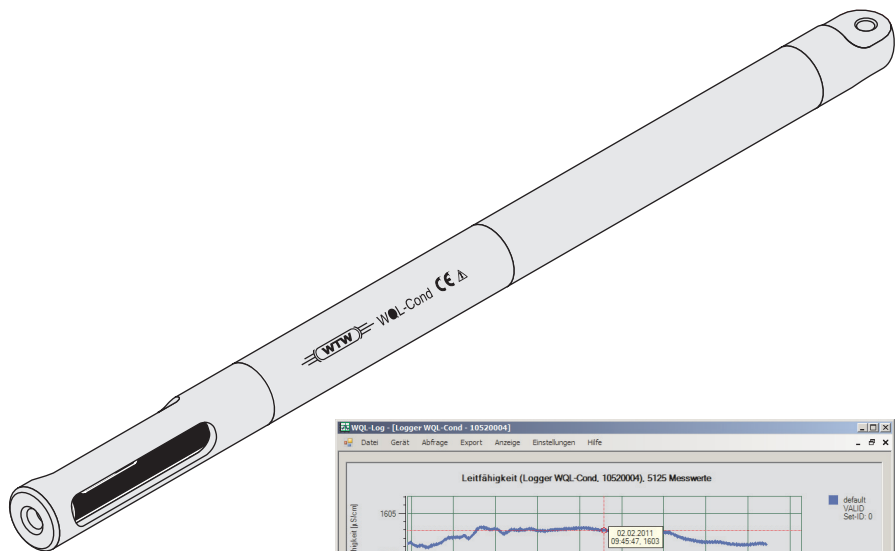


Logger WQL-Cond PC program WQL-Log



Logger for conductivity measurement and PC program to display and evaluate data from the logger

**Note**

The latest version of the present operating manual can be found on the Internet under www.WTW.com.

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Contents

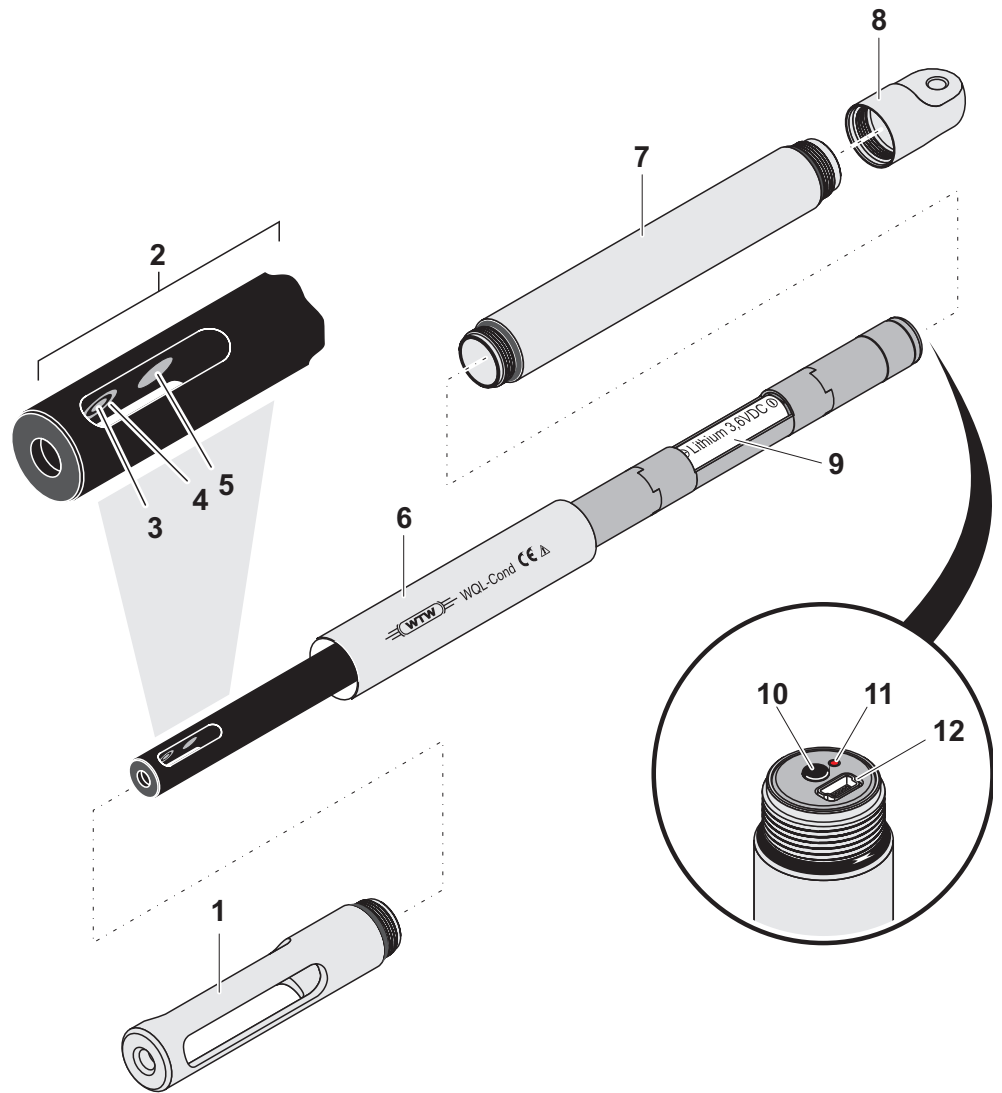
1	Overview	101
1.1	Logger WQL-Cond	101
1.2	PC program WQL-Log	102
2	Safety	105
3	Commissioning	107
3.1	Inserting the battery	107
3.2	Mounting suspension	108
3.3	Installing the WQL-Log program	109
3.3.1	PC requirements	109
3.3.2	Installation routine	109
3.4	Initial commissioning	115
3.5	Connection types	118
3.6	Starting the WQL-Log program	119
4	Setting the display	121
4.1	Setting the language	121
4.2	Setting the temperature unit	121
4.3	Setting the cursor	122
5	Setting the measuring mode	124
6	Calibration in control standard (determining the cell constant)	127
6.1	Calibration settings	128
6.2	Calibrating (automatic)	129
6.3	Calibrating (manual)	132
6.4	Viewing the calibration history	136
6.5	Exporting the calibration history	138
7	Measuring directly	139
8	Logging	140
8.1	Typical sequence of a logging job (checklist)	140
8.2	Setting up a logging job - setting parameters	141
8.3	Setting the parameters and starting the logging job	144
8.4	Logging job - storing or loading the configuration	151
8.5	Signal LED and logger key button	153
8.5.1	Signal LED to indicate the operating conditions of the logger	153
8.5.2	Logger key button	153
8.6	Importing data	154
8.7	Overview of the data window	155
8.8	Managing the logging jobs	156

9	Working with the database and measurement data	159
9.1	General information on the database	159
9.2	Creating a database	160
9.3	Opening a database	161
9.4	Backing up a database	162
9.5	Restoring a database	163
9.6	Erasing a database	165
9.7	Querying data	166
9.8	Exporting data	170
10	Info menus	174
10.1	Database information	174
10.2	Device information	175
10.3	Program info	176
11	Resetting the logger	177
12	Maintenance, cleaning, storage	179
12.1	General maintenance instructions	179
12.2	Exterior cleaning	179
12.3	Battery	180
12.3.1	Battery service life	180
12.3.2	Ascertaining the battery status	180
12.3.3	Resetting the battery counter	181
12.3.4	Battery replacement	182
12.4	Storage	183
12.5	Replacement parts	183
13	What to do if...	185
13.1	Calibration and measuring	185
13.2	Communication of the logger and PC program	186
13.3	Communication between PC program and SQL server	186
14	Technical data	187
14.1	Measurement characteristics	187
14.2	Application characteristics	188
14.3	General data	188
14.4	Electrical data	189

1 Overview

1.1 Logger WQL-Cond

Structure of the logger



1	Protective hood
2	Conductivity measuring cell (permanently installed)
3	Voltage electrode (inside, 2x)
4	Current electrode (ring, 2x)
5	Temperature sensor in graphite enclosure
6	Shaft
7	Sleeve
8	Cap
9	Battery compartment with battery
10	Key button
11	Signal LED
12	USB socket

**Recommended
fields of
application**

Conductivity measurements in wells, bore holes, rivers, water bodies and other surface water, drinking water, ground water, leachate, waste water.

1.2 PC program WQL-Log

The WQL-Log PC program serves to operate a connected WTW data logger of the WQL series type. The WQL-Log PC program automatically recognizes the logger when it is connected to the USB interface and controls the menus according to the type and measured parameter.

The PC program can carry out the following functions:

- Calibrate the measuring system
- Set up and start a logging job
- Measure directly: The logger is connected to the PC via USB and the PC program displays the current measured values.
- Read in measurement data of the logging job: Consistent data copying to a PC-based database.
- Database-supported evaluation of measurement data, export functions

**Note**

The current version of the WQL-Log PC program and the current firmware for the WQL-Cond logger is available on the Internet on the website of the manufacturer of your meter.

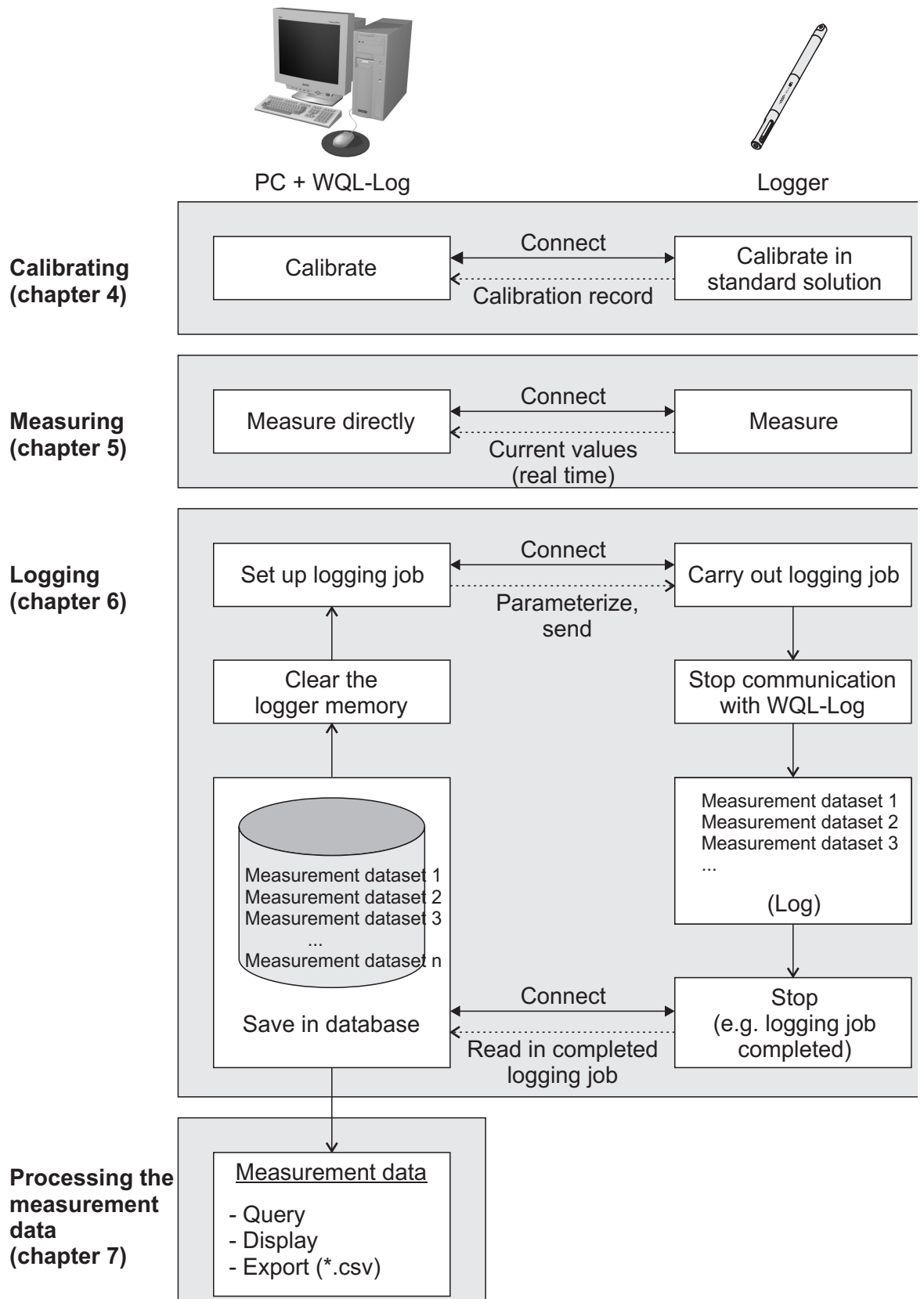


Fig. 1-1 Overview of the communication of the logger and PC program

2 Safety

This component operating manual contains special instructions that must be followed during the operation of the logger and PC program.

Always keep this operating manual in the vicinity of the logger and PC program.

Symbols used



Note

indicates notes that draw your attention to special features.



Note

indicates cross-references to other documents, e.g. application reports.



Warning

indicates instructions that must be followed precisely in order to avoid the possibility of slight injuries or damage to the instrument or the environment.

3 Commissioning



Note

- Normally, all screw joints of the logger housing can be opened and closed by hand, without using any tools. If necessary, use a paper towel so you can get a better grip on the parts.
- Insert the battery in a clean and preferably dry environment.

3.1 Inserting the battery



Note

The logger is powered by a 3.6 V lithium battery, size AA, as provided in the scope of the delivery (see chapter 14 TECHNICAL DATA). Other batteries of the same size such as alkaline manganese batteries do not provide the required operational voltage.

Operating time, see section 12.3 BATTERY.

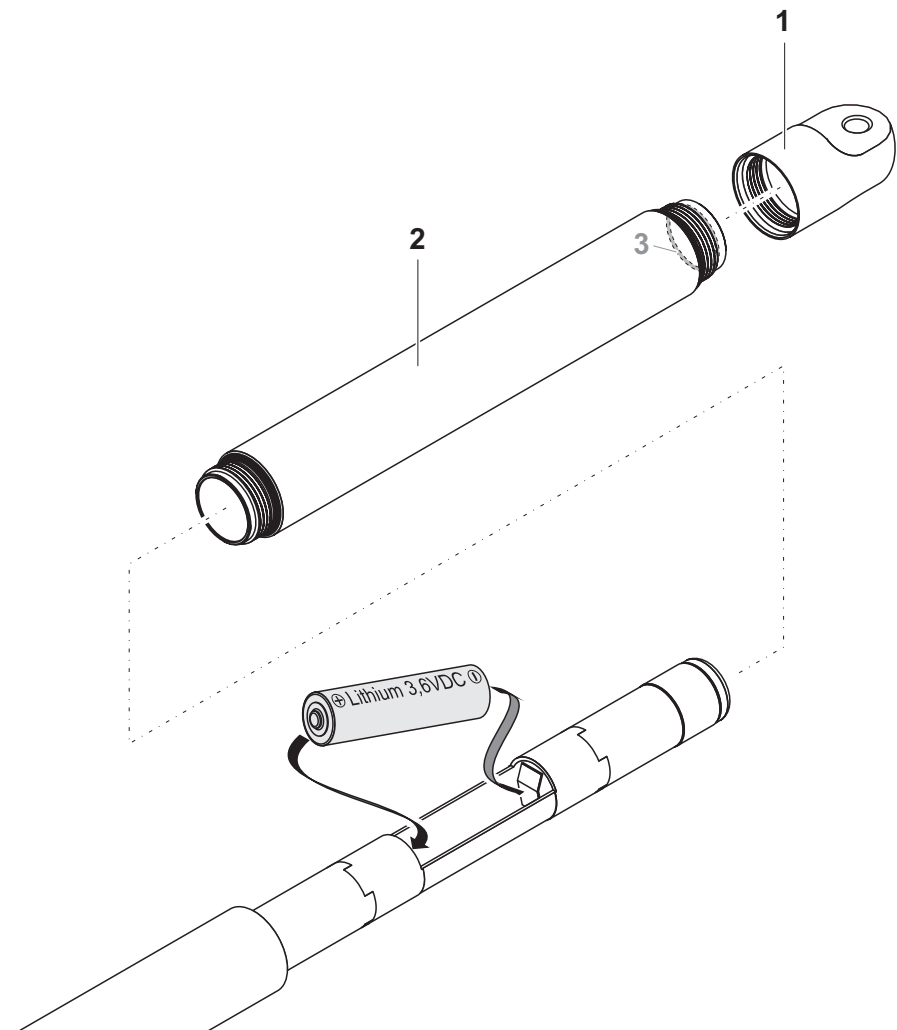


Fig. 3-1 Inserting the battery

1	Unscrew the cap (Pos. 1 in Fig. 3-1).
2	Unscrew the sleeve (Pos. 2).
3	Insert the battery. When doing so, make sure that the battery is correctly positioned (see label in the battery compartment).
4	Screw the sleeve on the shaft with the <u>shorter</u> thread. At the rear end of the sleeve there is a thin O-ring inside (Pos. 3). Make sure that this O-ring is evenly positioned in the groove and is not twisted.
5	Screw on the sleeve and cap again. In the screwed condition, no gap may be visible at the joints.

After the battery was inserted the signal LED lights up for 2 seconds. This means the logger has to be connected with the PC to set the date and time (see section 8.3 SETTING THE PARAMETERS AND STARTING THE LOGGING JOB and section 8.5 SIGNAL LED AND LOGGER KEY BUTTON).

3.2 Mounting suspension

To attach the logger to a rope or chain, a suitable shackle is provided whose bolt fits through the cross hole in the cap. As an alternative, you can screw some different sling gear into the M6 threaded hole at the cap end (e.g. M6 eye bolt).

Corrosion protection

In water, metal (e.g. zinc-plated) parts of the mounting suspension such as thimbles, shackles or swivel connectors create voltages (chemically caused according to the electrochemical series), which can cause corrosion of the stainless steel of the logger or the above mentioned suspension parts.

Lightning protection

Electrically conductive ropes or chains harbor the danger of the logger being damaged by lightning.

Recommendation

For reasons of corrosion and lightning protection, we recommend to use a nonconductive suspension, e.g. one with low-wear, resistant polypropylene ropes.

3.3 Installing the WQL-Log program

3.3.1 PC requirements

The WQL-Log software program requires the following system components:

Hardware requirements

- Computer with Intel or Pentium III 500 MHz processor or higher (1 GHz or quicker recommended.)
- At least 192 MB RAM (512 MB recommended)
- Hard disk with at least 600 MB available memory
- CD-ROM drive
- A free USB interface. Only one logger can be connected. If a new logger is registered, the previous one is logged off.

Software requirements

User rights

- 32-bit-operating system Windows 7, Windows Vista, Windows XP, Windows Server 2003 and higher or Windows 2000 Service Pack 4
- Administrator rights are required for the initial installation. Contact your system administrator if necessary.



Note

The program WQL-Log stores the database files with the stored data in the directory where the SQL server is installed (because of access authorization), i.e. normally on C:\. Make sure that there is enough storage capacity available on the hard disk for this directory. An empty database requires 3 MB storage space, a database with 50,000 datasets requires approx. 7 MB storage space. A database can be max. 4 GB, containing approx. 12.5 million datasets.

3.3.2 Installation routine



Note

The software is continuously developed further. The current version of the WQL-Log program is available for download on the Internet under <http://www.WTW.com>.



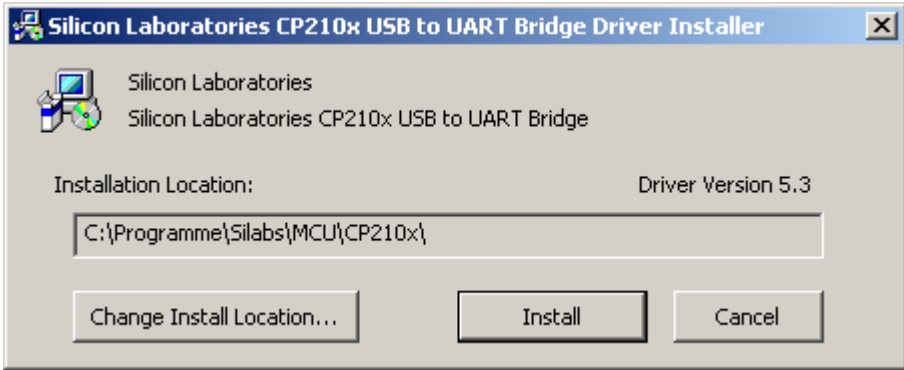
Note

The following files and/or directories are on the supplied CD-Rom:

- The installation file for the PC program and the database server
- A directory with the installation program for the driver of the USB interface
- A directory with the operating manual for the logger and the PC program.

Installing the driver

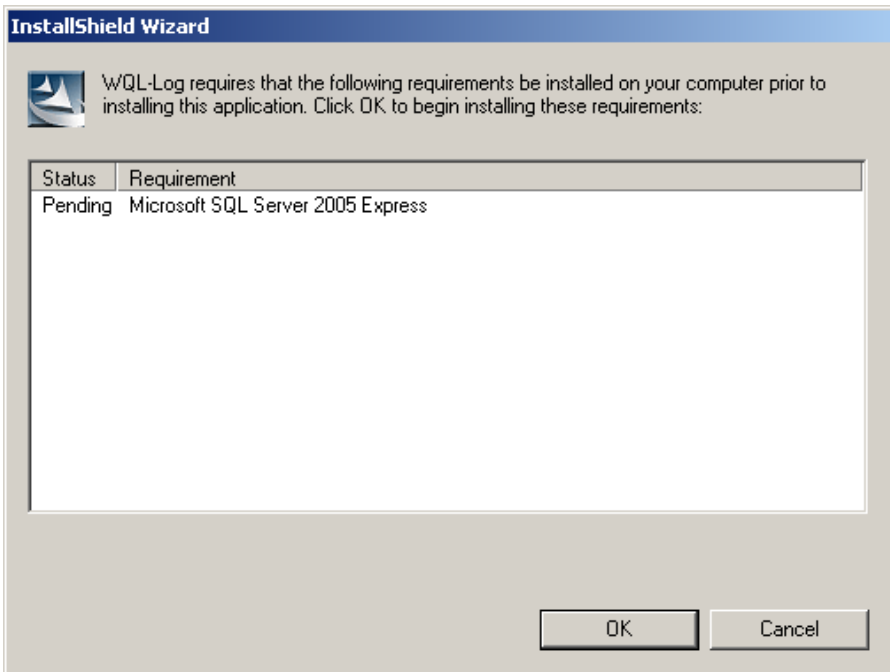
- 1 | Insert the enclosed CD-Rom in the corresponding disk drive of the PC.
- 2 | Open the directory, USB_VCP_driver.
- 3 | Execute the file, CP210xVCPInstaller with a double click.



