387
Moving 391
Open 1482
Opening 376
Presentation in the run 164
Renaming 391, 393
Reports 1488
Reprocessing 301
Sample data 95, 121, 146
Sample methods 393
Save 1483
Saving 385
Selection 378
Sending to 392
Show determination method
..... 321
Showing history 399
Sign 1486
Signature rights 1174
Signatures 330
Status 330
Structure 370
Toolbar 373
Variables 27
Version ... 330, 385, 399, 1487
Zoom 164, 379
Method editor 4
Method group
 Access rights 401
 General parameters 401
 Manage 400
 Properties 401
 Standard method group . 1176
Method groups
 Create 1491
 Delete 1491
Method variable 27
 Assignment 417
 Declaration 417
 Monitoring 417
 Type 417
 Value 417
MET Ipol 588
 Additional evaluations 606
 Additional measured values
 609
 Command variables 588
 Fix endpoint evaluation 613
 General/Hardware 592
 Overview 588
 Potentiometric evaluation . 603
 Start conditions 595
 Stop conditions 602
 Titration parameters 598
MET pH 536
 Additional evaluations 554
 Additional measured values
 558
 Command variables 536
 Fix endpoint evaluation ... 561
 General/Hardware 540
 Overview 536
 Potentiometric evaluation . 552
 Start conditions 543
 Stop conditions 550
 Titration parameters 546
MET U 562
 Additional evaluations 579
 Additional measured values
 584
 Command variables 562
 Fix endpoint evaluation ... 587
 General/Hardware 566
 Overview 562
 Potentiometric evaluation . 577
 Start conditions 569
 Stop conditions 575
 Titration parameters 572
MET Upol 614
 Additional evaluations 631
 Additional measured values
 635
 Command variables 614
 Fix endpoint evaluation ... 639
 General/Hardware 618
 Overview 614
 Potentiometric evaluation . 629
 Start conditions 621
 Stop conditions 627
 Titration parameters 624
Minimum evaluation
 448, 474, 500, 527, 554, 579,
 606, 631, 659, 680, 701, 722,
 744, 764, 855, 868, 880, 893,
 906, 918, 926, 945, 966
Miscellaneous commands 1147
Modification comment
 Determination 316, 1186
 Method 387, 1186
 Sample data
 133, 163, 1148, 1186
Modification reason
 Determination 1186
 Method 387, 1186
 Sample data
 133, 163, 1148, 1186
Module
 Calibration curve field 233
 Curve field 232
 Data field 217
 Date field 219
 Edit 211
 Fixed report 226
 Group field 227
 Image 228
 Insert 211
 Line 229
 Module bar 206
 Number of pages 224
 Page number 223
 Rectangle 231
 Text field 216
 Time field 221
 Toolbar 206
Molar mass calculator 78
Monitor
 Audit Trail 1226
Monitored dosing 1042
Monitoring
 Calibration data 1264
 Common variables 1285
 Database 196
 Dosing rate 819, 844
 Measured value
 819, 844, 1056, 1071
 Sensor 1261
 Solution 1238
 Temperature
 819, 844, 1056, 1071
 Titer 1240
Monitoring report 355
Move 1088
MOVE 1087
 Automatic solution changing
 995
 Command variables 1087
 Overview 1087
Move angle 1088
Multiplication 47

N
Natural logarithm 59
Navigation
 Audit Trail 1215
 Determination overview ... 279

- Reason for modification
 - Determination 316
- Recalculating 296
- RECEIVE 1136
 - Command variables 1136
 - Event/status 1138
 - Overview 1136
 - Properties 1137
- Recognition 453
- Reference spectrum 1398
- Reference temperature 941
- Regular expression 1142
- Remark 120, 136
- Remarks 123, 141
- Remote box 1131
- Remote functions
 - Manual Control 1426
- Repeat loop 1153
- Report
 - Method 388
 - Print 320, 1499
 - Printing 1470
- REPORT 1123
 - Command variables 1123
 - Overview 1123
 - Properties 1124
- Report (subwindow at workplace)