- 4 | Follow the user guidance (click *Install*).
- 5 | Confirm the installation with *OK*. A virtual COM Port has been created with the installation.

Installing the PC program and database server

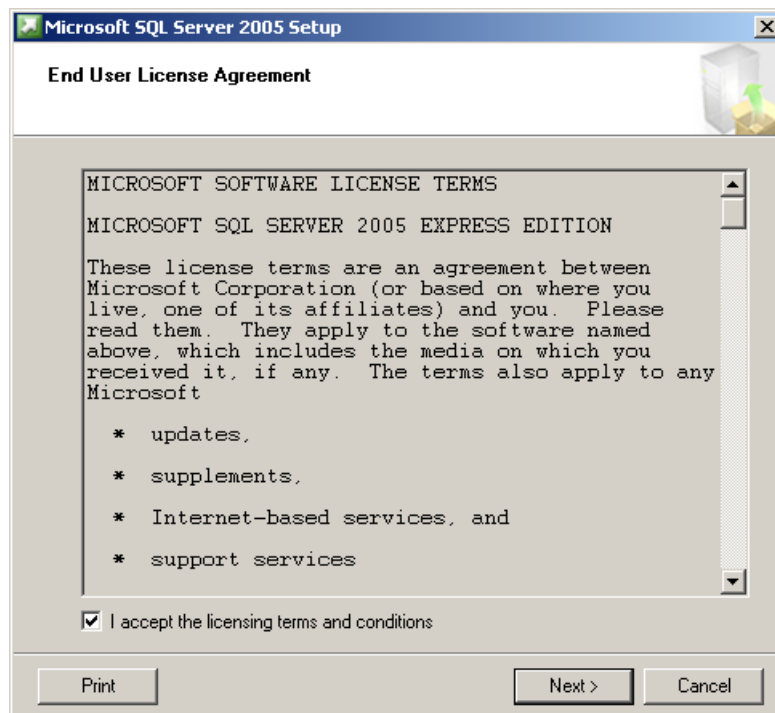
- 6 | Execute the WQLLog_Vxxxx.exe file with a double click (xxxx = current version number). The installation wizard appears.



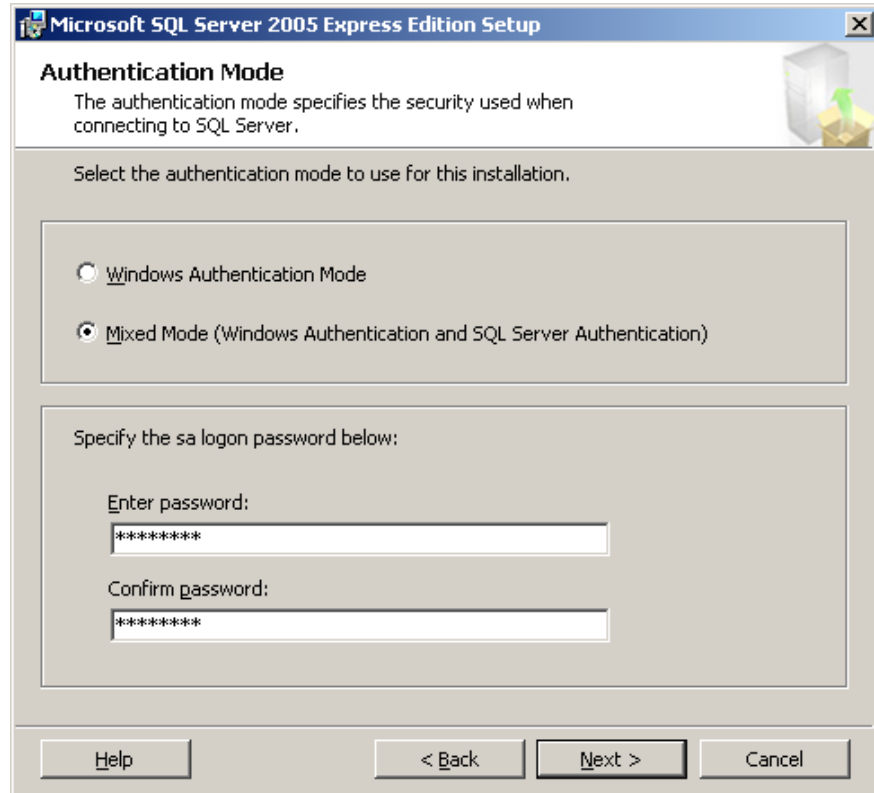
- 7 | Follow the user guidance (click *OK*).

**Note**

If the SQL server was already installed for another application, the installation of the server is automatically skipped. The program continues with step 15.



8	Check off the checkbox, <i>I accept the licensing terms and conditions</i> .
9	Click <i>Next</i> . An information window appears with the components required for the installation.
10	Click <i>Install</i> . The installation is carried out. Follow the user guidance (click <i>Next</i>) until the <i>Authentication Mode</i> window appears.



- 11 | Select the *Mixed Mode* option.
- 12 | In the *Enter password* field, enter the password WTW!2009.
- 13 | Repeat the password entry WTW!2009 in the *Confirm password* field.



Note

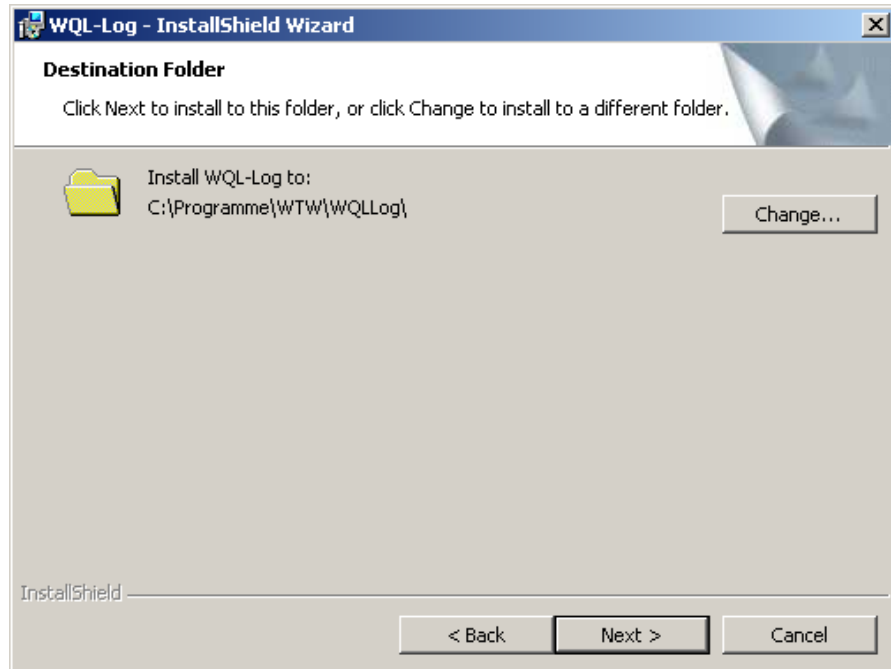
The password WTW!2009 must be entered twice. If a different password is entered, the PC program is not granted access to the database.



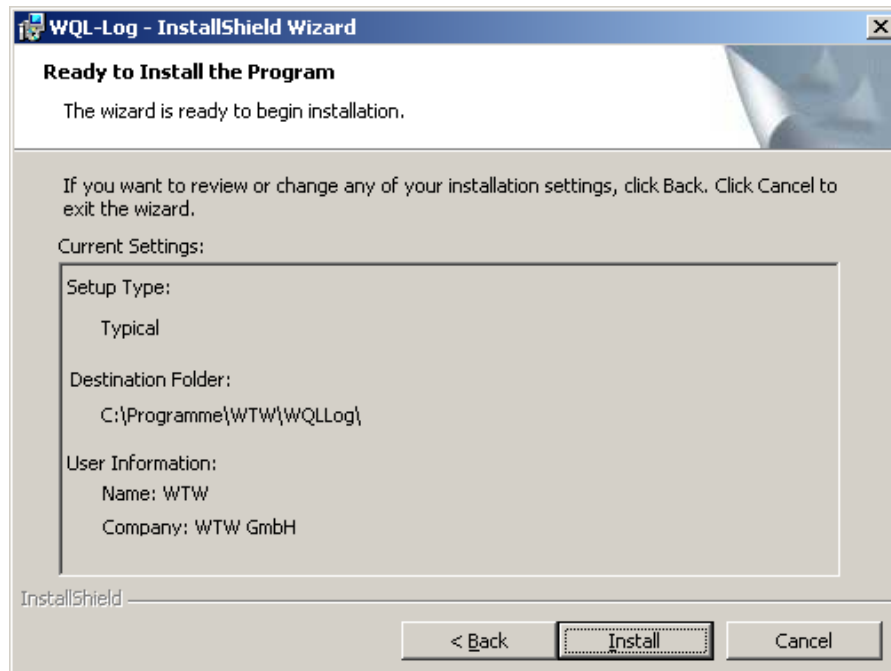
Note

If the SQL server was already installed for another application, you have to change the password for the SQL server first before the WQL-Log program can create a database. To change the password see section 13.3 COMMUNICATION BETWEEN PC PROGRAM AND SQL SERVER.

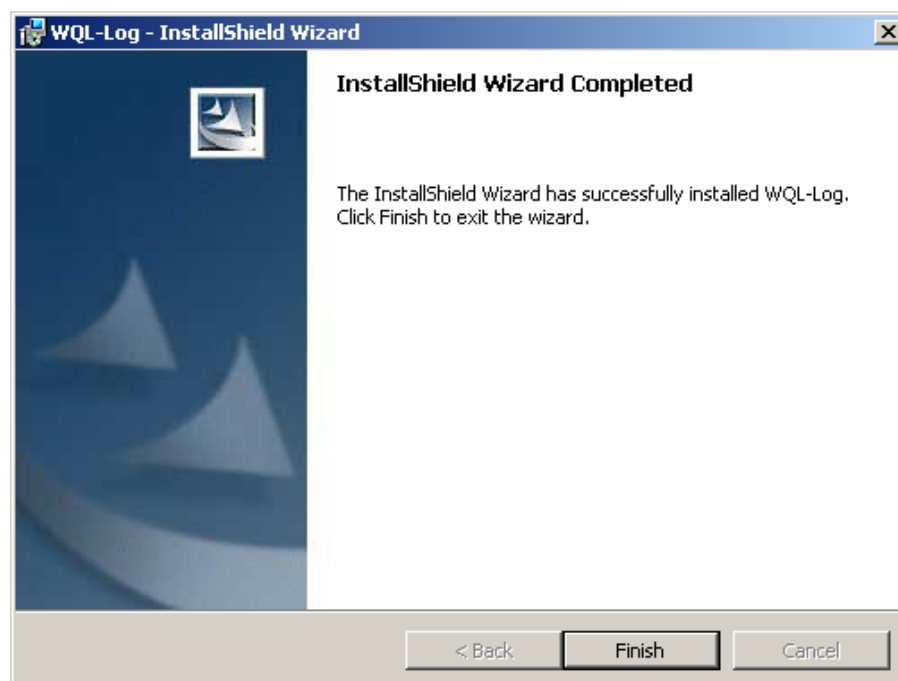
- 14 | Click *Next*. Then follow the user guidance (the default settings should not be changed) until the following display appears:



- 15 Here you can change the location where the PC program should be stored (click *Change...*).
When the required location is displayed, click *Next*.



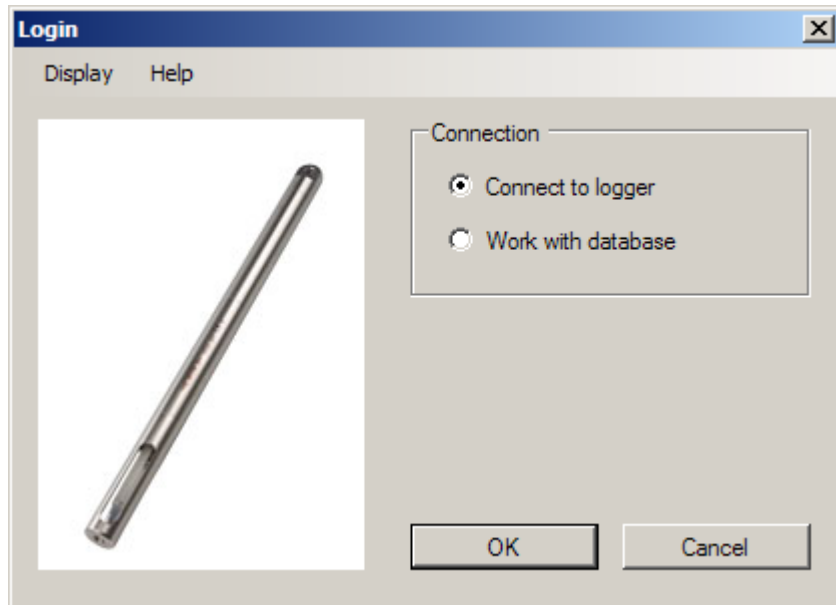
- 16 Here you find information on the installation. Click *Install*.



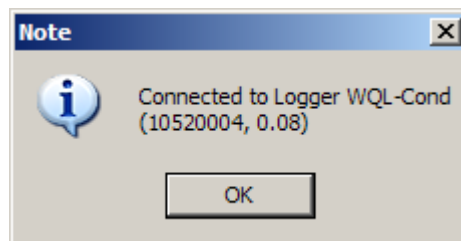
17 | Click *Finish* to complete the installation.

3.4 Initial commissioning

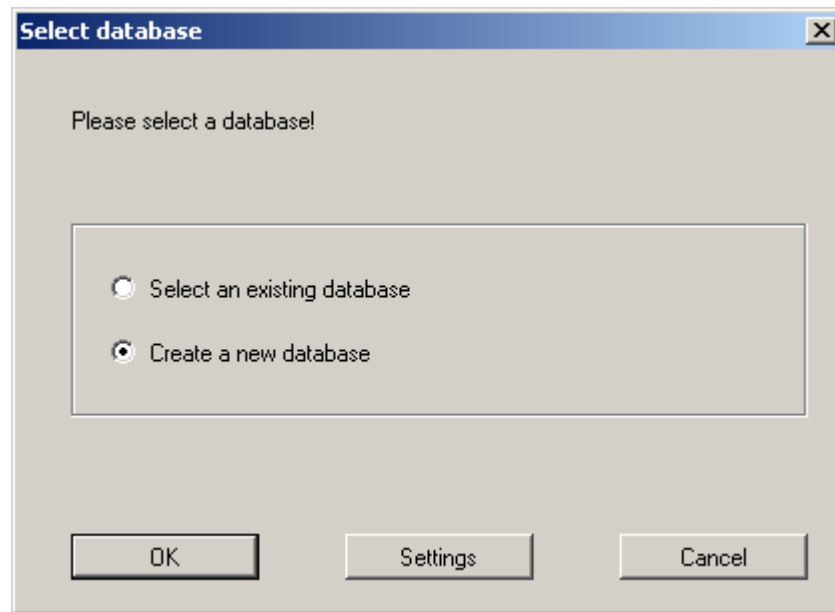
- 1 Start the WQL-Log program (the relevant icon is on the desktop). The *Login* window appears.



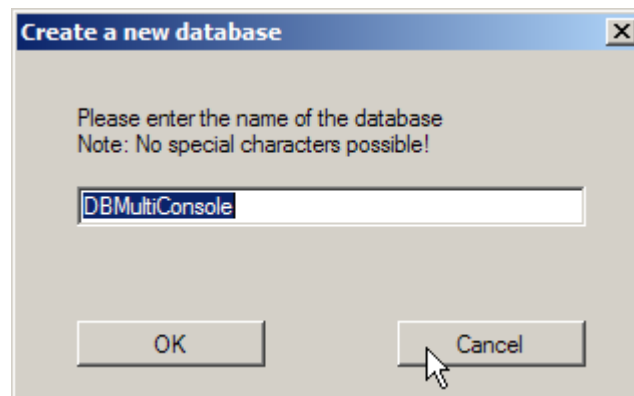
- 2 If the WQL-Cond logger is connected to the PC via a USB cable and should communicate with the WQL-Log PC program: Confirm with OK. The WQL-Log program searches for the connection with the logger.



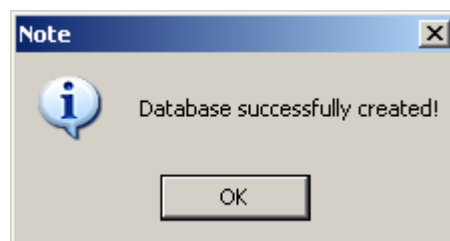
- 3 Confirm with OK. During the initial commissioning, the *Select database* window appears.



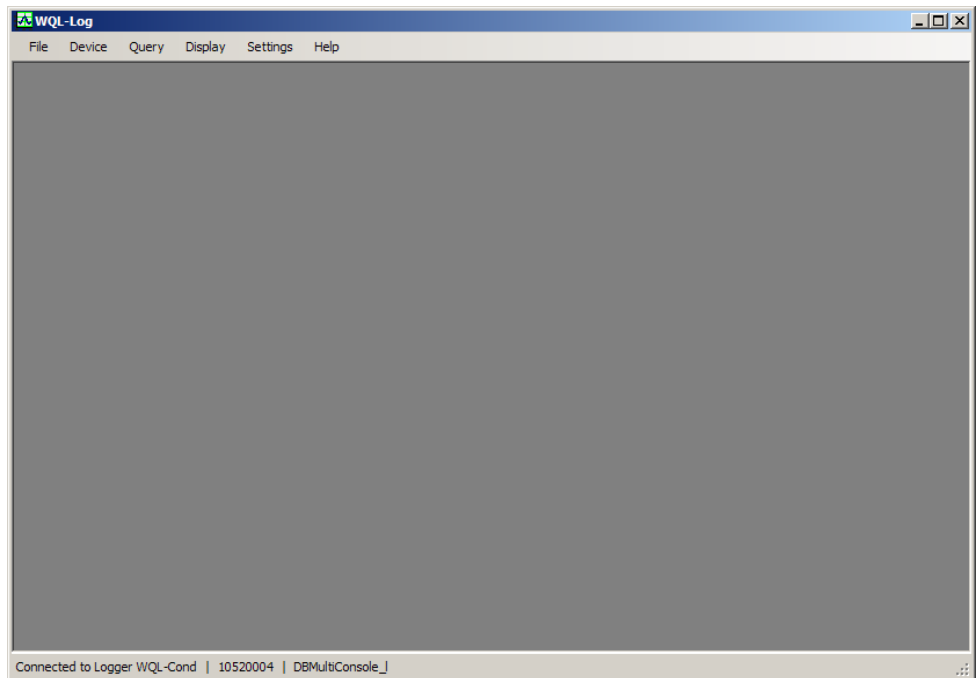
- 4 Confirm the option, *Create a new database* with *OK*. The window to save the newly created database appears.



- 5 Change the name of the database as necessary. Click *OK*. The database is stored and a message appears:



- 6 Confirm with *OK*. An empty data window appears, as the database is still empty:

**Note**

If the SQL server was already installed for another application, you have to change the password for the SQL server first before the WQL-Log program can create a database. To change the password see section 13.3 COMMUNICATION BETWEEN PC PROGRAM AND SQL SERVER.

3.5 Connection types

The PC program WQL-Log works with two types of connection:

- Work with database
(the logger and PC program do not communicate)
- Connected to logger
(the logger and PC program communicate)

Working with the database

In this type of connection it is only possible to process the measurement data stored in a database and to change the system settings.

Connected to the logger

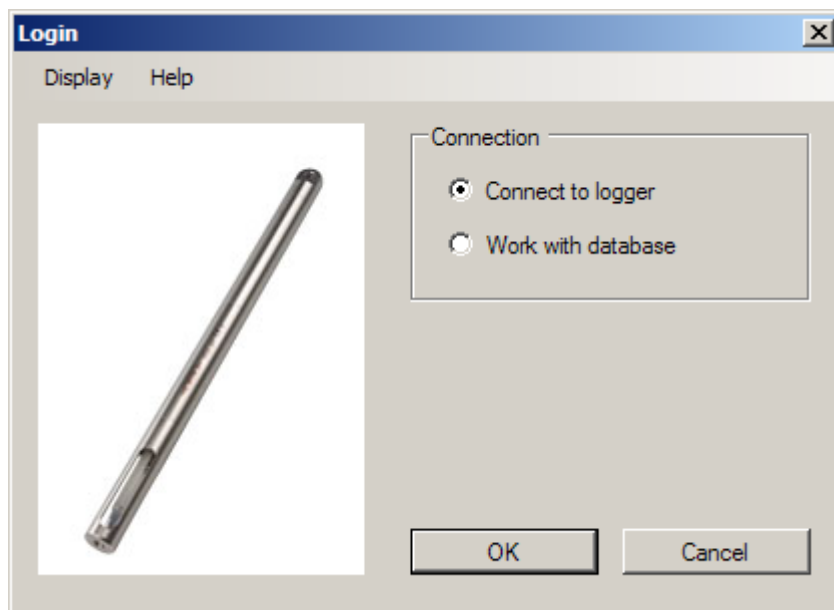
When the logger is logged on and connected to the WQL-Log PC program, the program and the logger communicate with each other. The measurement datasets present in the logger can be imported to the database and are thus available for processing.