 - General 175
 - Latest report 175
 - Properties report overview 176
 - Report overview 176
 - Selected report 175
- Report template
 - Calibration curve field 233
 - Comment 214
 - Copy 200
 - Create 1496
 - Creating new 201
 - Curve field 232
 - Data field 217
 - Date field 219
 - Default font 214
 - Define sections 209
 - Delete 200
 - Desktop editor 203
 - Edit 1497
 - Editing 202
 - Edit modules 211
 - Export 200
 - Fixed report 226
 - Form report 201, 209
 - Functions 207
 - General 202
- Grid 214
- Image 228
- Import 201
- Insert modules 211
- Insert pages 210
- Line 229
- Manager 199
- Menu bar 203
- Module bar 206
- Navigate 210
- Number of pages 224
- Opening 201
- Options 214
- Overview 202
- Page format 207
- Page number 223
- Page preview 213
- Page setup 207
- Rectangle 231
- Rename 200
- Save 215
- Selection 1124
- Side margins 207
- Tabular report 201, 210
- Text field 216
- Time field 221
- Toolbar 205, 206
- Unit 214
- Zoom 212
- Reprocessing 296
 - Curve evaluation 303, 304
 - Functions 296
 - General 296
 - Method 301
 - Modifications 300
 - Proceed 1466
 - Properties Curve evaluation 307
 - Raw data 316
 - Recalculating 296
 - Reprocessing window 296
 - Reset 296
 - Results overview 315
 - Result view 314
 - Rules 298
 - Set endpoints manually ... 304
 - Statistics 302
 - Subwindow 296
 - Variables 300
- REQUEST 1147
 - Command variables 1147
 - Overview 1147
 - Properties 1148
 - Sample data request 1150
- Restore
 - Configuration data 1200
 - Database 197
- Result 1115
 - Assignment 1115
 - Decimal places 1115
 - Definition 1115
 - Description 1115
 - Formula 1115
 - Formula assistant 1114
 - Monitoring 1117
 - Name 1115
 - New result 1113
 - Options 1119
 - Save as Common variable 1119
 - Save as titer 1119
 - Statistics 1115
 - Unit 1115
 - Variables 41
- Result commands 1110
- Result template 1120
 - Delete 1120
 - Formula assistant 1114
 - Import 1196
 - Manage 1120
 - Rename 1121
 - Save 1121
 - Selection 1113
- Result variables 41
- Return immediately 422
- Rinse position
 - 1304, 1356, 1364, 1374, 1381, 1431
 - Lift position 1300
- Robotic arm 1092
 - Configuration 1370
 - Robotic arm position 1431
- Rounding integer 62
- RS-232 device
 - Connect 1406
 - Overview 1401
 - Properties 1401
- RS-232 properties 1408
- Run
 - Continue 119, 134
 - Determination series 133
 - Hold 119, 134
 - Single determination 118
 - Start 118
 - Starting 134
 - Stop 118
 - Stopping 134
- Run test 117, 153

Limits	1268
Monitoring	1261, 1268
Parameter	1261
Print list of sensors	1260
Sensor information	333
Sensor selection	
434, 460, 486, 513, 540,	
566, 592, 618, 645, 666, 687,	
708, 730, 751, 771, 787,	
807, 832, 862, 874, 887, 900,	
913, 930, 939, 971, 978,	
986, 1012, 1019, 1024, 1049,	
1064	
Sensor table	1257
Slope	1264
Standard sensors	1256
Subwindow	1256
SEQUENCE	1160
Command variables	1160
Overview	1160
Properties	1161
Series	
Pause	134
Resuming	134
SERIES END	424
Command variables	424
Series end track	406, 424
SERIES START	424
Command variables	424
Series start track	405, 424
SET	639
Control range	641, 800
Overview	639
SET Ipol	683
SET pH	642
SET U	662
SET Upol	704
SET Ipol	683
Additional evaluations	701
Additional measured values	
.....	703
Command variables	683
Conditioning	699
Control parameters	693
Fix endpoint evaluation ...	704
General/Hardware	687
Overview	683
Start conditions	690
Stop conditions	698
Titration parameters	697
SET pH	642
Additional evaluations	659
Additional measured values	
.....	661

- Command variables 642
- Conditioning 657
- Control parameters 651
- Fix endpoint evaluation 662
- General/Hardware 645
- Overview 642
- Start conditions 648
- Stop conditions 656
- Titration parameters 655
- SET U 662
 - Additional evaluations 680
 - Additional measured values 682
 - Command variables 662
 - Conditioning 678
 - Control parameters 672
 - Fix endpoint evaluation 683
 - General/Hardware 666
 - Overview 662
 - Start conditions 669
 - Stop conditions 677
 - Titration parameters 676
- SET Upol 704
 - Additional evaluations 722
 - Additional measured values 724
 - Command variables 704
 - Conditioning 720
 - Control parameters 714
 - Fix endpoint evaluation 725
 - General/Hardware 708
 - Overview 704
 - Start conditions 712
 - Stop conditions 719
 - Titration parameters 717
- Shift direction 1088
- Shift position 1304, 1431
 - Lift position 1300
- Shift rate 1088
- Show measured value
 - 657, 678, 699, 720, 742, 762, 779, 794
- Sign 63
 - Display signatures 397
 - Method 1486
- Signal drift
 - 437, 440, 463, 466, 490, 493, 516, 519, 543, 546, 569, 572, 595, 598, 621, 624, 648, 669, 690, 712, 734, 754, 811, 836, 864, 877, 889, 902, 915, 932, 975, 983, 990, 1014, 1021, 1026
- Signature
 - Delete Signatures 2 22, 295, 398
 - Display signatures 294
 - Procedure 18
 - Rules 17, 291, 394
 - Security settings 1187
 - Signature 1 19, 291, 395
 - Signature 2 20, 293, 396
 - Signature rights 1174
- Signing
 - Determination 1460
- Single determination
 - Data import 131
 - Determination parameters 120
 - Determination run 125
 - Display 129
 - Live modification 123
 - Operating elements 118
 - Overview 118
 - Process 130
 - Properties 128
 - Repeating determination automatically 130
 - Run test 117, 153
 - Sample data 121
 - Starting 1455
 - Status display 119
- SLK export 245
- Slope 1264
- Smoothing factor
 - 448, 474, 500, 527, 554, 579, 606, 631, 868, 880, 893, 906, 918, 945, 966
- Solution 1233
 - Add new solution 1235
 - Column display 1236
 - Concentration 1238
 - Delete 1236
 - Dosing unit 1249
 - Editing properties 1237
 - Exchange unit 1245
 - Export 1194
 - General 1233
 - Import 1196
 - Monitoring 1238
 - Parameter 1292
 - Parameters 1237
 - Print list of solutions 1237
 - Solution selection
 - 434, 460, 486, 513, 540, 566, 592, 618, 645, 666, 687, 708, 730, 751, 807, 832, 978, 986, 1036, 1049, 1064, 1077
 - Solution table 1234
 - Subwindow 1233
 - Titer 1240
 - Titer history 1242
- Special beaker 1301, 1431
 - Parameters 1302
 - Properties 1304
- Special filter
 - Audit Trail 1219
 - Determinations overview .. 286
- Special position 1304, 1431
 - Lift position 1300
- Spectrometer
 - Dark spectrum 1397
 - Reference spectrum 1398
- Square root 60
- Standard addition ... 973, 981, 989
- Standards 1017
- START 413
 - Application note 416
 - General 414
 - Method variables detail window 417
 - Method variables table 417
 - Overview 413
- Start condition
 - 437, 463, 490, 516, 543, 569, 595, 621, 648, 669, 690, 712, 734, 754, 774, 790, 811, 836
- Start drift
 - 657, 678, 699, 720, 742, 762, 779, 794
- Start key 118, 134
- Start measured value
 - 437, 463, 490, 516, 543, 569, 595, 621, 815, 841
- Start password
 - Entering 16
 - Set 1178, 1180
- Start rate 815, 841
- Start slope
 - 437, 463, 490, 516, 543, 569, 595, 621
- Start temperature 953