You can configure the logger according to your requirements and set up a logging job. When the logging job is started, the connection between the logger and the WQL-Log PC program is cut. The cable connection between the logger and PC does not have to be disconnected for this.

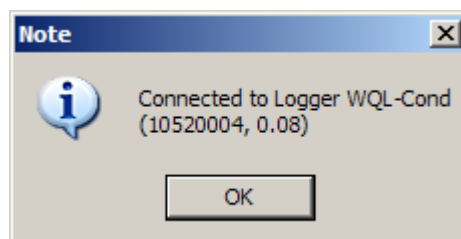
3.6 Starting the WQL-Log program

- 1 Start the WQL-Log program.
The *Login* window appears.
- 2 If necessary, you can change the display language here with the menu item, *Display* (see section 4.1 SETTING THE LANGUAGE) and find out which software version of the WQL-Log program is installed with the menu item, *Help* (see section 10.3 PROGRAM INFO).

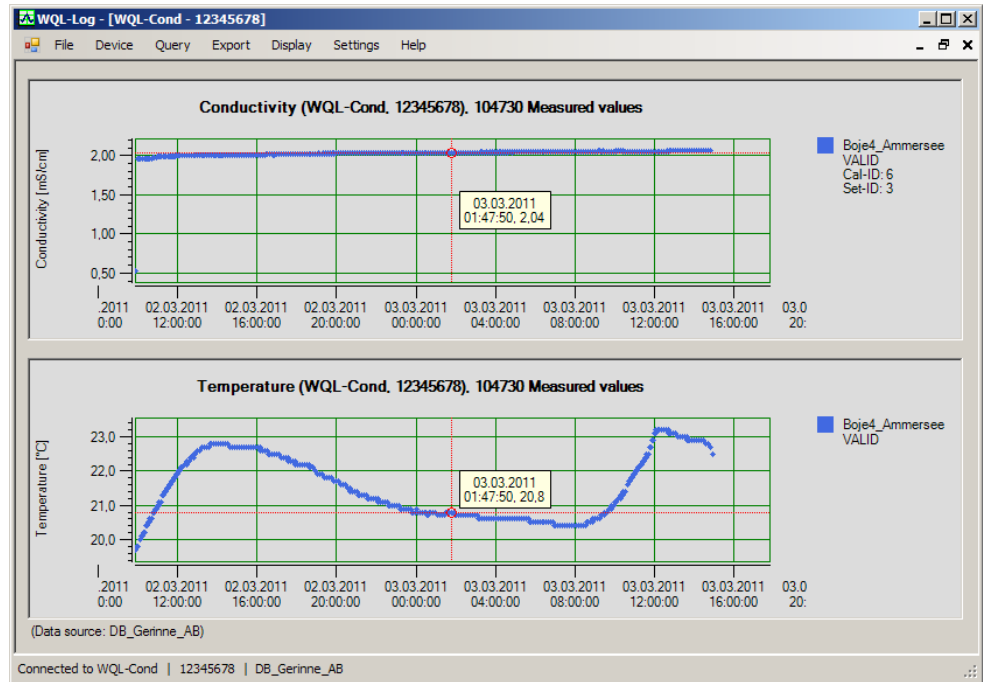
Connection to
logger



- 3 If the WQL-Cond logger is connected to the PC via a USB cable and should communicate with the WQL-Log PC program:
Confirm with OK. The WQL-Log program searches for the connection with the logger.

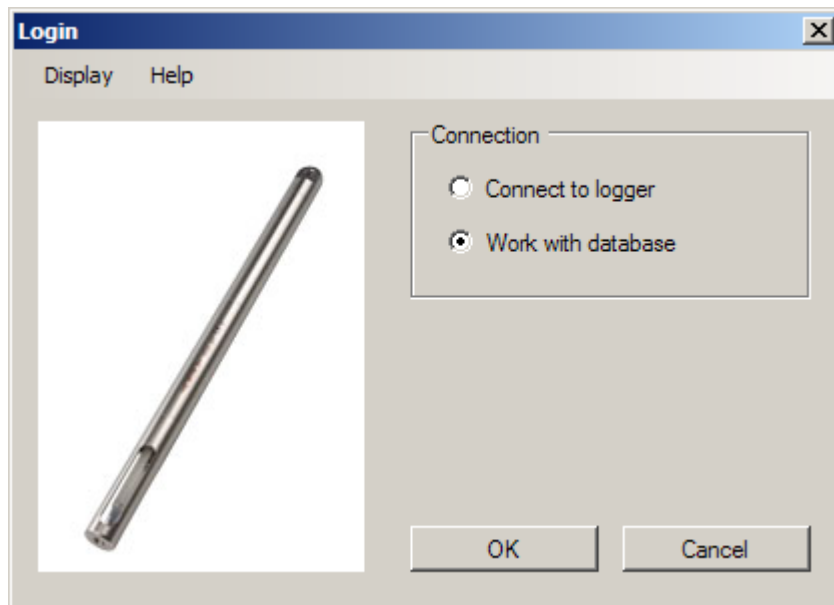


- 4 Confirm with OK. The data window appears.
If there are no data in the database (such as during the initial commissioning), an empty data window appears.
If data are stored in the logger, an overview of the logging jobs appears first (see section 8.8 MANAGING THE LOGGING JOBS).



Working with the database

5 If you want to work with the database:
 Select *Work with database* and confirm with OK.
 The data window appears with the logger data that was last read in (during the initial commissioning, an empty data window appears).



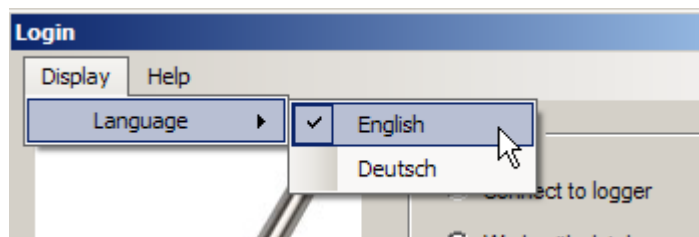
6 To continue, see chapter 9 WORKING WITH THE DATABASE AND MEASUREMENT DATA.

4 Setting the display

Under the *Display* menu item you can set the language and temperature for the WQL-Log PC program and the WQL-Cond logger. You can additionally set whether or not a cursor with a value field with time, date and measured value should appear for each measured parameter in the data window.

4.1 Setting the language

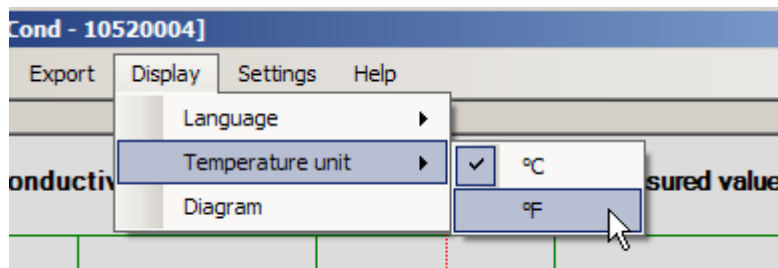
- 1 In the *Display* menu, select the menu item, *Language*.
- 2 The options *Deutsch (German)* and *Englisch (English)* appear.



- 3 Select the required language with a mouse click. The setting is immediately active.

4.2 Setting the temperature unit

- 1 In the *Display* menu, select the menu item, *Temperature unit*.
- 2 The options, °C (*degrees Celsius*) and °F (*degrees Fahrenheit*) appear.



- 3 Select the required temperature unit with a mouse click. The setting is immediately active.

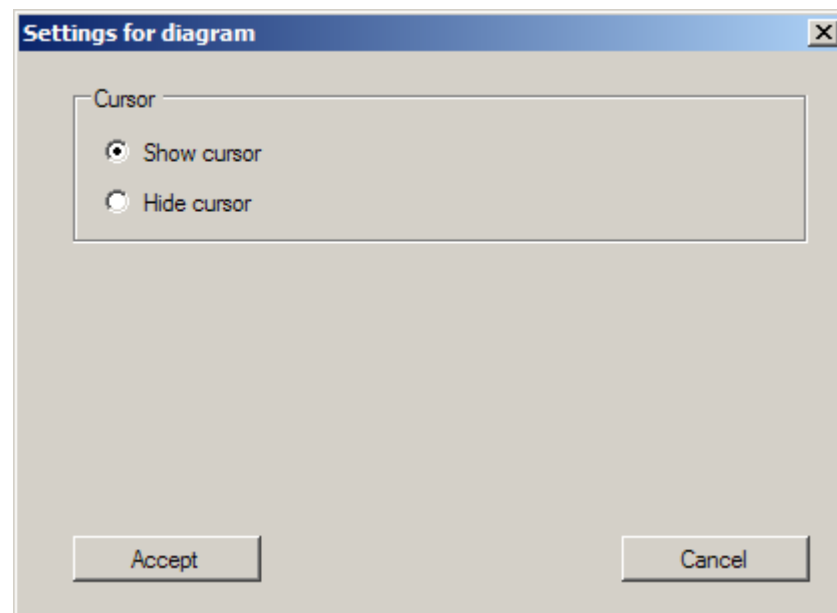
4.3 Setting the cursor

**Note**

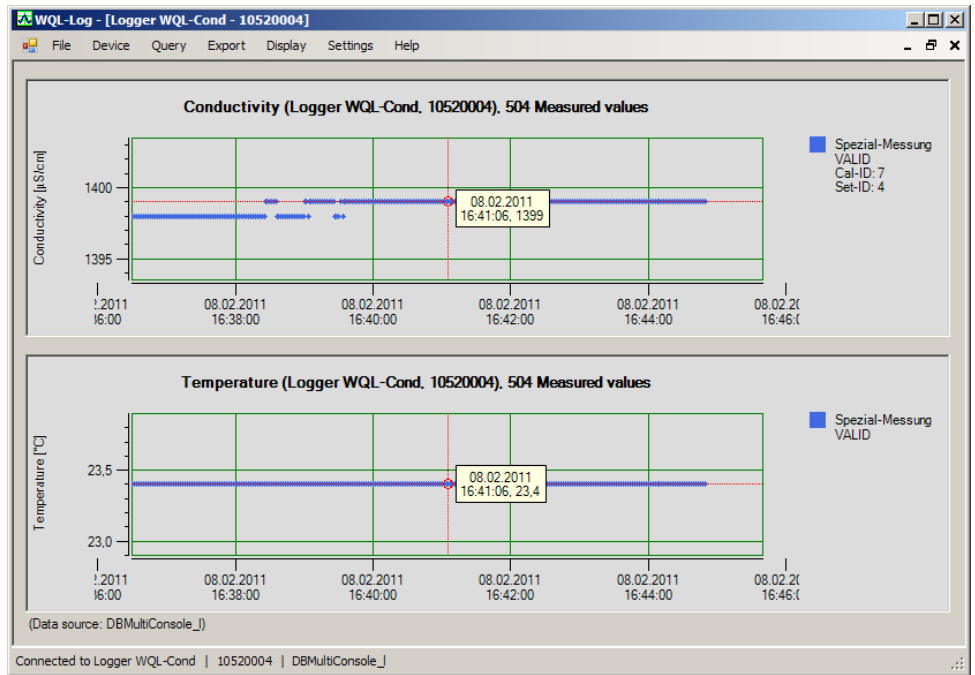
The *Diagram* menu item appears only if data are available in the database.

1 In the *Display* menu, select the menu item, *Diagram*.

2 The options, *Show cursor* and *Hide cursor* appear.



3 Select the required option with a mouse click.
After clicking on *Accept* the setting is immediately active. The data window appears with the cursor and value field. You can change the position of the cursor by moving the data window with the mouse.



5 Setting the measuring mode

You can make the following settings in the *Device / Set* menu (default setting in bold):

Measuring mode	<ul style="list-style-type: none"> ● Conductivity [μS/cm] / [mS/cm] ● Salinity Sal [] ● TDS [mg/l] / [g/l] with adjustable TDS factor in the range 0.40 ... 1.00 ● Resistivity [Ω·cm] / [kΩ·cm] / [MΩ·cm]
Temperature compensation	<ul style="list-style-type: none"> ● Nonlinear temperature compensation (nLF) according to EN 27 888 ● Linear temperature compensation (lin) with adjustable coefficients in the range 0.000 ... 2.000 ... 3.000 %/K ● No temperature compensation (off)
Reference temperature	<ul style="list-style-type: none"> ● 25 °C ● 20 °C

TDS factor

The factor to calculate the total dissolved solids is set to 1.00 in the factory. You can adjust this factor to meet your requirements in the range of 0.40 to 1.00. The factor is set in the menu for the parameter, TDS.

Temperature compensation

The calculation of the temperature compensation is based on the preset reference temperature, 20 °C or 25 °C. The reference temperature is shown on the display.

-Temperature coefficient

The temperature coefficient for the linear temperature compensation is set to 2.000 %/K in the factory. You can adjust this factor to meet your requirements in the range 0.000 ... 3.000 %/K. The factor is set in the menu for the setting of the temperature compensation.



Note

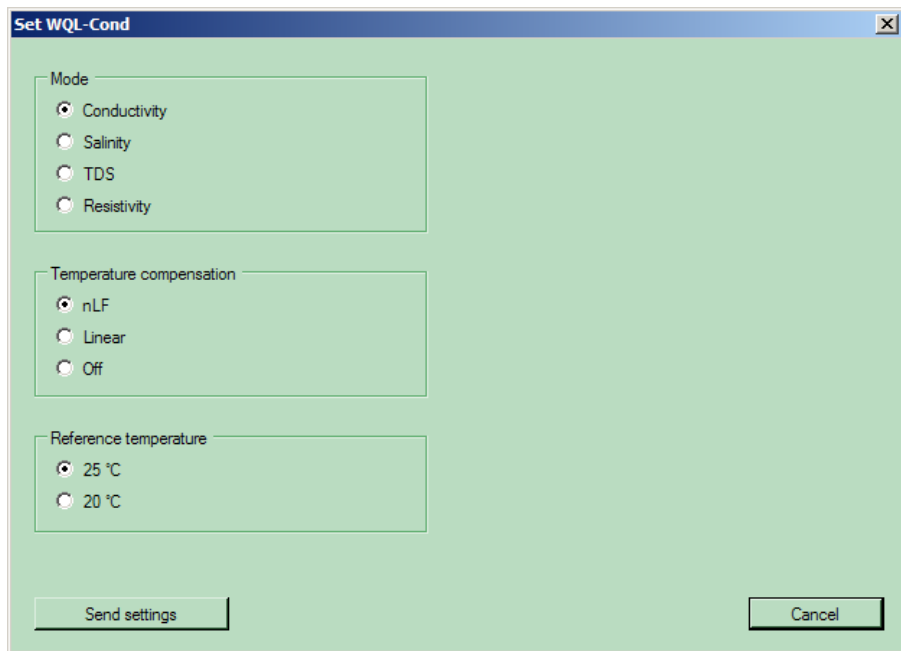
More information on conductivity measurements is given in the WTW conductivity primer.

Application tips

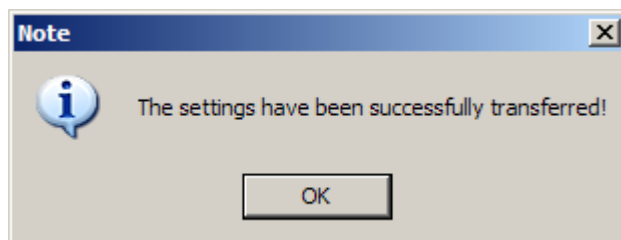
Select the temperature compensations given in the table according to the respective test sample:

Test sample	Temperature compensation	Display
Natural water (ground water, surface water, drinking water, waste water)	<i>nLF</i> according to EN 27 888	<i>nLF</i>
Other aqueous solutions	Set linear temperature coefficient 0.000 ... 3.000 %/K	<i>Linear</i>
Salinity (seawater)	Automatic according to IOT (International Oceanographic Tables)	

- 1 In the *Device* menu, select the menu item, *Set*.
- 2 The window for the selection of the measuring mode, temperature compensation and reference temperature appears.



- 3 Select the required settings with a mouse click.
Click *Send settings*.
A confirmation message appears:



4 | Confirm with OK.

6 Calibration in control standard (determining the cell constant)

Why determine the cell constant?

Aging slightly changes the cell constant, e. g. due to coatings. As a result, an inexact measured value is displayed. The original characteristics of the cell can often be restored by cleaning the cell. Calibration determines the current value of the cell constant and stores this value in the logger.

Thus, we recommend calibrating at regular intervals:

- on initial commissioning
- before starting a logging job.

Procedure

You can determine the actual cell constant of the WQL-Cond logger by calibrating with the control standard in the following range:

0.450 ... 0.500 cm^{-1}
(nominal cell constant 0.475 cm^{-1})

The cell constant is determined in the control standard, 0.01 mol/l KCl.

In the default condition, the calibrated cell constant of the WQL-Cond logger is set to 0.475 cm^{-1} .

AutoRead

During calibration, the AutoRead function is automatically activated. The AutoRead function checks the stability of the measurement signal and the stability of the temperature signal. The stability has a considerable effect on the reproducibility of the measured value.

The current AutoRead measurement can be terminated at any time (accepting the current value).

6.1 Calibration settings

Calibration procedures

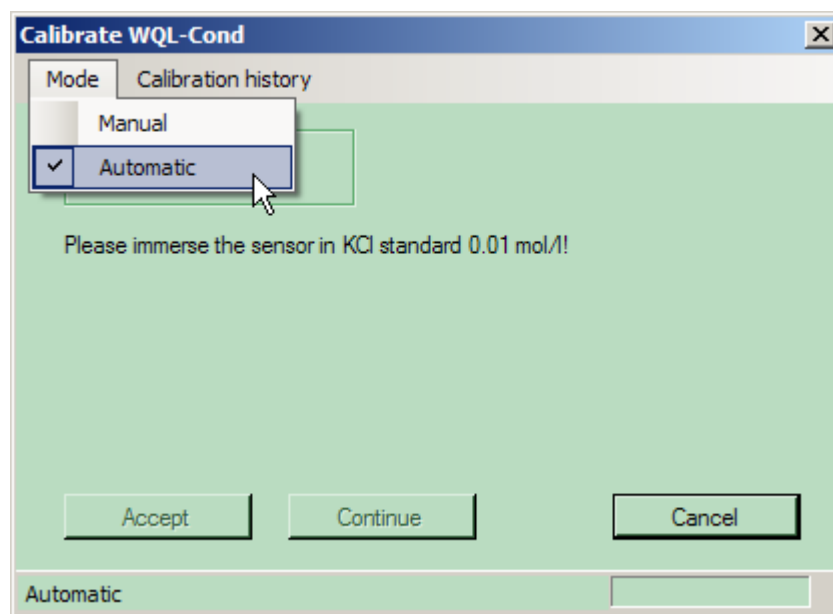
Two calibration procedures can be selected:

- Manual (with a control standard of your choice)
- Automatic (with 0.01 mol/l KCl control standard)

- | | |
|---|--|
| 1 | In the <i>Device</i> menu, click the menu item, <i>Calibrate</i> . |
| 2 | The calibration window appears. |

Selecting the calibration procedure

Here you can select the Manual or Automatic calibration procedure.



- | | |
|---|--|
| 3 | In the mode menu, highlight the required calibration procedure and select it with a mouse click. The selected setting is immediately active. |
|---|--|

6.2 Calibrating (automatic)



Note

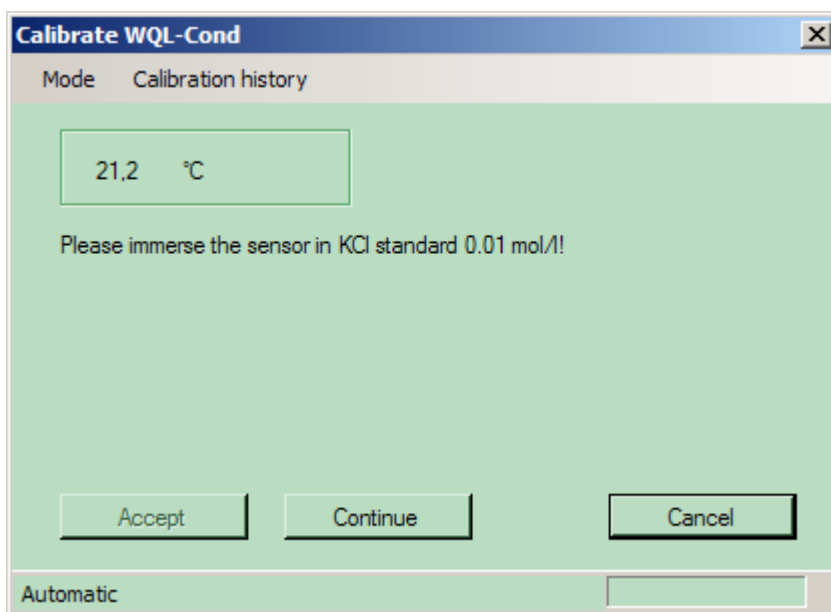
We recommend to always calibrate with the protective hood screwed on so the measuring cell is protected. Use a stand as necessary.