- Start time 815, 841
- Start volume
 - 437, 463, 490, 516, 543, 569, 595, 621, 648, 669, 690, 712, 734, 754, 811, 836
- STAT 799
 - Control range 800
 - Monitoring report 355

T	
Tabular report	201
Tandem dosing	802
Tandem dosing device	
.....	807, 832, 1036, 1049, 1064
Tangent evaluation	304
Target temperature	1105
Temperature coefficient	1289
Temperature measurement	
434, 460, 486, 513, 540, 566,	
592, 618, 645, 666, 687, 708,	
730, 751, 807, 832, 862, 874,	
887, 900, 930, 971, 978, 986,	
1049,	1064
Template	
Conductivity standard	1206
Custom calibration buffer	
.....	1202
E-mail	1207

- Input lines 1203
 Output lines 1204
 Text editor 79
 TextPosition 73
 Text templates 115
 TextToNumber 68
 TextToTime 69
 Threshold value
 448, 474, 500, 527, 554, 579,
 606, 631, 659, 680, 701, 722,
 744, 764, 855, 868, 880, 893,
 906, 918, 926, 945, 966
 Time() 64
 Time(Date) 65
 Time(Date+Time) 66
 Time interval measuring point
 655, 676, 697, 717, 739, 760,
 778, 793, 815, 841
 TimeToNumber 70
 TimeToText 71
 Titer 1240
 Calculation in CALC command
 1119
 History 1242
 History limit values 1244
 Intervention limits 1244
 Monitoring 1240
 Statistics 1240
 Titer determination 1240
 Warning limits 1244
 Titrand
 Overview 1305
 Properties 1305
 Titration commands 427
 Titration direction
 655, 676, 697, 717, 739, 760,
 815, 841
 Titration parameters
 440, 466, 493, 519, 546, 572,
 598, 624, 655, 676, 697, 717,
 739, 760, 778, 793, 815, 841
 Titration rate
 440, 466, 493, 519, 546, 572,
 598, 624, 651, 672, 693, 714,
 736, 756, 813, 838
 Titrimo
 Overview 1311
 Properties 1311
 Toolbar
 Audit Trail 1214
 Configuration 1166
 Database 182
 Enable/Disable 1164
 Methods 373
 Report template 205
 Workplace 84
 Tower 1356, 1364, 1374, 1381
 External position
 1356, 1364, 1374, 1381
 External positions 1371
 Lift positions 1300
 Lift positions (774) 1304
 Swing Head
 1356, 1364, 1374, 1381
 Tower parameters
 1356, 1364, 1374, 1381
 Track
 Call 1151
 Cancel 1134
 Copy 381
 Cut 382
 Definition 402
 Delete 382
 Edit 380
 Error track 407, 426
 Exit track 407, 425
 Insert 380, 382
 Interrupt 1134
 Move 381
 Normal track 404, 422
 Presentation 402
 Presentation in the run 164
 Resume 1134
 Select 380
 Series end track 406, 424
 Series start track 405, 424
 Structure 402
 Track command 413
 TRACK 422
 Command variables 422
 Track call
 . 801, 819, 844, 1045, 1056, 1071
 Track command 413
 END 427
 ERROR 426
 EXIT 425
 SERIES END 424
 SERIES START 424
 START 413
 TRACK 422
 Track display 414
 Tracks
 Interrupt 1159
 Live display 166
 Main track 403
 TRANSFER 1139
 Command variables 1139
 Overview 1139
 Properties 1140
 Regular expression 1142
 Transfer command 1142
 Transfer command 1140, 1142
 Trim 74
U
 Unit
 Request 1148, 1150
 Sample data 146
 User
 Access rights 1173
 Add 1179
 Details 1178
 Full Name 1178
 General 1171
 Options 1176
 Short name 1178
 Signature rights 1174
 Status 1178
 User administration
 Access rights 1173
 Export 1194
 Functions 1171
 General 1171
 Import 1196
 Options 1176
 Signature rights 1174
 User groups 1172
 User group
 Access rights 1173
 Add 1176
 Copy 1177
 Delete 1177
 Details 1172
 General 1171
 Options 1176
 Rename 1177
 Signature rights 1174
 User name
 Short name 15
 UTC 64, 65, 66
V
 Variable
 Commands 28
 Common variables 44
 Determination variables 42
 Entering 26
 Method 27
 Overview 26
 Result variables 41
 System variables 43
 Versions 7