Preparatory activities

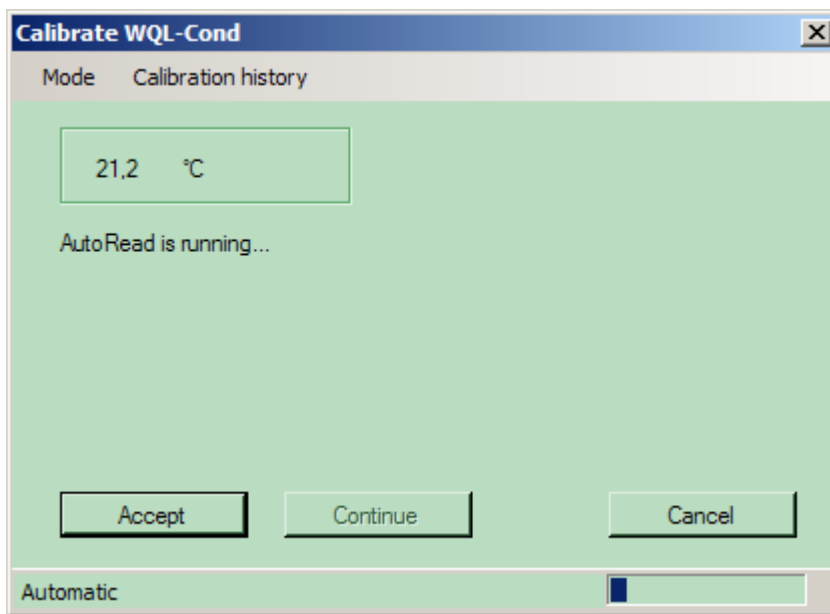
1	Connect the WQL-Cond logger to a USB port of your PC with the USB cable.
2	Have the 0.01 mol/l KCl control standard ready.
3	In the <i>Device</i> menu, click the menu item, <i>Calibrate</i> . The calibration window appears.

Calibration

4	Immerse the logger in the 0.01 mol/l KCl control standard.
---	--



5	Use the <i>Next</i> button to start the measurement.
---	--



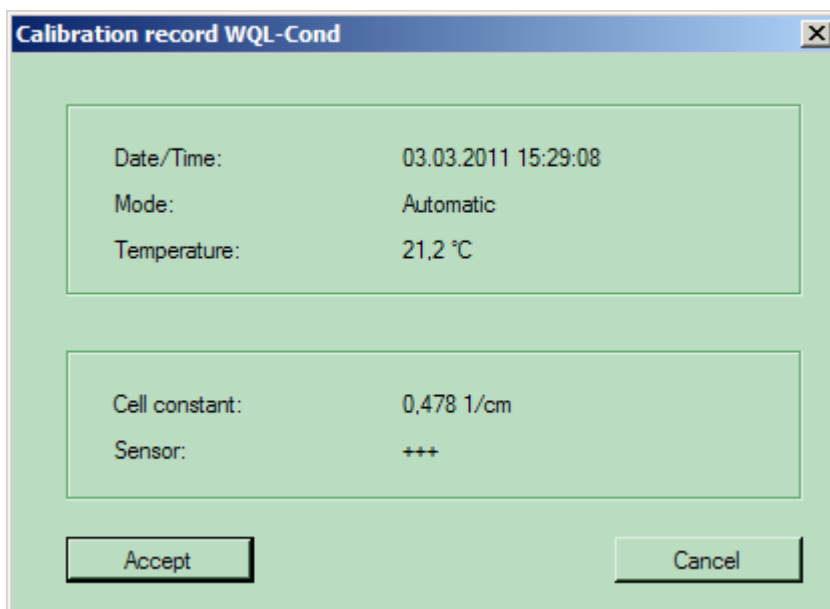
6 The note, *AutoRead is running...* appears. As soon as a stable value is recognized, the calibration record appears.



Note

You can prematurely terminate the AutoRead function manually with *Accept* at any time. If the AutoRead function is prematurely terminated, the current measurement data are accepted immediately.

Calibration record



- 7 | Accept the calibration with *Accept*. The message *Calibration successful* appears and the new calibration will now be used for measurement.
If you press *Cancel*, the logger discards the new calibration and will continue to use the previous calibration values.

**Note**

The calibration history with the data of the last 20 calibration procedures can be displayed at any time (see section 6.4 VIEWING THE CALIBRATION HISTORY).

6.3 Calibrating (manual)



Note

We recommend to always calibrate with the protective hood screwed on so the measuring cell is protected. Use a stand as necessary.



Note

For manual calibration with a control standard, the temperature dependent conductivity values of the standard are required. Normally a table with these values is enclosed with the control standard.

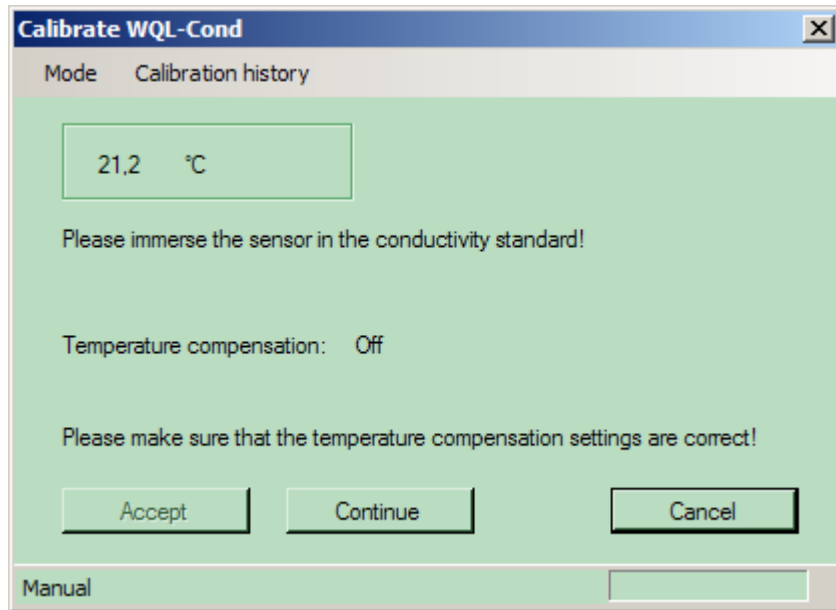
- Prior to manual calibration, please switch off the temperature compensation (menu, *Device / Set*).
- Determine the conductivity of the used standard solution using the temperature measured by the logger during calibration (interpolate the table values as necessary).
- After the calibration is completed, restore the required setting for the temperature compensation.

Preparatory activities

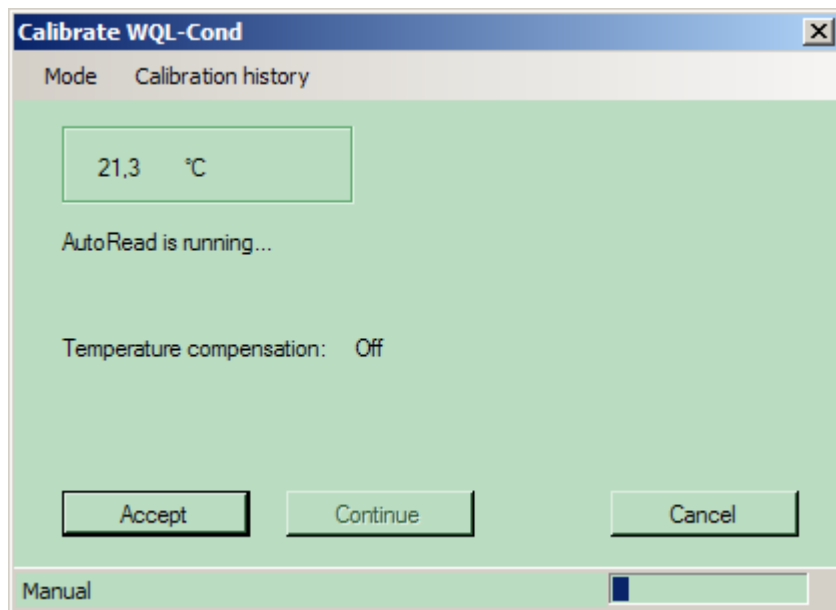
1	Connect the WQL-Cond logger to a USB port of your PC with the USB cable.
2	Keep a control standard of your choice ready.
3	In the <i>Device</i> menu, click the menu item, <i>Calibrate</i> . The calibration window appears.

Calibration

4	Immerse the logger in the control standard.
---	---



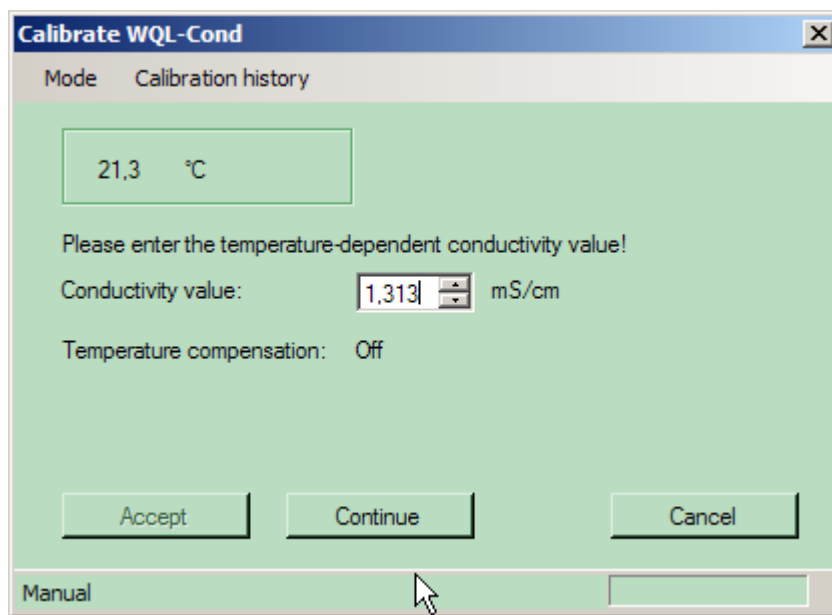
- 5 Use the *Continue* button to start the measurement.



- 6 The note, *AutoRead is running...* appears. As soon as the value is stable, the prompt to enter the temperature dependent conductivity value appears.

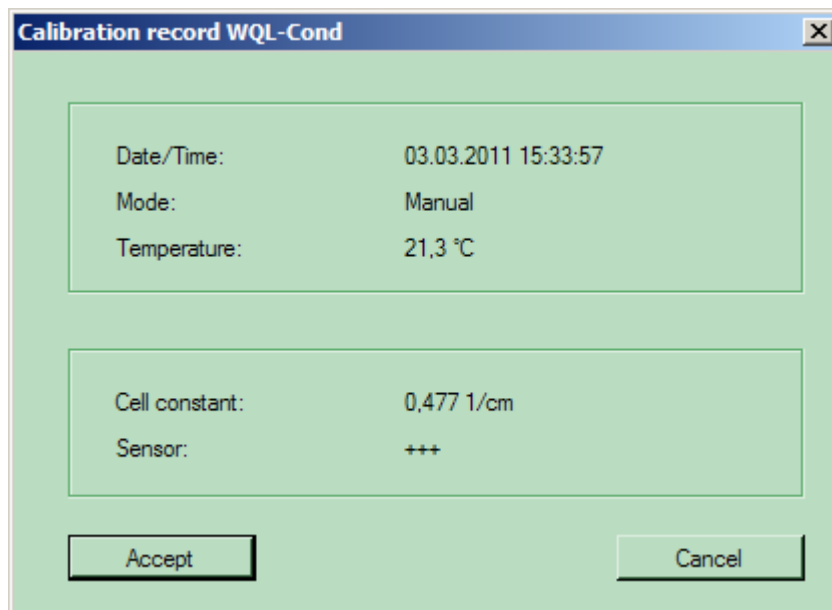
**Note**

You can prematurely terminate the AutoRead function manually with *Accept* at any time. If the AutoRead function is prematurely terminated, the current measurement data are accepted immediately.



- 7 | Enter the conductivity value for the displayed temperature.
- 8 | Click *Continue*. As soon as a stable value is recognized, the calibration record appears.

Calibration record



- 9 | Accept the calibration with *Accept*. The message *Calibration successful* appears and the new calibration will now be used for measurement. If you press *Cancel*, the logger discards the new calibration and will continue to use the previous calibration values.

**Note**

The calibration history with the data of the last 20 calibration procedures can be displayed at any time (see section 6.4 VIEWING THE CALIBRATION HISTORY).

Calibration evaluation

After calibration, the system automatically evaluates the current status of the calibration. The evaluation appears also in the calibration record.

Calibration record	Cell constant [cm ⁻¹]
+++	Within the range 0.450 ... 0.500 cm ⁻¹
<i>Error</i>	Outside the range 0.450 ... 0.500 cm ⁻¹

Eliminate the error according to chapter 13 WHAT TO DO IF...

**Note**

The logger can store up to 20 logging jobs with the respective calibration records and setting data. If, however, you calibrated several times for one logging job and the logger would thus have to store more than 20 calibration records with the 20th logging job, a message informs you of this.

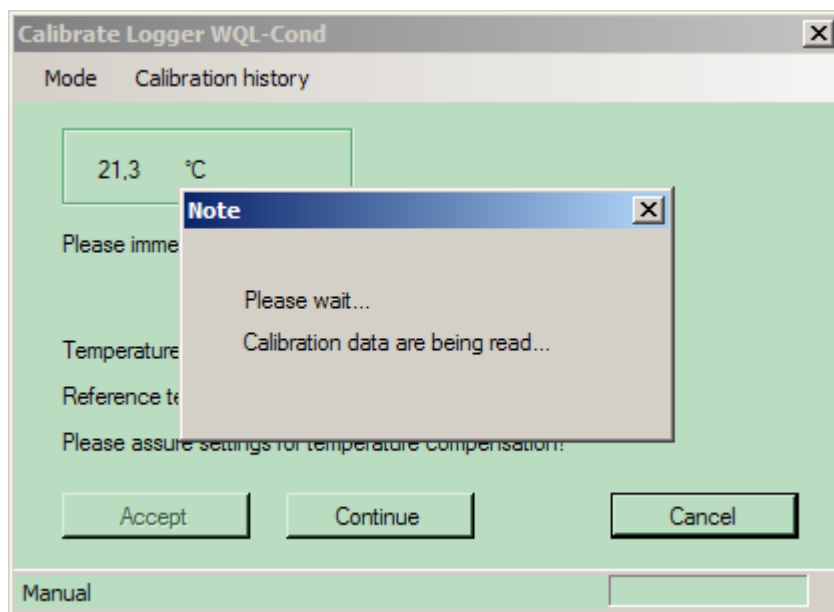
This is to ensure that no calibration record for which there are measured values can be lost. In this case the logger will prompt you to delete the logger memory.

Make sure that you have read in all data you want to use before deleting the logger memory. The logger memory can only be deleted completely.

6.4 Viewing the calibration history

The last 20 calibration records are stored in the logger and can be recalled. Proceed as follows:

- 1 In the *Device* menu, select the *Set* menu item, and select the measuring mode for which the calibration history should be displayed.
- 2 In the *Device* menu, click the menu item, *Calibrate*.
- 3 The calibration window appears.
- 4 Click the menu item, *Calibration history*. The program reads the calibration data of the set measuring mode.



- 5 The calibration history with the data of the last 20 calibration procedures appears. Use the arrows on the side to scroll up or down.

Calibration history WQL-Cond

Export

SensorName	SerNo					
WQL-Cond	12345678					
ID	DateTime	Mode	Temp [°C]	CellConst [1/cm]	Status	
8	03.03.2011 15:33:57	Manual	21,3	0,477	+++	
ID	DateTime	Mode	Temp [°C]	CellConst [1/cm]	Status	
7	03.03.2011 15:29:08	Automatic	21,2	0,478	+++	
ID	DateTime	Mode	Temp [°C]	CellConst [1/cm]	Status	
6	22.09.2009 08:17:00	Automatic	25,0	0,481	+++	

Cancel

6 | Return to the calibration window with *Cancel*.

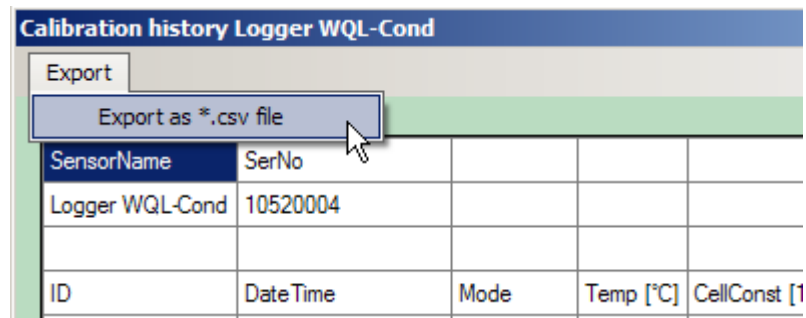
**Note**

Each calibration is given an individual calibration ID, which is stored with the logged measured values together with the calibration date and time (see section 9.8 EXPORTING DATA).

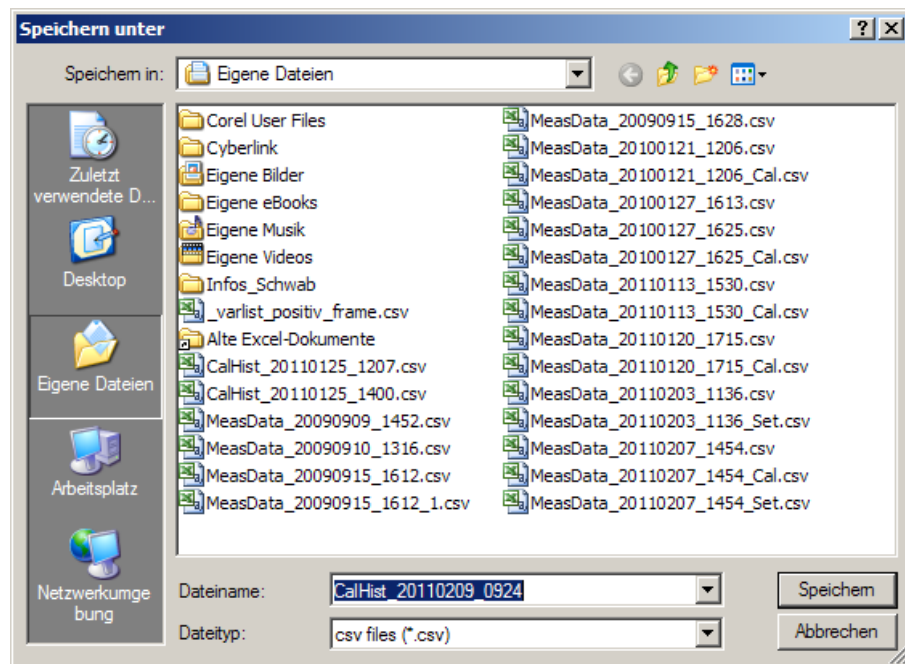
6.5 Exporting the calibration history

The last 20 calibration records are stored in the logger as the calibration history and can be exported as a csv file. Proceed as follows:

- 1 In the *calibration history* window, select the *Export* menu item.



- 2 Select the option, *Export as *.csv file*. The window to save the calibration history appears.



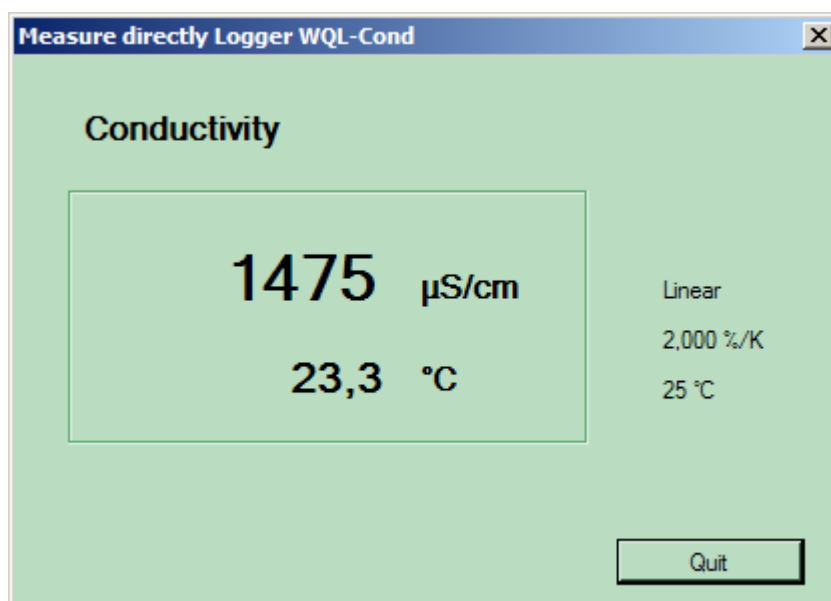
- 3 Change the location and name of the file as necessary.
- 4 Confirm with the *Save* button.
- 5 A message appears, confirming that the file with the calibration history was stored.
- 6 Confirm with *OK*.

7 Measuring directly

The WQL-Log PC program in conjunction with the WQL-Cond logger can measure and display the value of a solution directly according to the set parameter. The directly measured values are not stored in the logger.

Proceed as follows when you want to measure directly:

1	Connect the WQL-Cond logger to the PC with the USB cable.
2	In the <i>Device/Login</i> menu, connect the logger to the WQL-Log PC program.
3	If a logging job is running, terminate or interrupt it (measuring directly is not possible while a logging job is running).
4	In the <i>Device</i> menu, click the <i>Set</i> menu item and select the settings for the measuring mode and temperature compensation (see chapter 5 SETTING THE MEASURING MODE).
5	In the <i>Device</i> menu, click the <i>Measure directly</i> menu item.
6	Immerse the WQL-Cond logger in the measuring solution.
7	The measured value window pops up with the measured value (depending on the setting) and the temperature value of the test sample. Next to the measured value, the set temperature compensation and if necessary, the temperature coefficient or TDS factor and reference temperature are displayed.



- | | |
|---|---|
| 8 | Terminate the direct measurement with <i>Quit</i> . |
|---|---|

8 Logging

Listed below are the typical operating steps with which to set up and carry out a logging job. The chapters where the operating steps are described in detail are also mentioned.

8.1 Typical sequence of a logging job (checklist)

1	Connect the logger to the PC with the USB cable.
2	Start the WQL-Log program (see section 3.6 STARTING THE WQL-LOG PROGRAM).
3	Register the logger (see section 3.6 STARTING THE WQL-LOG PROGRAM).
4	If a logging job is running, terminate or interrupt it (see section 8.8 MANAGING THE LOGGING JOBS).
5	Erase the logger memory if necessary (see section 8.8 MANAGING THE LOGGING JOBS).
6	Calibrate the logger (see chapter 6 CALIBRATION IN CONTROL STANDARD (DETERMINING THE CELL CONSTANT)
7	Set up the logging job and send it (see section 8.3 SETTING THE PARAMETERS AND STARTING THE LOGGING JOB).
8	Disconnect the USB cable from the logger.
9	If necessary, start the logger with the key button.
10	Check the operation of the logger based on the behavior of the signal LED (see section 8.5 SIGNAL LED AND LOGGER KEY BUTTON).
11	Tightly close the logger with the cap.
12	Install the logger at the measuring location.
13	After completion of the logging job: Connect the logger to the PC with the USB cable (see step 1 etc.).

8.2 Setting up a logging job - setting parameters

You can set the following parameters for a logging job (i.e. the job to determine and record measured values according to your requirements over a certain period of time):

Tab	Setting	Setting options (default setting in bold)
Recording	Interval	<ul style="list-style-type: none"> ● User-defined (set the hours, minutes, seconds) ● 1 second, 5 seconds, 10 seconds, 30 seconds ● 1 minute, 5 minutes, 10 minutes, 15 minutes, 30 minutes ● 1 hour, 2 hours, 3 hours, 6 hours, 9 hours, 12 hours, 24 hours
	Start	<ul style="list-style-type: none"> ● Immediately (when the setting mode is quit and the logger is separated from the PC program) ● Logger key button (when the key button at the control panel of the logger is pressed) ● Delay Set the time before the logger should start logging: 1 hour ... 7 days ● Time Set the date and time
	Stop	<ul style="list-style-type: none"> ● Memory full (the loggers stops logging only when the memory is full, i.e. when 600,000 datasets have been stored) ● Time period (1 hour ... 365 days) ● Time Set the date and time
	Measured value ID	You can assign a measured value ID (consisting of up to 20 alphanumerical character, no special characters) e.g. the name of the measuring site). Default setting: default

This tab provides you with information on the free memory capacity and battery status.

Tab	Setting	Setting options (default setting in bold)
Time	Automatic time adjustment	<ul style="list-style-type: none"> ● Yes (date/time for the logger is automatically synchronized with that of the PC) ● No (Enter the date/time for the logger)
Parameter	Mode	<ul style="list-style-type: none"> ● Conductivity [μS/cm] / [mS/cm] ● Salinity Sal [] ● TDS [mg/l] / [g/l] with adjustable TDS factor in the range 0.40 ... 1.00 ● Resistivity [Ω·cm] / [kΩ·cm] / [MΩ·cm]
	Temperature compensation	<ul style="list-style-type: none"> ● Nonlinear temperature compensation (nLF) according to EN 27 888 ● Linear temperature compensation (lin) with adjustable coefficients in the range 0.000 ... 2.000 ... 3.000 %/K ● No temperature compensation (off)
	Reference temperature	<ul style="list-style-type: none"> ● 25 °C ● 20°C

Temperature compensation

The calculation of the temperature compensation is based on the preset reference temperature, 20 °C or 25 °C. The reference temperature is shown on the display.

Temperature coefficient

The temperature coefficient for the linear temperature compensation is set to 2.000 %/K in the factory. You can adjust this factor to meet your requirements in the range 0.000 ... 3.000 %/K. The factor is set in the menu for the setting of the temperature compensation.

TDS factor

The factor to calculate the total dissolved solids is set to 1.00 in the factory. You can adjust this factor to meet your requirements in the range of 0.40 to 1.00. The factor is set in the menu for the parameter, TDS.

Application tips

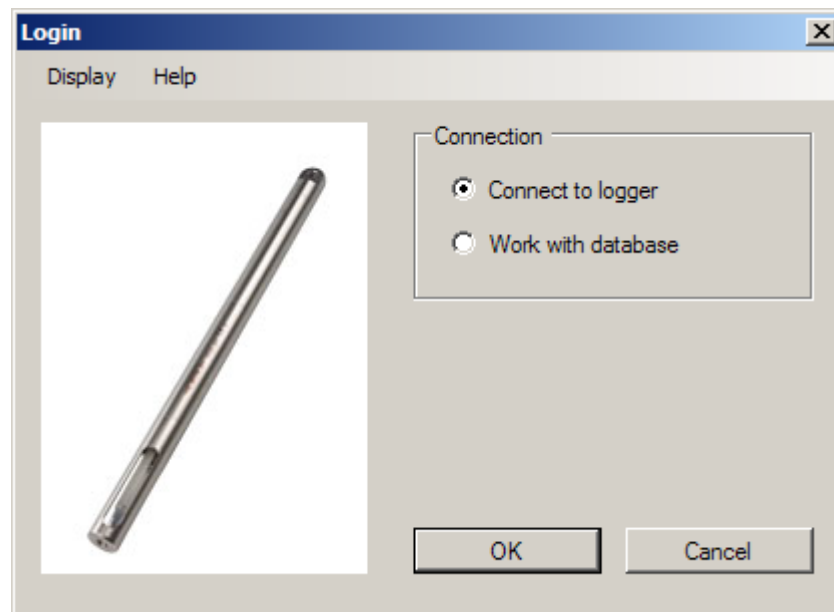
Select the temperature compensations given in the table according to the respective test sample:

Test sample	Temperature compensation	Display
Natural water (ground water, surface water, drinking water)	<i>nLF</i> according to EN 27 888	<i>nLF</i>
Other aqueous solutions	Set linear temperature coefficient 0.000 ... 3.000 %/K	<i>Linear</i>
Salinity (seawater)	Automatic according to IOT (International Oceanographic Tables)	

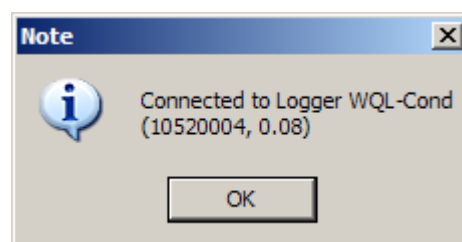
8.3 Setting the parameters and starting the logging job

To change one or several of the above listed settings proceed as follows:

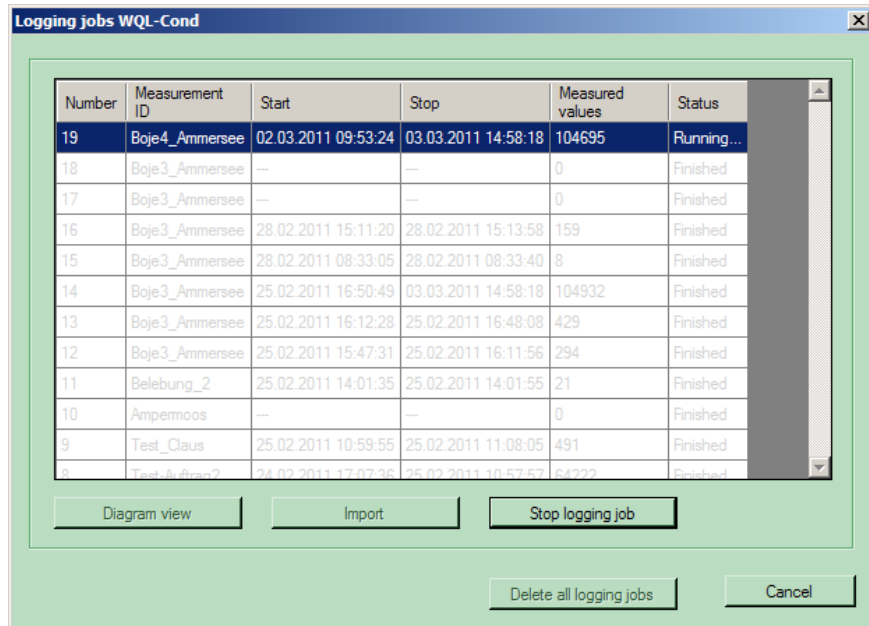
- 1 Connect the WQL-Cond logger to the PC with the USB cable.
- 2 Start the WQL-Log program.
The *Login* window appears.



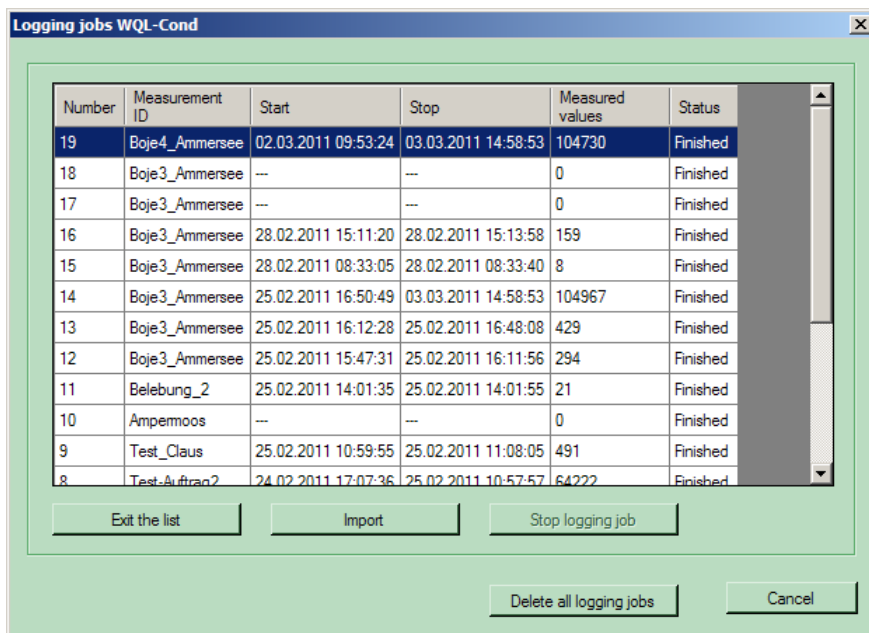
- 3 Confirm with *OK*. The WQL-Log program searches for the connection with the logger.



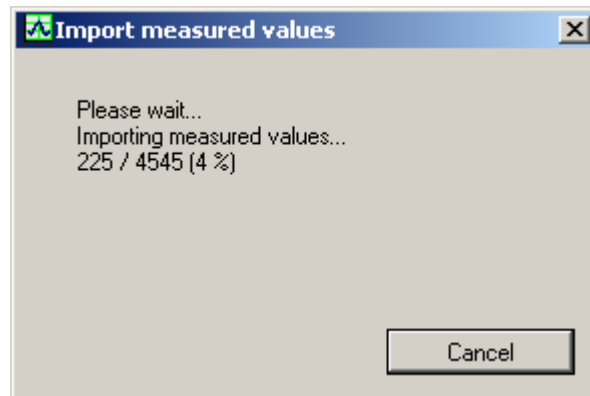
- 4 Confirm with *OK*.
- 5 If the logger contains new data:
A window with the current logging jobs appears.



6 If a logging job is still running, click *Stop*.



7 To go to the data window without reading in any data, click *Exit the list*.
 If you wish to import the data, click *Import*.
 The read-in process can take some time (depending on the number of datasets to be read in).

**Note**

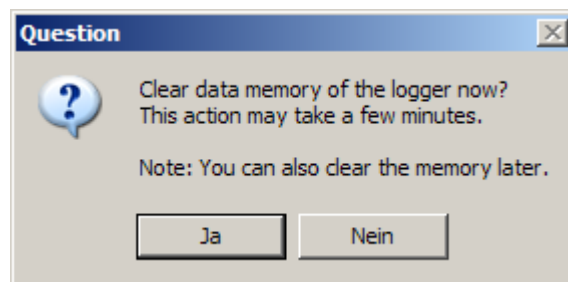
Do not unplug the cable connecting the logger to the PC during the read-in process. If the connection is cut, the read-in process is terminated and has to be repeated from scratch.

**Note**

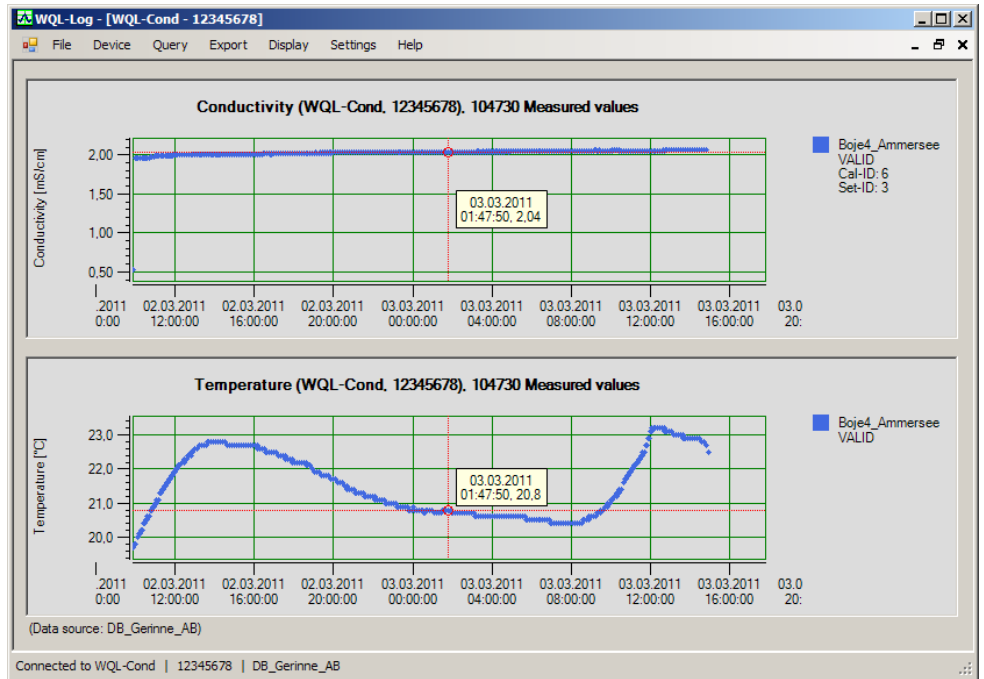
Only click *Delete all logging jobs* if you want to discard all data stored in the logger. This action will delete all jobs in the logger memory, and the data will be irretrievably lost!

The jobs that were already imported and stored in the database are retained.

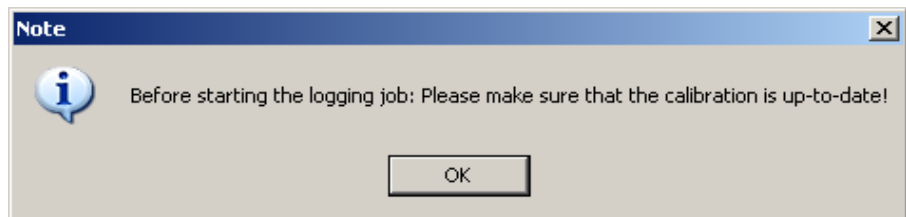
- 8 | When the import of the measured values is completed, a message appears (confirm with *OK*) and the query to erase the complete measured value memory.



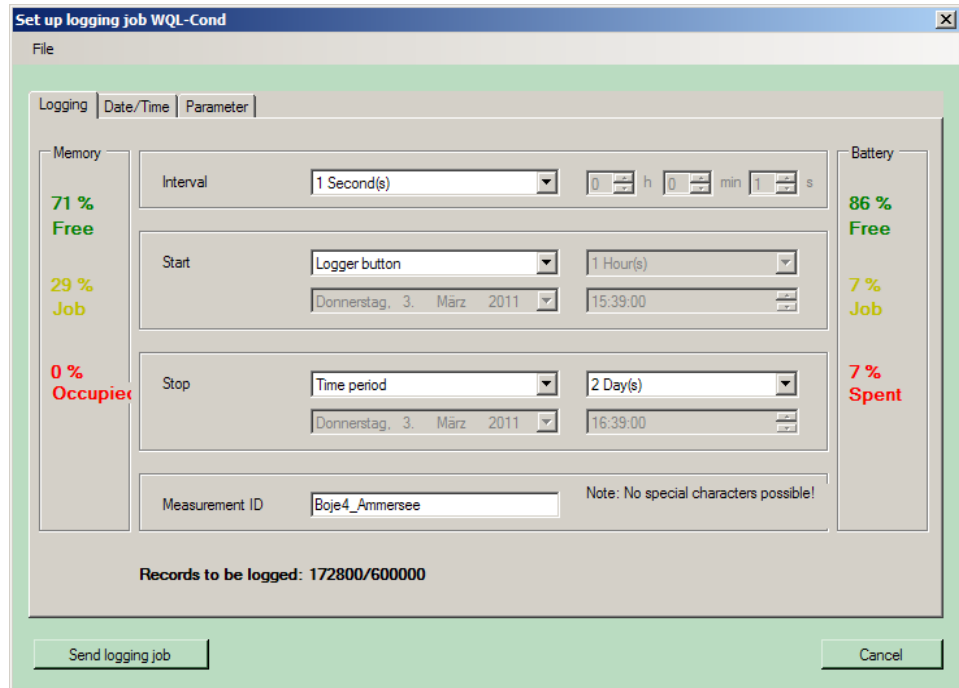
- 9 | Press *OK* or *Cancel*.
The data window appears with a graphic of the imported data, no matter whether or not the data memory was erased.



- 10 In the *Device* menu, select the menu item, *Set up logging job*. A note on calibration appears.



- 11 Confirm with *OK*. The *Logging* tab appears, the first tab of the window, *Set up logging job*.
- 12 Based on the displayed percentages check whether the storage capacity and battery charge are sufficient for the intended logging job.



- | | |
|----|---|
| 13 | <p><i>Interval:</i> To set the logging interval, click the arrow on the right side of the setting field. A drop-down menu appears with the possible intervals. Select the required interval with a mouse click.
 If <i>User-defined</i> was selected, click the arrows on the right side of the selection fields and set the hours, minutes and seconds for the interval.</p> |
| 14 | <p><i>Start:</i> To set the start of the logging, click the arrow on the right side of the setting field. A drop-down menu appears with the starting times. Select the required starting time with a mouse click.
 If <i>Delay</i> or <i>Time</i> was selected, click the arrows on the right side of the selection fields and select the required period of time or set the point in time.</p> |
| 15 | <p><i>Stop:</i> To set the end of the logging, click the arrow on the right side of the first setting field. A drop-down menu appears with the possible settings. Select the required starting time with a mouse click.
 If <i>Time period</i> or <i>Time</i> was selected, click the arrows on the right side of the selection fields and select the required period of time or set the point in time.</p> |
| 16 | <p><i>Measured value ID:</i> Enter the measured value ID (up to 20 alphanumeric characters, no special characters).</p> |
| 17 | <p>Click the <i>Time</i> tab.</p> |
| 18 | <p>Select <i>Yes</i> or <i>No</i> for adjustment to PC time. If <i>No</i> was selected, click the arrows on the right side of the selection fields and set the date and time for the logger.</p> |

19 Click the *Parameter* tab.

Set up logging job WQL-Cond

File

Logging | Date/Time | Parameter

Mode

Conductivity Salinity TDS Resistivity

Temperature compensation

nLF Linear Off

Reference temperature

25 °C 20 °C

Temperature compensation

Coefficient 1.000 %/K

Send logging job Cancel

20 Make the settings for the measuring mode and temperature compensation and if necessary, for the reference temperature and temperature compensation as well.

21 Save the settings for the logging job (configuration) as required (see section 8.4 LOGGING JOB - STORING OR LOADING THE CONFIGURATION).

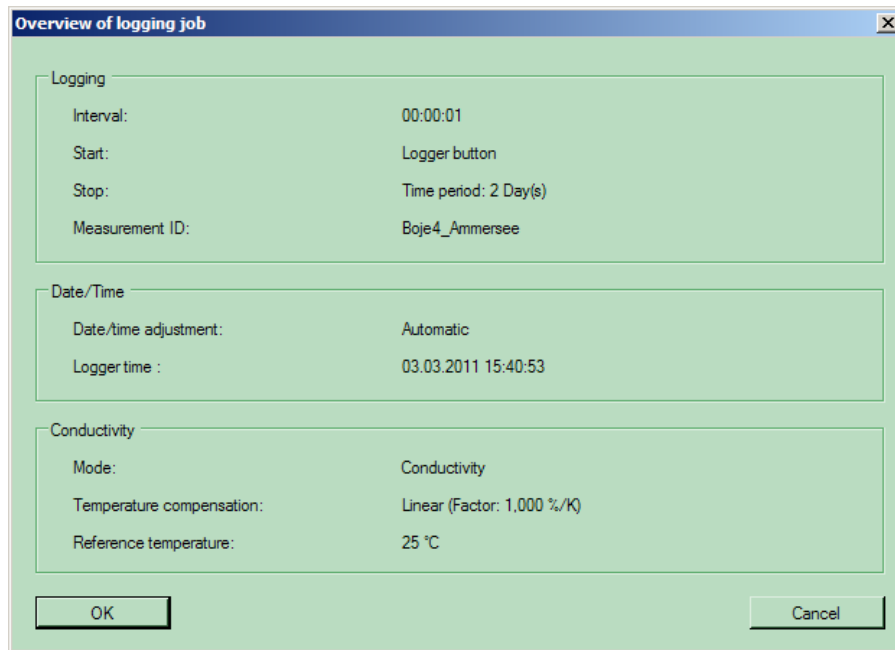


Note

In the *Logging* tab, the memory capacity required with the selected settings is displayed at the bottom (number x of 600,000 possible datasets).

Starting the logging job

- 22 To start the logging job, click the button, *Send logging job*. The message, *The settings have been successfully transferred* appears.
- 23 Confirm with *OK*. A window pops up with an overview of the logging job just sent.



- 24 Confirm with *OK*. A note appears with the message that the logger will now be disconnected from the PC program and, depending on the setting, the information that the logging is started immediately or that the logging is started when the logger key button is pressed.
- 25 Confirm with *OK*.



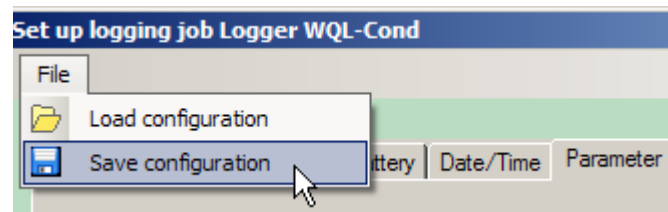
Note

The setting routine for the logging job can be canceled at any time with the *Cancel* button. In this case the logger does not start the logging job; instead, the data window appears after a note.

8.4 Logging job - storing or loading the configuration

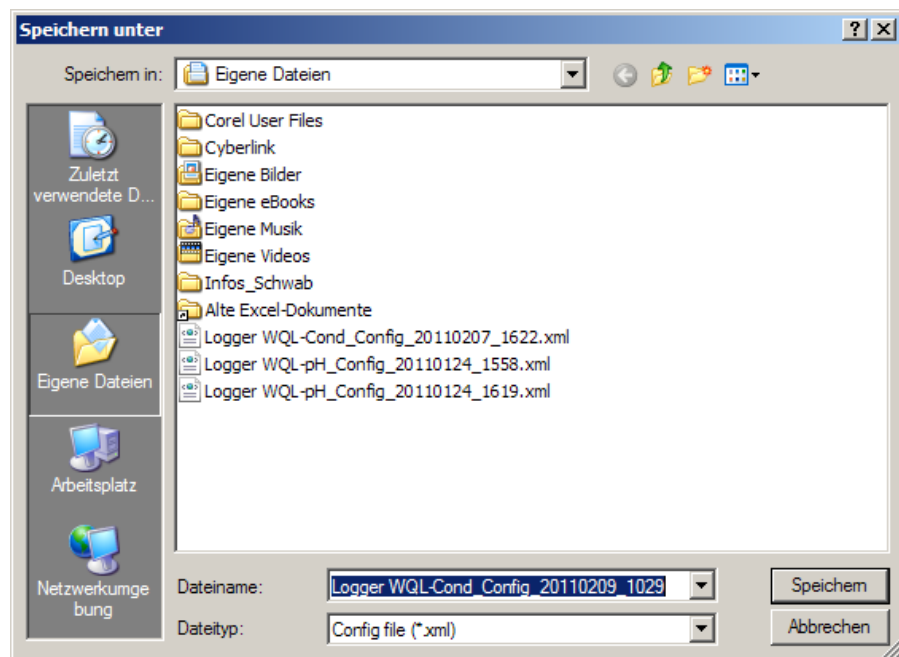
You can store to a file the settings for a logging job and call them up later for another logging job. To do so, proceed as follows:

- 1 In the *File* menu, select the submenu, *Set up logging job*.
- 2 After making the settings, click *File* in the *Set up logging job window*.



Storing the configuration

- 3 To save the configuration of a logging job, click *Save configuration*. The window to save the configuration appears.





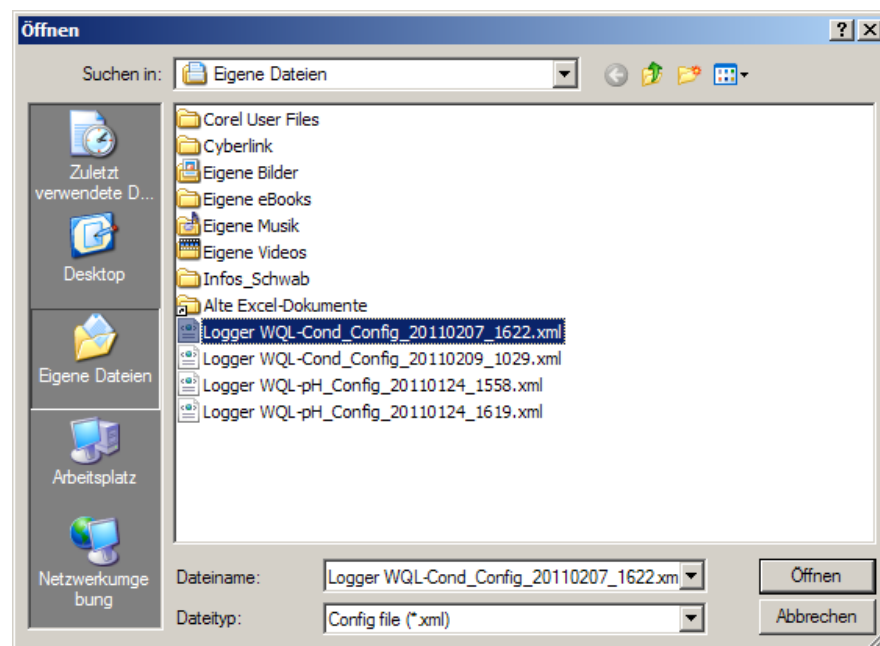
Notes

- The program suggests a storage location and name for the file: the name of the logger and the storing date and time (e.g. Logger WQL-Cond_Config_20110124_1619).
- The file has the file extension, ".xml".
- The suggested location and name can be changed.

4	Confirm with the <i>Save</i> button.
5	A message appears, confirming that the file with the configuration was stored.
6	Confirm with <i>OK</i> .

Loading the configuration

7	To load the configuration of a logging job, click <i>Load configuration</i> . The <i>Open</i> window of the configuration appears.
---	--



8	Select the file and click <i>Open</i> .
9	A window with the stored configuration of the logging job appears. Change the settings if necessary and set up the logging job as usual.

8.5 Signal LED and logger key button

8.5.1 Signal LED to indicate the operating conditions of the logger

Next to the key button on the control panel of the logger there is a signal LED. When the logger is not connected to the WQL-Log PC program, this red LED indicates the different operating conditions of the logger as follows:

Mode of flashing	Operating condition
On for 2 seconds, then off	<ul style="list-style-type: none"> ● The logging job is completed. ● The power supply of the logger was interrupted. The logger has to be connected to the PC program in order to set the date and time.
A short flashing every 2 seconds	The logger is ready to log and can be started with the logger key button.
A short flashing every 0.5 seconds	The logging job is running (the logger is logging).



Notes

- The flashing stops after 15 seconds to save energy. Short pressing of the logger key button starts the flashing for 15 seconds again.
- Important: The logger can be started with the logger key button only while the signal LED is flashing (if starting the logger with the key button was set during the setting up of the logging job).

8.5.2 Logger key button

Next to the signal LED on the control panel of the logger there is a key button. It has the following functions:

- With the corresponding setting, a logging job can be started by pressing the key button. The pressure must last for at least 3 seconds, and the LED lights up when the 3 seconds have passed.
- A running logging job can be stopped by pressing the key button for at least 3 seconds. If you press the key button again for at least 3 seconds, a new logging job with the same settings will be started (e.g for logging at different locations).
- Pressing the key shortly activates the LED that indicates the operating state of the logger for 15 seconds (see section 8.5.1 SIGNAL LED TO INDICATE THE OPERATING CONDITIONS OF THE LOGGER).

8.6 Importing data

Depending on the logging job, the WQL-Cond logger measures for a certain period of time and at certain intervals the conductivity and temperature of a solution. The data is stored in the logger. The WQL-Log PC program has to import and store to a database the data before the data can be displayed and processed.

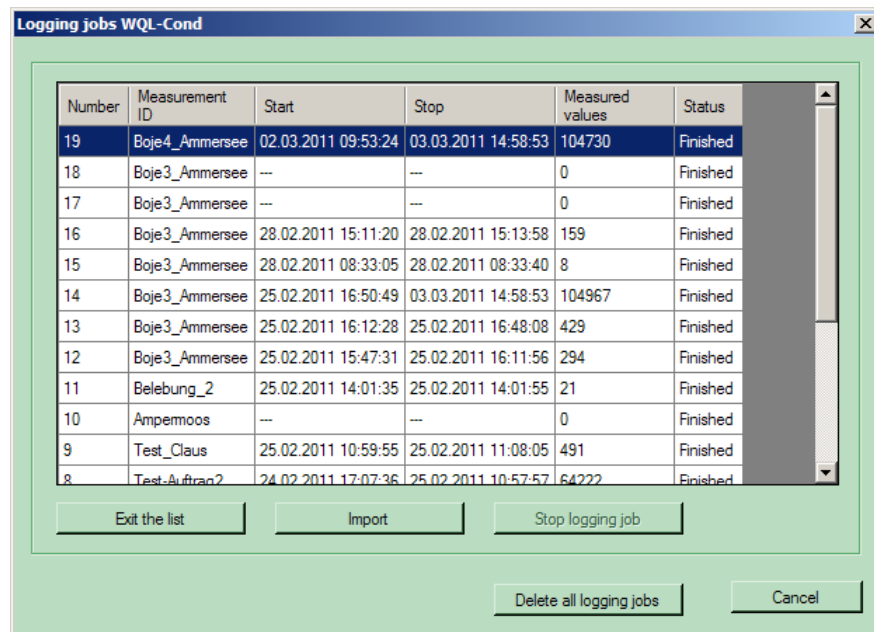


Note

If the logger contains data, the list with the query for the use of the data appears automatically when the logger is connected to the PC program.

To import the data of a logging job, proceed as follows:

- 1 | Connect the WQL-Cond logger to the PC with the USB cable.
- 2 | The list of logging jobs with their respective status appears.



- 3 | If you wish to import the data of the highlighted job, click *Import*. Further information, see section 8.8 MANAGING THE LOGGING JOBS.



Note

Only click *Delete all logging jobs* if you want to discard all data stored in the logger. This action will delete all jobs in the logger memory, and the data will be irretrievably lost!
The jobs that were already imported and stored in the database are retained.

8.7 Overview of the data window

The measurement datasets imported from the logger are stored in a database and graphically displayed in a data window.

The data window is structured as follows:

The screenshot displays the WQL-Log software interface with the following components and annotations:

- Menu bar:** File, Device, Query, Export, Display, Settings, Help.
- Title bar:** WQL-Log - [Logger WQL-Cond - 10520004]
- Conductivity Window:**
 - Title:** Conductivity (Logger WQL-Cond, 10520004), 15975 Measured values
 - Y-axis:** Conductivity [µS/cm] (1715 to 1725)
 - X-axis:** Time (07.02.2011 11:00:00 to 15:00:00)
 - Legend:** Spezial-Messung VALID, Cal-ID: 3, Set-ID: 3
 - Annotation:** 07.02.2011 12:48:23, 1718
- Temperature Window:**
 - Title:** Temperature (Logger WQL-Cond, 10520004), 15975 Measured values
 - Y-axis:** Temperature [°C] (22.5 to 23.5)
 - X-axis:** Time (07.02.2011 11:00:00 to 15:00:00)
 - Legend:** Spezial-Messung VALID
 - Annotation:** 07.02.2011 12:48:23, 23,1
- Status Bar:**
 - Text:** (Data source: DBMultiConsole_)
 - Bottom Line:** Connected to Logger WQL-Cond | 10520004 | DBMultiConsole_

Annotations from the image:

- Name and series number of the logger that provided the data:** Points to '10520004' in the title bar.
- Cursor:** Points to the red vertical line at 12:48:23.
- Number of selected datasets:** Points to '15975 Measured values' in the window titles.
- Value window (for cursor position):** Points to the data value '1718' in the Conductivity window and '23,1' in the Temperature window.
- Measured value ID, status, Cal ID and Set ID of the displayed data:** Points to the legend 'Spezial-Messung VALID, Cal-ID: 3, Set-ID: 3'.
- Name of the database providing the pictured data:** Points to '(Data source: DBMultiConsole_)'.
- Name and series number of the connected logger:** Points to '10520004' in the status bar.
- Name of the currently connected (=open) database:** Points to 'DBMultiConsole_' in the status bar.

8.8 Managing the logging jobs

The WQL-Cond logger can store up to 20 logging jobs with the respective calibration data and setting data. You can view an overview of the logging jobs stored in the logger, read them in individually, display each logging job as a graphic or clear the logger memory.

Possible status displays of a logging job

Status display	Explanation	Options
<i>Running....</i>	The logger is logging.	<i>Stop logging job or Cancel</i>
<i>Waiting...</i>	<ul style="list-style-type: none"> - The logger is waiting to be started with the key button - The logger was stopped with the key button - The waiting time/delay of the start option <i>Time</i> or <i>Delay</i> has not yet expired. 	Start the logging job with the logger key button, <i>Stop logging job or Cancel</i>
<i>Finished</i>	The logging job is finished or was stopped. The data were not yet imported to the database.	<i>Exit the list, Import or Cancel</i>
<i>Imported</i>	The logging job is finished and the data were imported to the database.	<i>Diagram view or Cancel</i>



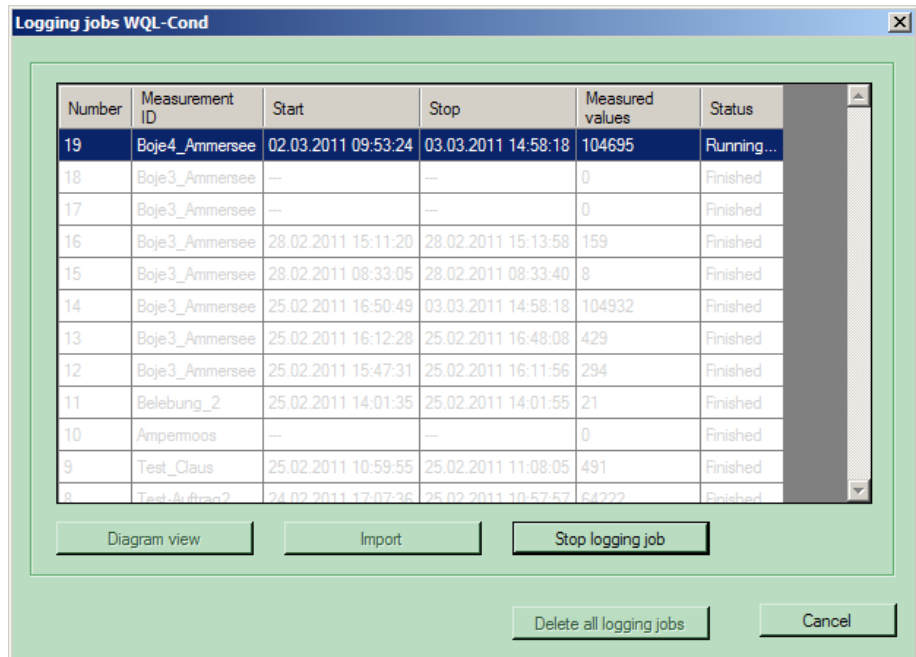
Note

After being imported, the logging jobs shown in the overview can be individually shown as a graphic, but they can only be deleted completely.

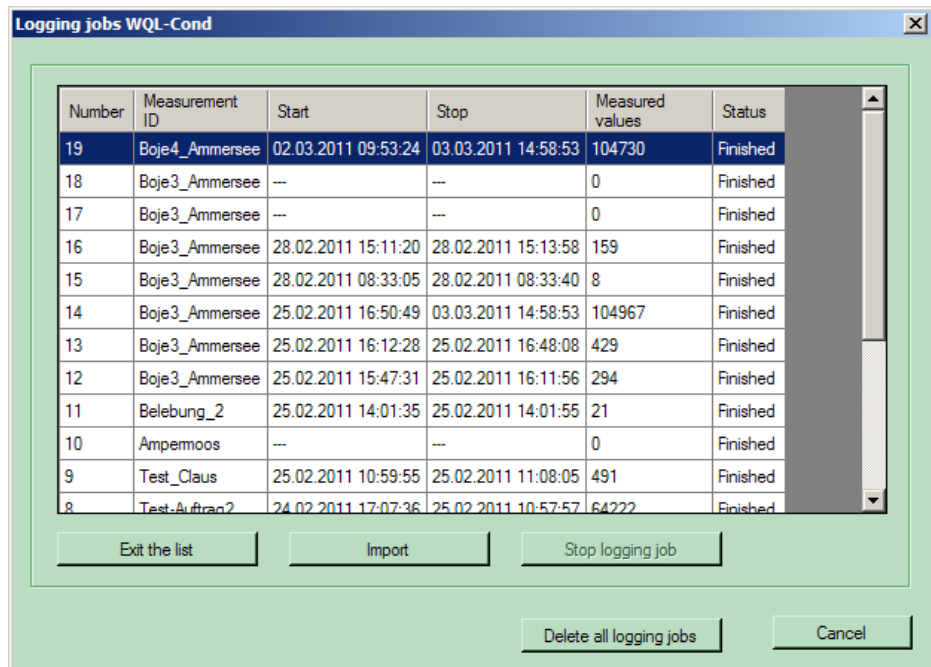
Proceed as follows to view the list of logging jobs stored in the logger:

Viewing the logging jobs

1	Connect the WQL-Cond logger to the PC with the USB cable.
2	In the <i>Device</i> menu, click the menu item, <i>Manage logging jobs</i> . If a logging job is presently running, the following display with information on the running job appears:



- To stop the running job, click *Stop logging job*. The list of logging jobs is displayed.
With *Cancel* the logging job goes on running and the logger is logged off.

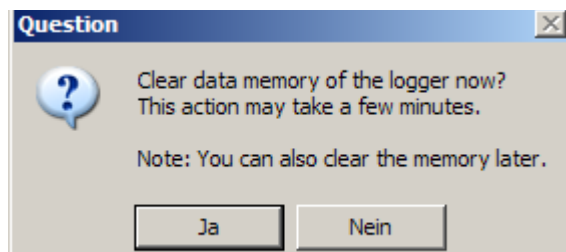


Showing a logging job as a diagram

4	Select a logging job with the arrow keys or with the mouse.
5	If the status is <i>Finished</i> , import the data of the highlighted logging job to the database with <i>Import</i> (the diagram view is only available after the data have been imported).
6	To show the data of the highlighted and imported logging job as a graphic, click <i>Diagram view</i> .
7	If a logging job is selected that is finished but was not imported, the <i>Exit the list</i> button appears. Use this button to go to the empty data window.
8	To show the next logging job, select the menu item <i>Manage logging jobs</i> in the <i>Device</i> menu. Show the next job of the list of logging jobs as a diagram.
9	Use <i>Cancel</i> to return to the data window with the last displayed diagram view.

Clearing the logger memory

1	In the list of logging jobs, click the <i>Delete all logging jobs button</i> . A security prompt appears:
---	---



Note

Only click *Delete all logging jobs* if you want to discard all data stored in the logger. This action will delete all jobs in the logger memory, and the data will be irretrievably lost!

The jobs that were already imported and stored in the database are retained.

2	To delete all logging jobs, click the <i>Yes</i> button.
3	The data is cleared. A message appears after the clearing that informs you that the memory was cleared. Confirm the message with <i>OK</i> . If <i>No</i> is selected, the program returns to the list of logging jobs.

9 Working with the database and measurement data

9.1 General information on the database

The WQL-Cond logger can generate large amounts of measurement data, which can subsequently be stored, managed and used for evaluation with the WQL-Log program. The WQL-Log program uses the Microsoft SQL Server 2005 Express database for this. All generated measurement data are provided with additional information (such as measurement ID, sensor) and stored in the currently connected database.

Database storage considerably differs from the file-based storage known from one's daily PC work with word processing or spreadsheet programs. A database is created and managed by a program, in our case WQL-Log. The WQL-Log program creates several files and works with them.



Warning

- Always use the WQL-Log program to make any changes on the database (such as creating, erasing, saving, restoring a database).
- Never erase any files created by the WQL-Log program with another program (e.g. with MS Windows Explorer). In this case, WQL-Log might not be able to access the database and the stored data are lost.

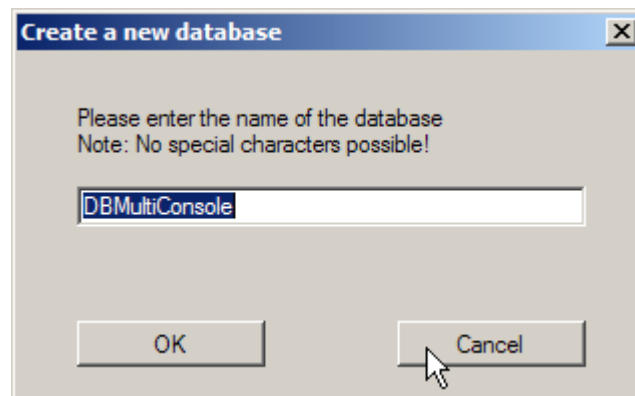
With a database you can use queries to select/filter certain events from the stored measured values. You can e.g., search for measured values from certain periods or individual locations. This enables the secure and user-friendly handling of large amounts of data.

9.2 Creating a database

If no database is available on initial commissioning, its creation is enforced, i.e. a database must first be created prior to storing data in it. If a database already exists, newly generated data can be stored in it or you can create a new database and store the data there.

Proceed as follows:

- 1 In the *File* menu, select the submenu, *Create new database*.



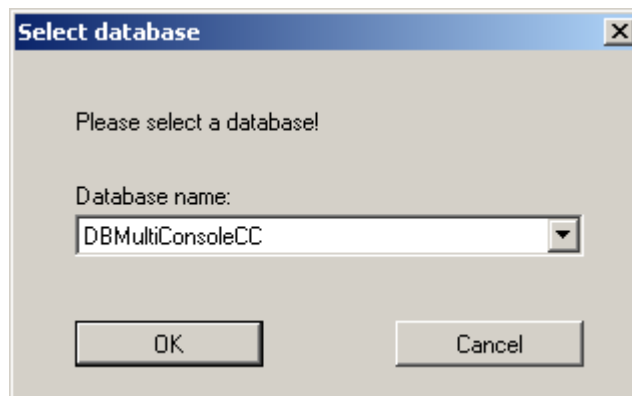
- 2 Confirm with *OK*.
- 3 A message appears informing you that the database was created.
- 4 Confirm with *OK*. The new database was created and is connected with the WQL-Log program.

9.3 Opening a database

When being started, the WQL-Log program automatically opens the database last used. If there are several databases, you can select another database to be opened.

Proceed as follows:

- 1 In the *File* menu, select the submenu, *Open database*. A window to select the database pops up.



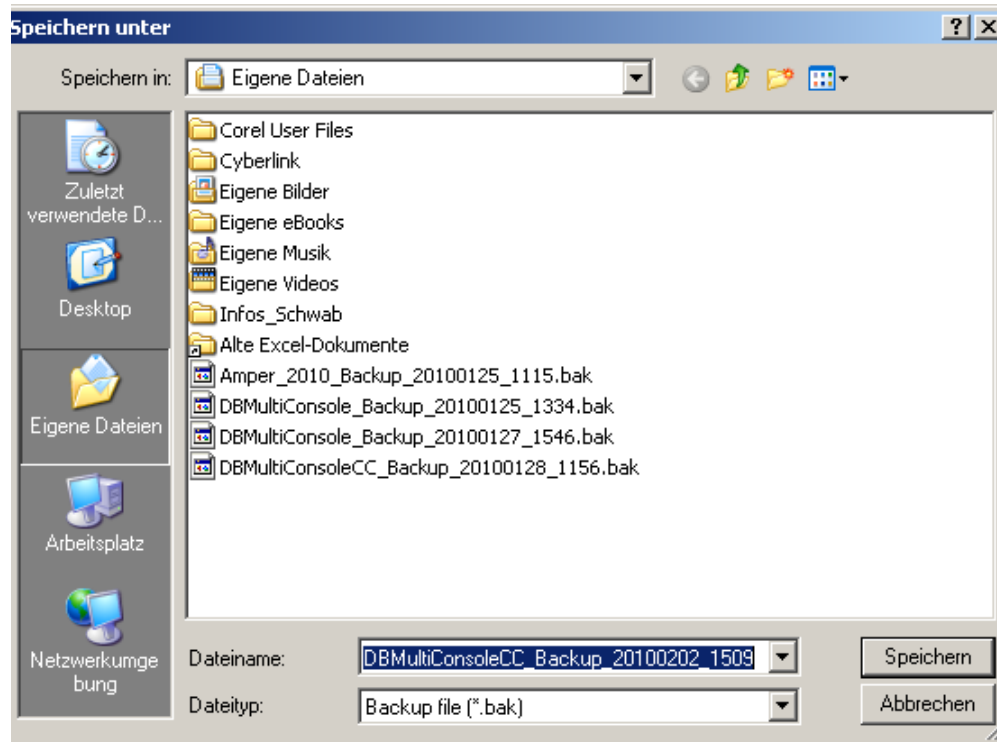
- 2 Click the arrow next to the *Database name* field and select the required database.
- 3 Confirm with *OK*. The selected database is opened.

9.4 Backing up a database

You can create a backup copy of an open database at any time.

Proceed as follows:

- 1 In the *File* menu, select the submenu, *Back up database*.



Notes

- The program suggests a storage location and name for the backup copy: the name of the original database with the addition "backup" and the date and time the backup copy is created.
- The backup copy has the file extension, ".bak".
- The suggested location and name can be changed.

2	Change the location and name of the backup copy as necessary.
3	Confirm with the <i>Save</i> button.
4	A message appears informing you that the database was saved.
5	Confirm with <i>OK</i> . The backup copy of the database has been created.

9.5 Restoring a database

You can restore a database from a backup copy (see section 9.4 BACKING UP A DATABASE) at any time by opening the backup copy from a connected database. This can either be an existing database you want to restore to a previous state or a newly created, empty database into which you want to store the saved data in case the original database was destroyed or inadvertently erased.

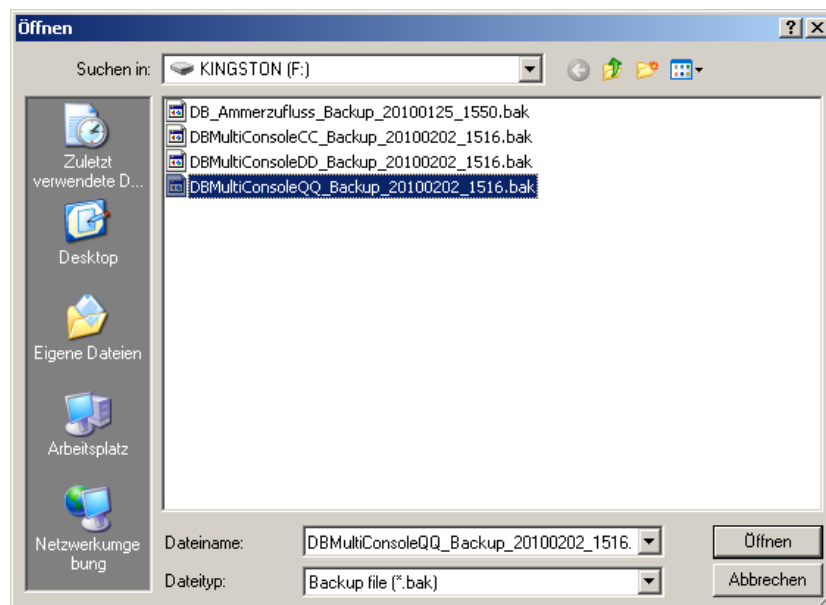


Warning

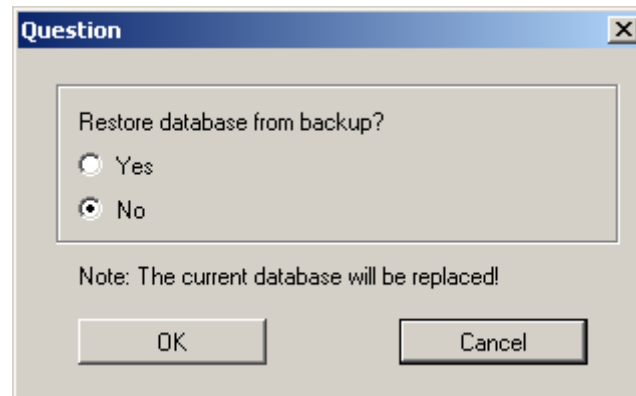
- The database from where you open the copy to be restored is overwritten with the backup copy to be restored. Data that were stored in the database will be irrevocably lost on restoring the backup copy!
- If you are in any doubt, open a backup copy to be restored from an empty, newly created database (see section 9.2 CREATING A DATABASE).

Proceed as follows:

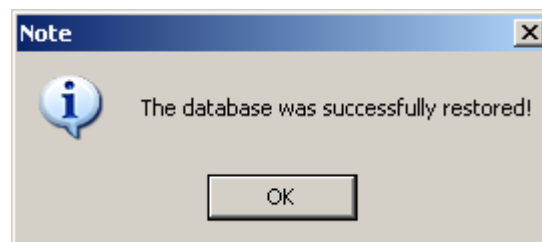
1	In the <i>File</i> menu, select the submenu, <i>Open database</i> .
2	Select the database into which you want to import the database to be restored.
3	In the <i>File</i> menu, select the submenu, <i>Restore database</i> .
4	Select the location and name of the backup copy (*.bak) to be restored.



- 5 Confirm with the *Open* button.
A security prompt appears:



- 6 Click the option *Yes* and confirm with *OK*.
A message appears:



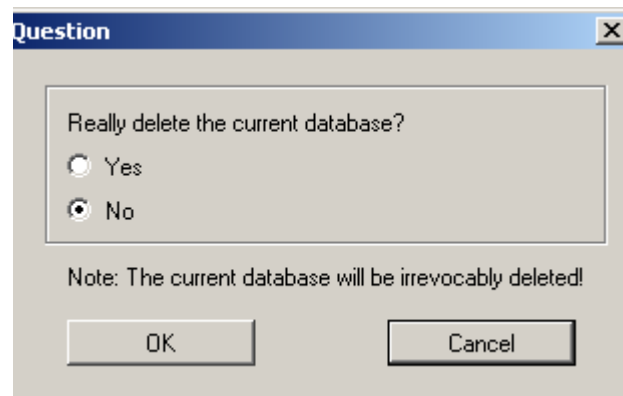
- 7 Confirm with *OK*.
The database has been restored.

9.6 Erasing a database

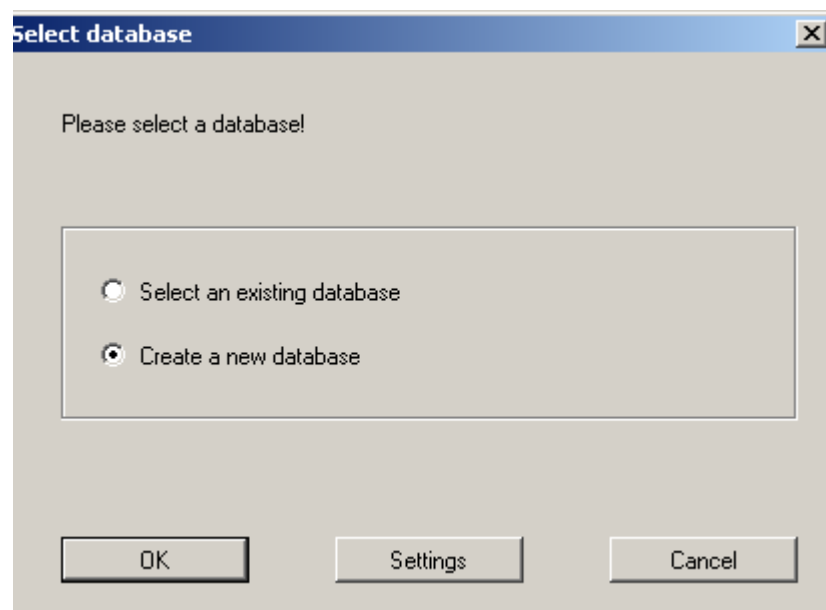
You can erase any connected database of the WQL-Log program.

Proceed as follows:

- 1 Make sure that the database you want to erase is connected (= open), or open the database with the menu, *File / Open database*.
- 2 Open the menu, *File / Delete database*. A security prompt appears:



- 3 Click the option Yes and confirm with *OK*. The database is erased. If it was the only database, a window to create a new database pops up.

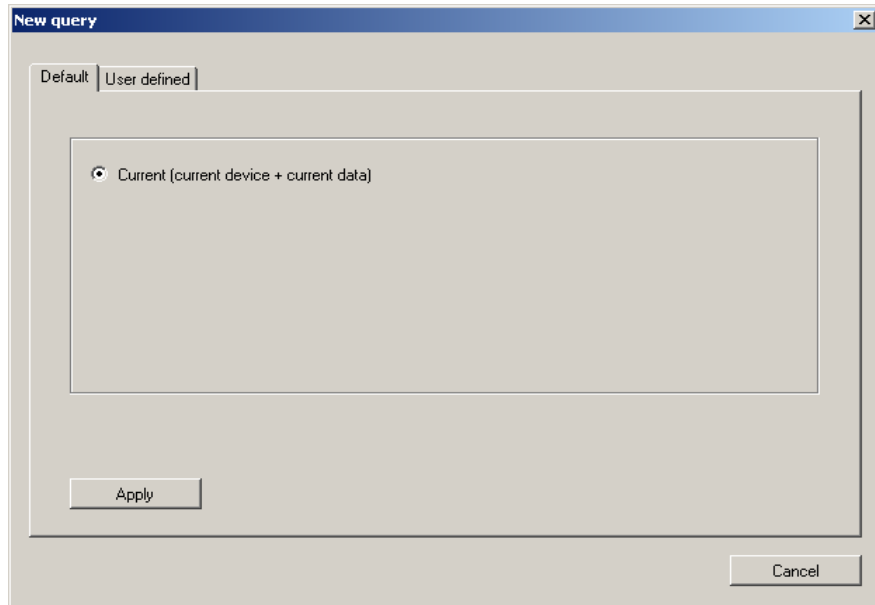


9.7 Querying data

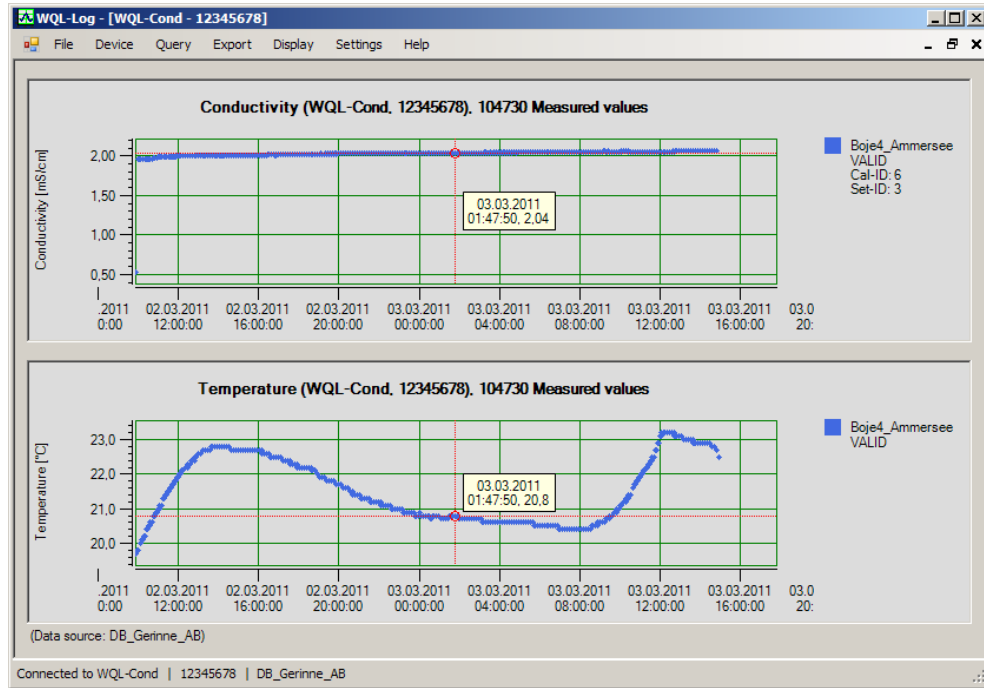
The data recorded by the logger and stored in the database can be displayed as a graphic via the *Query* menu item. Proceed as follows:

Querying current data

- 1 In the *Query* menu, click the menu item, *New*. The *New query* window appears.
- 2 The *Standard* tab appears when a logger is connected.



- 3 To graphically display the data last imported from the connected logger, click *Apply*. The data appear as a graphic, broken according to conductivity value and temperature.



Note

You can change the position of the cursor by moving the data window with the mouse.



Note

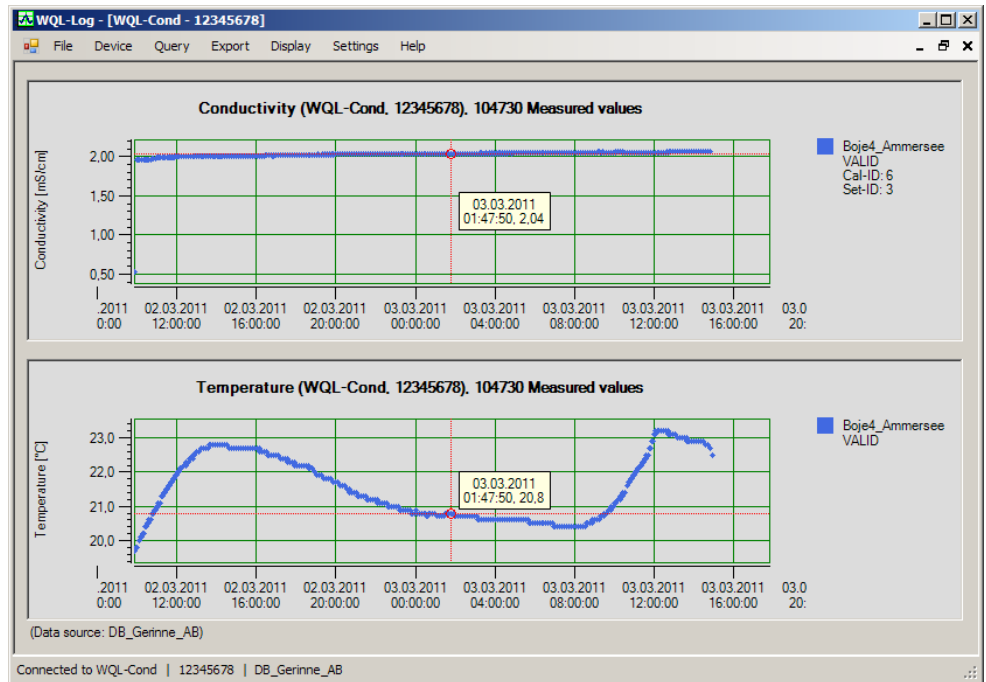
The series number of the connected logger is displayed in the bottom left corner of the data window (see section 8.7 OVERVIEW OF THE DATA WINDOW).

Querying user-defined data

- 1 Click the *User-defined* tab in the *New query* window. The *User-defined* tab appears immediately in the *Query* menu if no logger is connected.

The screenshot shows the 'New query' dialog box with the 'User defined' tab selected. The 'Measurement ID' is set to 'default'. The 'Sensors' list contains four items: 'pH, Logger WQL-pH, 09341221' (unchecked), 'ORP - Ag/AgCl, sat., Logger WQL-pH, 09341221' (unchecked), 'Conductivity, Logger WQL-Cond, 10520004' (checked), and 'Temperature, Logger WQL-Cond, 10520004' (checked). The 'Time period' is set from 'Mittwoch, 2. Februar 2011 08:59:07' to 'Mittwoch, 2. Februar 2011 10:24:31'. There are 'Apply' and 'Cancel' buttons at the bottom.

- 2 If you only want to query datasets with a certain measured value ID, check off the box for *Measured value ID* and then click the arrow next to the selection field for the Measured value ID. Select the required measured value ID.
- 3 In the *Sensors* field, select one or two measured values to be queried.
- 4 If you only want to query datasets with a certain date, check off the box for *Time period* and then click the arrow next to the selection fields for the time (*from* and *to*). Select the required date in both fields. Next to the date fields are the time fields where you enter the time (hours, minutes, seconds) either with the arrow keys or by entering the number with the keyboard.
- 5 Click *Apply* to display the selected datasets.



6 | The queried data appear as a graphic.




Note

Always make the settings for the user-defined query from the top down, as the data are filtered in this sequence.



Note

If you do several queries, even from several databases, an additional window with a graphic appears for each query. You can cascade these windows with the *Restore down* () button. You can also arrange the windows side by side in order to compare several graphics.

9.8 Exporting data

The data displayed as a graphic with the aid of the *Query* menu can be exported to a *.csv file. The WQL-Log program creates three csv files with each export procedure: One with the measurement data, one with the calibration data and a third one with the setting data.

In this form the data can be read and processed with Microsoft Excel and many other spreadsheets.

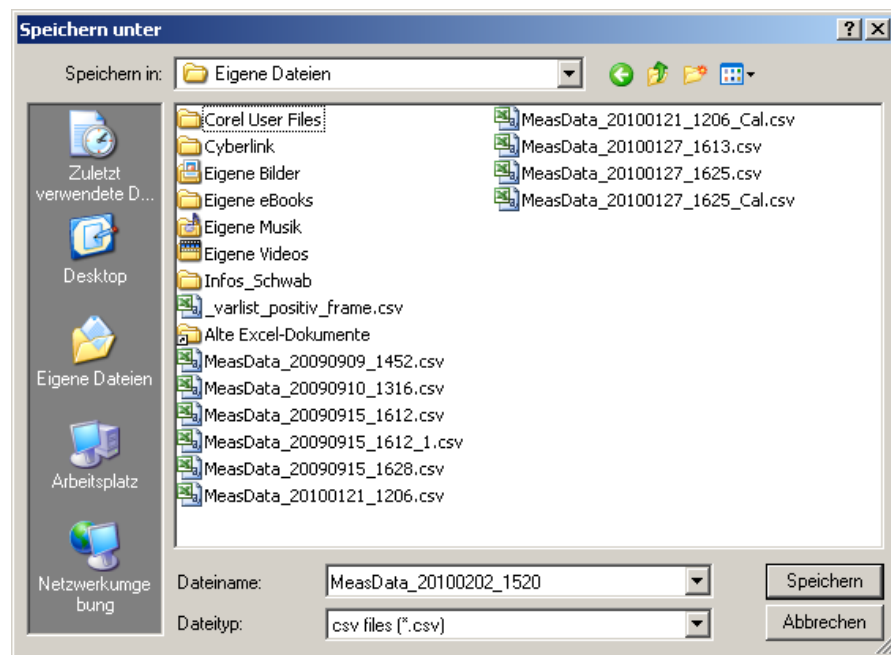


Note

If the number of datasets to be exported is more than 60,000 and the data are to be processed with Microsoft Excel 2007 or older, export the data with the function, "Export as *.csv file (splitted)", as Excel versions 2007 and older can store only 60,000 datasets in one worksheet. The number of datasets is given in the header of the graphic, next to the series number of the logger that provided the data.

Proceed as follows to export the datasets displayed as a graphic:

- 1 In the *Export* menu, click the menu item, *Export as *.csv file* or *Export as *.csv file (splitted)*.
The *Save as* window appears.



- 2 The WQL-Log PC program suggests a directory and file name. Store the data to be exported in the selected directory under the required name with the *Save* button.
- 3 A note on the successful data export appears. Confirm with *OK*.

**Notes**

The WQL-Log program creates three csv files with each export procedure:

- A csv file with the measurement data and information on the logger and logging job (suggested name with date and time)
- A csv file with the relevant setting data (suggested name with date and time and the addition, "Set")
- A csv file with the relevant calibration data (suggested name with date and time and the addition, "Cal")
- If the number of datasets to be exported is more than 60,000 and the data is exported with the function, *Export as *.csv file (splitted)*, the WQL-Log program automatically divides the data into files with max. 60,000 datasets and adds a 1, 2 etc. to the suggested file names.

Example: Exported measurement data opened with MS Excel

	A	B	C	D	E	F	G	H	I	J	K	L
1	SensorName	SerNo		DateTime	Conductivity	Status	Temperature	Status	MeasID	CalProtID	CalDateTime	SetID
2	WQL-Cond	12345678		02.03.2011 09:53	1.914	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
3				02.03.2011 09:53	1.914	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
4	Start	Stop		02.03.2011 09:53	0.532	RANGING	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
5	02.03.2011 09:53	03.03.2011 14:58		02.03.2011 09:53	0.534	RANGING	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
6				02.03.2011 09:53	0.534	RANGING	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
7				02.03.2011 09:53	1.913	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
8				02.03.2011 09:53	1.915	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
9				02.03.2011 09:53	1.915	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
10				02.03.2011 09:53	1.915	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
11				02.03.2011 09:53	1.916	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
12				02.03.2011 09:53	1.916	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
13				02.03.2011 09:53	1.917	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
14				02.03.2011 09:53	1.917	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
15				02.03.2011 09:53	1.917	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
16				02.03.2011 09:53	1.917	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
17				02.03.2011 09:53	1.918	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
18				02.03.2011 09:53	1.918	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3
19				02.03.2011 09:53	1.919	VALID	19.7	VALID	Boje4_Amme	6	22.09.2009 08:17	3

The csv file with the measurement data includes the following information:

- Sensor name
- Series number of the logger (SerNo)
- Start and stop (time) of the exported data
- Date and time of the measured values
- Measured value
- Measured value status (Valid; Invalid; OFL/UFL = outside the measuring range; Ranging = optimal measuring range is being searched)
- Temperature
- Measured value status (Valid; Invalid; OFL/UFL = outside the measuring range)
- Measured value ID (MeasID)
- Calibration ID (CalProtID) so you can allocate the calibration data if there are several calibration procedures for the exported data - see csv file with calibration data).
- Date and time of the calibration (CalDateTime)
- Settings ID (SetID) so you can allocate the settings for the exported data - see csv file with setting data).

AutoRange function

Due to the large scope of conductivity measurements (1 ... 1.000.000 $\mu\text{S}/\text{cm}$) the WQL-Cond logger automatically searches for the suitable measuring range. In the most unfavorable case (changing from the largest to the smallest measuring range or vice versa) it takes the logger a response time of approx. 8 seconds to do this.

In the case of extreme conductivity jumps, the logger can determine the real conductivity value only approximately because of this response time. Approximate values are indicated with the measured value status, RANGING.

When measuring directly, the conductivity value is only displayed after the suitable measuring range has been found.

Example: Exported calibration data opened with MS Excel

	A	B	C	D	E	F
1	SensorName	SerNo				
2	WQL-Cond	12345678				
3						
4	ID	DateTime	Mode	Temp [Å°C]	CellConst [1/Å]	Status
5	6	22.09.2009 08:17	Automatic	25,0	0,481	+++

The csv file with the calibration data includes the following information:

- Sensor name
- Series number of the logger (SerNo)
- Calibration ID, so you can allocate the calibration data if there are several calibration procedures for the exported data
- Date and time of the calibration
- Calibration mode (Mode)
- Calibration temperature (Temp)
- Cell constant (CellConst)
- Calibration evaluation
(CalStatus - similar to CALIBRATION EVALUATION, page 135)

Example: Exported setting data opened with MS Excel

	A	B	C	D	E
1	SensorName	SerNo			
2	WQL-Cond	12345678			
3					
4	ID	TempComp	TRef [Å°C]	LinCoeff [%/K]	TDSFactor
5	3	nLF	25	---	---

The csv file with the setting data includes the following information:

- Sensor name
- Series number of the logger (SerNo)
- Settings ID (ID) so you can allocate the settings for the exported data
- Temperature compensation (TempComp)
- Reference temperature (TRef [Å°C])
- Temperature coefficient (LinCoeff [%/K])
- TDS factor

10 Info menus

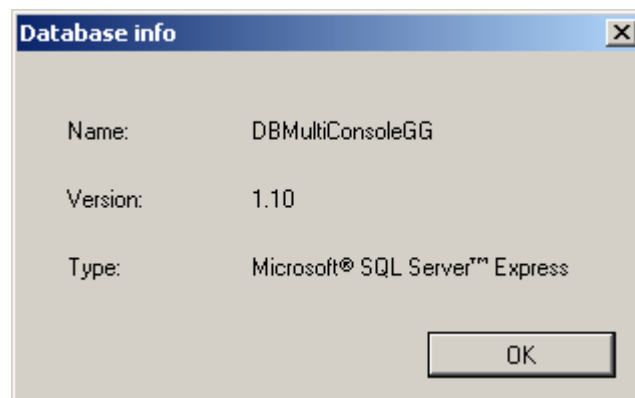
10.1 Database information

The data read in from the logger are saved in a database. You can query the name, version and type of the opened database.

To do so, proceed as follows:

Database information

- 1 In the *File* menu, click the menu item, *Database info*. The *Database info* window appears.



- 2 Confirm with *OK*. The *Database info* window disappears.



Note

The size of a database file can be 4 GB max. When this amount of data is stored, a new database file must be created. The new database file is created in the *Device/Create new database* menu.

A database with 50,000 datasets requires approx. 7 MB storage space. Thus the database can store approx. 12,5 million datasets.

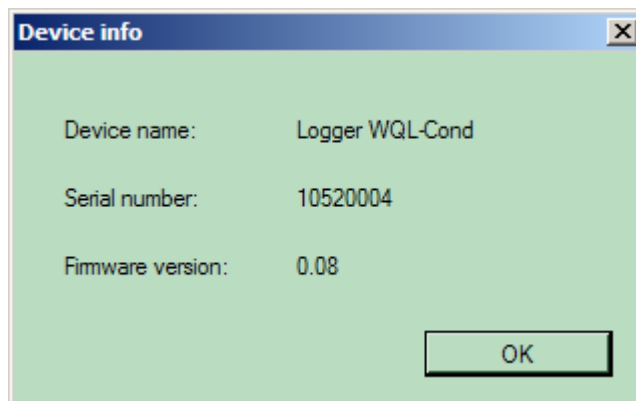
10.2 Device information

If a logger is connected to the PC, you can query the device name, series number and firmware version of the connected logger via the *Device/Info* menu item.

To do so, proceed as follows:

Device information

- 1 In the *Device* menu, click the menu item, *Info*. The *Device info* window appears.



- 2 Confirm with *OK*. The *Device info* window disappears.

10.3 Program info

In the *Help/About* WQL-Log menu you can look up which version of the WQL-Log PC program was installed.

To do so, proceed as follows:

- 1 In the *Help* menu, click the *About* WQL-Log menu item. The *About* WQL-Log window appears.

Program info



- 2 Confirm with *OK*. The *About* WQL-Log window disappears.

11 Resetting the logger

You can reset to the default condition the logger and the PC program with its settings.

In the default condition, the settings are as follows:

Configuration parameters	Setting
Logging interval	1 second
Start of the logging	Logger key button
End of the logging	Time period 1 hour
Measured value ID	default
Measuring mode	Conductivity
Temperature compensation	nLF
Temperature coefficient	2.000
Reference temperature	25 °C
Cell constant	0.475 cm ⁻¹
TDS factor	1.00
Date, time	01.01.2003, 00:00
Calibration records	None



Notes

- The *Device / Reset* function deletes the calibration records as well as all measurement data from the logger! Before deleting the logger memory, make sure that you have imported to the database all data you want to keep.
- The battery counter is not reset with the *Device / Reset* function. It has to be reset with the reset function of the battery manager.

Resetting to default condition

To reset the logger and PC program to the default condition, proceed as follows:

1	In the <i>Device</i> menu, click the menu item, <i>Reset</i> . A security prompt appears.
2	Confirm with <i>OK</i> . The settings are reset to the default condition.

12 Maintenance, cleaning, storage

12.1 General maintenance instructions

General information

- Normally, all screw joints of the logger housing can be opened and closed by hand, without using any tools. If necessary, use a paper towel so you can get a better grip on the parts.
- In the screwed condition, no gaps may be visible at the joints.
- Prior to unscrewing any screw joints, clean the exterior of the logger (see section 12.2 EXTERIOR CLEANING) and dry it thoroughly.
- Prior to reassembly, clean all internal and external threads thoroughly. Contaminated threads can get stuck by-and-by. Normally, the threads can be screwed together without using any effort and without noticeable grinding (sand particles).
- Clean all O-rings prior to reassembly. Dirt, e.g. fibers, on the O-rings can affect the tightness. If the O-rings are damaged, they have to be exchanged (see section 12.5 REPLACEMENT PARTS).

12.2 Exterior cleaning

Clean the logger with tapwater and a soft sponge or brush. Remove the protective hood when you want to clean the measuring cell.

Cleaning the measuring cell

We recommend to clean the measuring cell thoroughly, especially before measuring low conductivity values.

Contamination	Cleaning procedure
Lime sediments	Immerse in acetic acid for 5 minutes (volume share = 10 %)
Fat/oil	Clean with warm water that contains washing-up liquid

After cleaning, thoroughly rinse with deionized water and recalibrate if necessary.

Aging of the conductivity measuring cell

Normally, the conductivity measuring cell does not age. Special measuring media (e.g. strong acids and bases, organic solvents) or temperatures that are too high may considerably reduce its lifetime or lead to damage. The warranty does not cover failure caused by measuring conditions and mechanical damage.

12.3 Battery

12.3.1 Battery service life

The logger has an energy saving feature. The service life of the battery depends very much on the usage of the logger, especially on the measuring interval. The service life to be expected of a full battery (2600 mAh) can be estimated by means of the following table:

Measuring interval	Service time to be expected
1 ... 4 sec	1 months
5 ... 9 sec	1.5 months
10 29 sec	2 months
30 ... 59 sec	5 months
1 min ... < 2 min	6 months
2 min ... < 5 min	11 months
5 min and longer	12 months



Note

The power consumption also depends on the measured value: When measuring high conductivity values, the logger uses more energy, when measuring low conductivity values, it uses less energy. The service times to be expected given in the above table apply to a permanent conductivity of 10 mS/cm. With other conductivity values the service times will change accordingly.

12.3.2 Ascertaining the battery status

The battery manager of the logger records the battery use so that you can ascertain the battery status at any time. For this the battery counter has to be reset when a new battery is inserted.

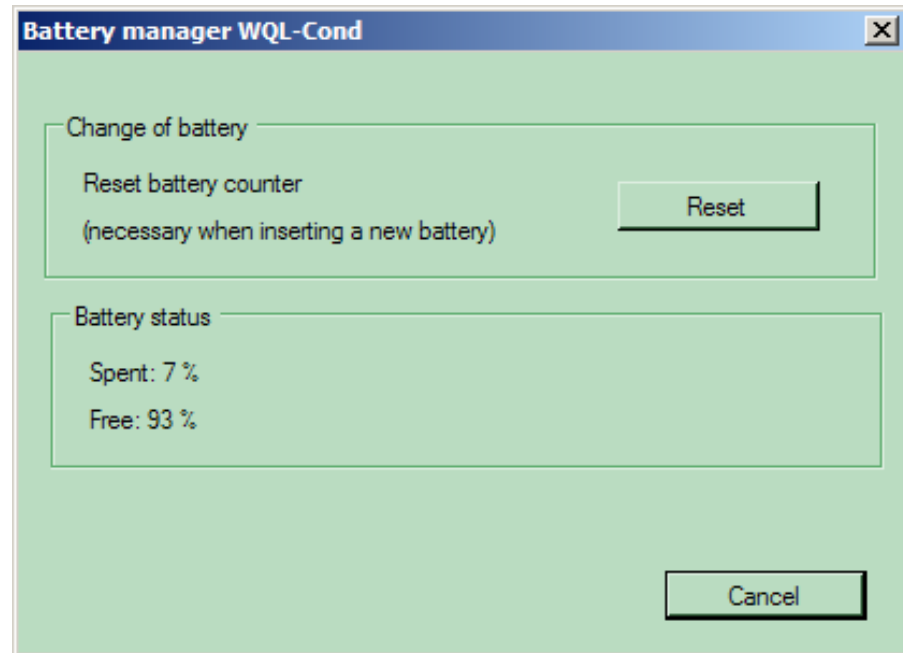


Note

Leave the battery installed even if you will store the logger for a longer period of time. This ensures that the battery counter can properly work and display the battery status.

Ascertaining the battery status

- 1 In the *Device* menu, select the menu item, *Battery manager*. The *Battery manager* window appears. The battery status is displayed as a percentage (spent and free).



Note

The battery status is also displayed while you are setting up a logging job (see section 8.3 SETTING THE PARAMETERS AND STARTING THE LOGGING JOB).

12.3.3 Resetting the battery counter

For the battery status to be displayed correctly, the battery counter must be reset on installing a new battery.

Proceed as follows:

Resetting the battery counter

- | | |
|---|--|
| 1 | In the <i>Device</i> menu, select the menu item, <i>Battery manager</i> . The <i>Battery manager</i> window appears. Select the <i>Reset</i> button. |
| 1 | A security prompt appears. Confirm the reset with <i>OK</i> . |

12.3.4 Battery replacement



Note

Always install a brand-new battery (see section 12.5 REPLACEMENT PARTS) so the battery manager can work correctly. When replacing the battery the general maintenance instructions in section 12.1 must also be followed.

The battery is replaced in the same way as it is inserted during the commissioning (see section 3.1 INSERTING THE BATTERY).

Data preservation

After the battery was removed all stored measured values are retained. Only the date and time are reset to the default condition (01.01.2003, 00:00) when the power supply is interrupted.

We recommend to connect the logger to the PC for the time of the battery replacing so the logger is supplied with power while there is no battery inserted. Thus the date and time will be retained. Otherwise, the date and time will be set the next time the logger is connected to the PC with the WQL-Log PC program. Depending on the setting in the WQL-Log program, this is either done automatically when the connection is established (synchronization with the system time of the PC), or manually.

State of the logger after the power supply was interrupted (battery empty or removed, see also section 8.4 LOGGING JOB - STORING OR LOADING THE CONFIGURATION):

Case 1: Logging job active at the time of interruption

- The logging job is terminated.
- The time is reset to default.
- All data logged up to this point of time are retained and can be saved on the PC the next time the logger is connected to the PC (see section 8.6 IMPORTING DATA).
- The terminated logging job can be continued with a corresponding new logging job as necessary. To do so, the time must be set anew if the automatic time synchronization is switched off.

Case 2: No logging job at the time of interruption

- The time is reset to default.
- Prior to setting up the next logging job, you have to set the time if the automatic time synchronization is switched off.

12.4 Storage

Store the logger in a dry place, observing the storing conditions according to section 14.2 APPLICATION CHARACTERISTICS. Low temperatures usually delay the aging of the measuring cell.

Leave the battery installed for storage.

12.5 Replacement parts

Description	Model	Order no.
3.6 V Li battery	WQL-RB	109 825



Note

If the O-rings or shackle have to be replaced, please contact the WTW service department.

13 What to do if...

13.1 Calibration and measuring

Unstable measured values

Cause	Remedy
– No stable measured value	– Provide stable measuring conditions (e.g. temperature) – Use a shorter USB cable
– USB-Hub or USB connection at the PC faulty or defective	– Use other USB connection or PC

Implausible measured values

Cause	Remedy
– Measuring range exceeded	– Make sure the logger is suitable for the application
– Contamination in the area of the electrodes	– Clean the conductivity measuring cell (see section 12.2 EXTERIOR CLEANING).
– Electrodes damaged	– Return the logger

Incorrect temperature display

Cause	Remedy
– The temperature sensor is not immersed deep enough in the measuring solution	– Observe the minimum immersion depth
– Temperature sensor defective	– Return the logger

Logger does not react

Cause	Remedy
– Battery depleted	– Insert new battery (see section 12.3)

System cannot be calibrated

Cause	Remedy
– Contamination in the area of the electrodes	– Clean the conductivity measuring cell (see section 12.2 EXTERIOR CLEANING).
– Calibration solution not suitable	– Use suitable control standard

13.2 Communication of the logger and PC program

Import of measured values is aborted

Cause	Remedy
– Communication problem	– Repeat the import process – Use a shorter USB cable
– USB-Hub or USB connection at the PC faulty or defective	– Use other USB connection or PC

Data logging of the logger aborted

Cause	Remedy
– Power supply interrupted	– Connect the logger to the PC program and set up logging job. – Make sure that the logger is supplied with power (battery)

13.3 Communication between PC program and SQL server

The program cannot access the server database

Cause	Remedy
– The SQL server is already installed on the PC with a different password	– In the <i>Settings / Database</i> menu, click the <i>User-defined</i> option and enter the password that was used for the initial installation of the SQL server. – Set Windows authentication.



Note

The connection can be checked with the *Test* button. A message appears informing you whether the connection was established.

14 Technical data

14.1 Measurement characteristics

General features of the measuring cell

Measuring principle	Four-electrodes measurement
Range of application	1 $\mu\text{S/cm}$... 1 S/cm
Cell constant	0.475 $\text{cm}^{-1} \pm 1.5\%$
Temperature sensor	Integrated NTC 30 (30 $\text{k}\Omega$ at 25 °C / 77 °F)
Temperature responding behavior	t_{99} (99 % of the final value display after) < 20 s
Accuracy of the temperature sensor	± 0.2 K

Measuring ranges, resolution (AutoRange function: the logger automatically selects the suitable measuring range)

Measured parameter	Measuring range	Resolution
Conductivity [$\mu\text{S/cm}$]	0.0 ... 199.9	0.1
	200 ... 1999	1
Conductivity [mS/cm]	2.00 ... 19.99	0.01
	20.0 ... 199.9	0.1
	200 ... 1000	1
Resistivity [Ohm*cm]	1.00 ... 19.99	0.01
	20.0 ... 199.9	0.1
	200 ... 1999	1
Resistivity [kOhm*cm]	2.00 ... 19.99	0.01
	20.0 ... 199.9	0.1
	200 ... 1999	1
Resistivity [MOhm*cm]	2.00 ... 19.99	0.01
Salinity	0.0 ... 70.0 according to the IOT table	0.1
TDS	0 ... 199.9 mg/l	1
	200 ... 1999 mg/l	0.01
	2.00 ... 19.99 g/l	0.1
	20.0 ... 199.9 g/l	
Temperature [°C]	- 5.0 ... + 60.0	0.1
Temperature [°F]	+ 23.0 ... + 140.0	0.1

Accuracy of the measuring technique in the range of application

Measured parameter	Accuracy (± 1 digit)
Conductance	$\pm 0.5\%$ of measured value
T [°C]	± 0.1

Logger function	Measuring interval	adjustable: user-defined (1 s ... 24 h) 1 / 5 / 10 / 30 s 1 / 5 / 10 / 15 / 30 min 1 / 2 / 3 / 6 / 9 / 12 / 24 h
	Capacity of the data memory	600.000 measurement datasets

14.2 Application characteristics

Measuring medium	Allowed temperature range	0 ... 60 °C (32 ... 140 °F)
	Allowed pH range	2 ... 12
	Minimum depth of immersion	60 mm

Pressure resistance IP 68 (1 x 10⁶ Pa or 10 bar)

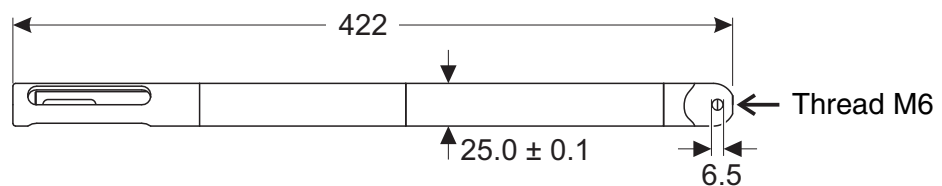
The WQL-Cond logger meets all requirements according to article 3(3) of 97/23/EC ("pressure equipment directive").

Storage conditions	Recommended storing type	Dry, in air
	Storage temperature	-25 ... 65 °C (-13 ... 149 °F)

14.3 General data

Test certificates CE

Dimensions (in mm)



Weight 950 g

Material	Metal parts coming into contact with the sample: – Shaft – Sleeve – Coupling ring – Protective hood – Cap	Stainless steel 1.4571*
	Battery compartment	Brass, gold-plated
	Screws	Stainless steel V2A
	Housing of the control panel	Brass, gold-plated
	Key button	Silicone
	Seals	FPM (Viton)
	Shackle	Stainless steel V4A *
	Shaft of the measuring cell	Epoxy
	Conductivity electrodes	Graphite
	Thermistor enclosure	Graphite

* Stainless steel can be susceptible to corrosion at chloride concentrations of ≥ 500 mg/l and more.

Guidelines and norms used

EMC	EC directive 2004/108/EC EN 61326 FCC Class A
Meter safety	EC directive 2006/95/EC EN 61010-1
Climatic class	VDI/VDE 3540
Pressure resistance	EC directive 97/23/EC
IP protection class	EN 60529

14.4 Electrical data

Power supply	Battery	Lithium thionyl chloride battery 3.6 V, size AA, 2600 mAh
	Operational life	At least 1 month, depending on measuring interval
Electrical safety	Protective class	III
USB interface	Type	USB 1.1, galvanically isolated
	Baud rate	38.400 (921.600 when reading in data)
	Socket type	Mini USB
	Cable length	max. 3 m

Index

A

Application tips	143
AutoRange function	172
AutoRead	127

B

Battery manager	180, 181
-----------------------	----------

C

Calibration	127
Automatic	129
Calibration record	130, 134
Manual	132
Calibration evaluation	135
Calibration procedures	128
Calibration settings	128
Cell constant, nominal	127
Clearing the logger memory	158
Connected to logger (type of connection)	118

D

Data filter	168
Data preservation	182
Data window	155
Default settings	177
Determining the cell constant	127

E

Exporting data	170
----------------------	-----

F

Fields of application	102
Filtering of data	168
Firmware version	175
Flashing of the logger	153

L

Logging job	
Checklist	140
Overview of the settings	150
Setting parameters	141
Automatic time adjustment	142
Interval	141
Measured value ID	141

Measuring mode	142
Start	141
Stop	141
Start	144
Logging job setting routine	147
Logging jobs	
Erase	158
Viewing	156

M

Measuring directly	139
--------------------------	-----

Q

Query	166
-------------	-----

R

Reading in of measured values	154
Recording	141
Reset	177

S

Showing a logging job as a diagram	158
Size of the database	174
Starting the logging job	144
System messages	185

T

TDS factor	142
Temperature coefficient	142
Time adjustment	142
Trouble shooting	185

W

What to do if...	185
Working with the database (type of connection)	
118	



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