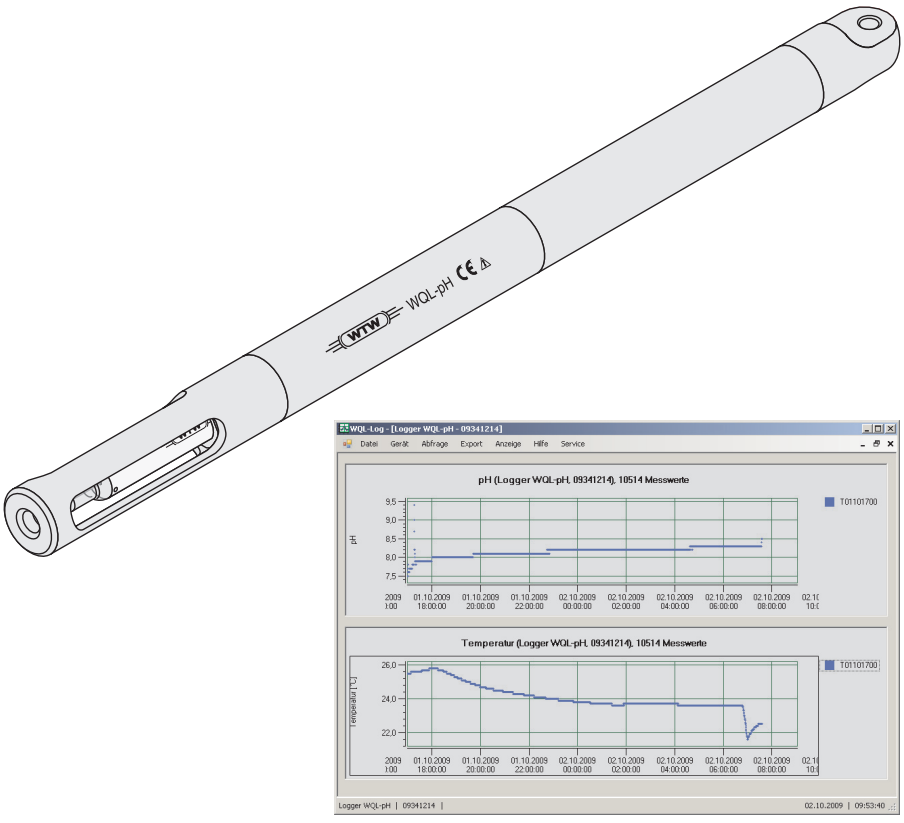
Operating manual

pH Logger WQL-pH
PC Program WQL-Log



pH logger and PC program to display and evaluate measurement data from the logger

ba75821de01 10/2009

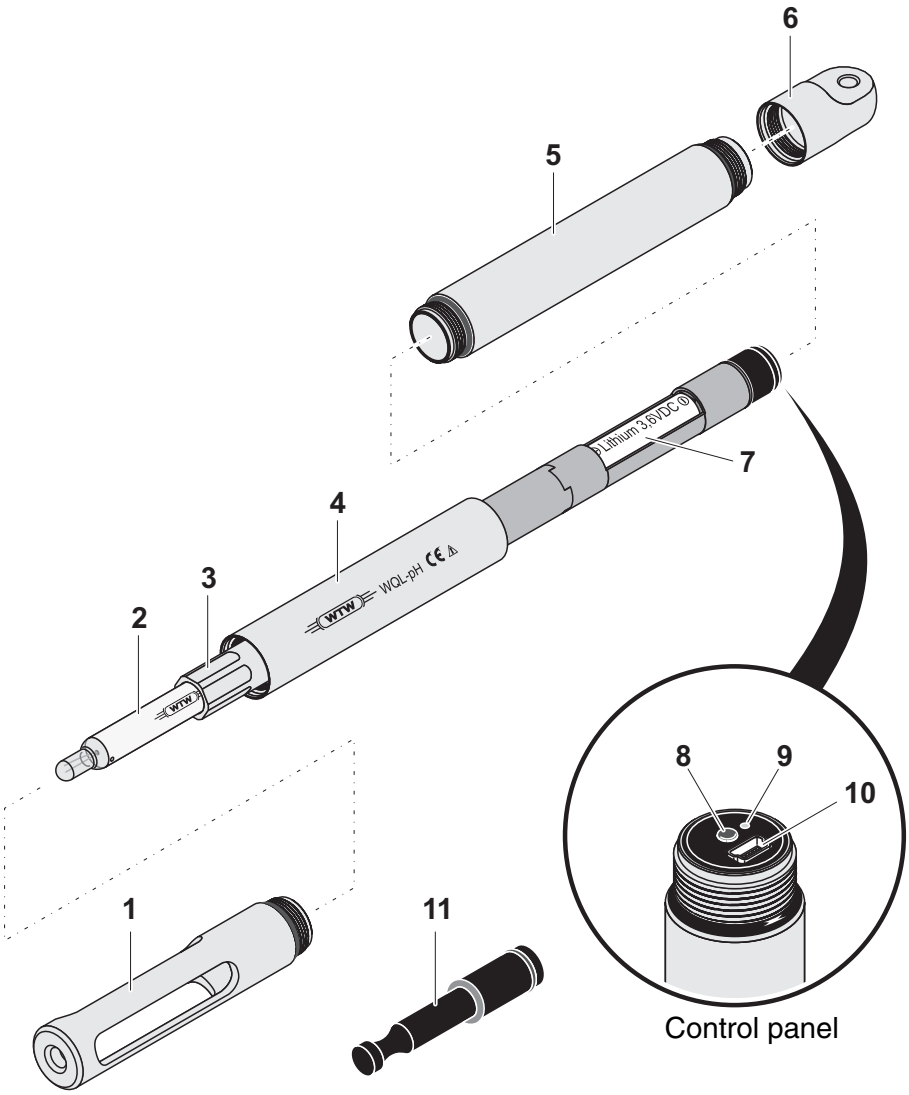
Note
The latest version of the present operating manual can be found on the Internet under www.WTW.com.

Contents

1 Overview

1.1 Logger WQL-pH

Structure of the logger



1	Protective hood
2	Electrode
3	Coupling ring
4	Shaft
5	Sleeve
6	Cap
7	Battery compartment with battery
8	Key button
9	Signal LED
10	USB socket
11	Blind plug

Recommended fields of application

pH measurements in wells, bore holes, rivers, water bodies and other surface water, drinking 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 electrode
- 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 is available on the Internet on the site of the manufacturer of your device.

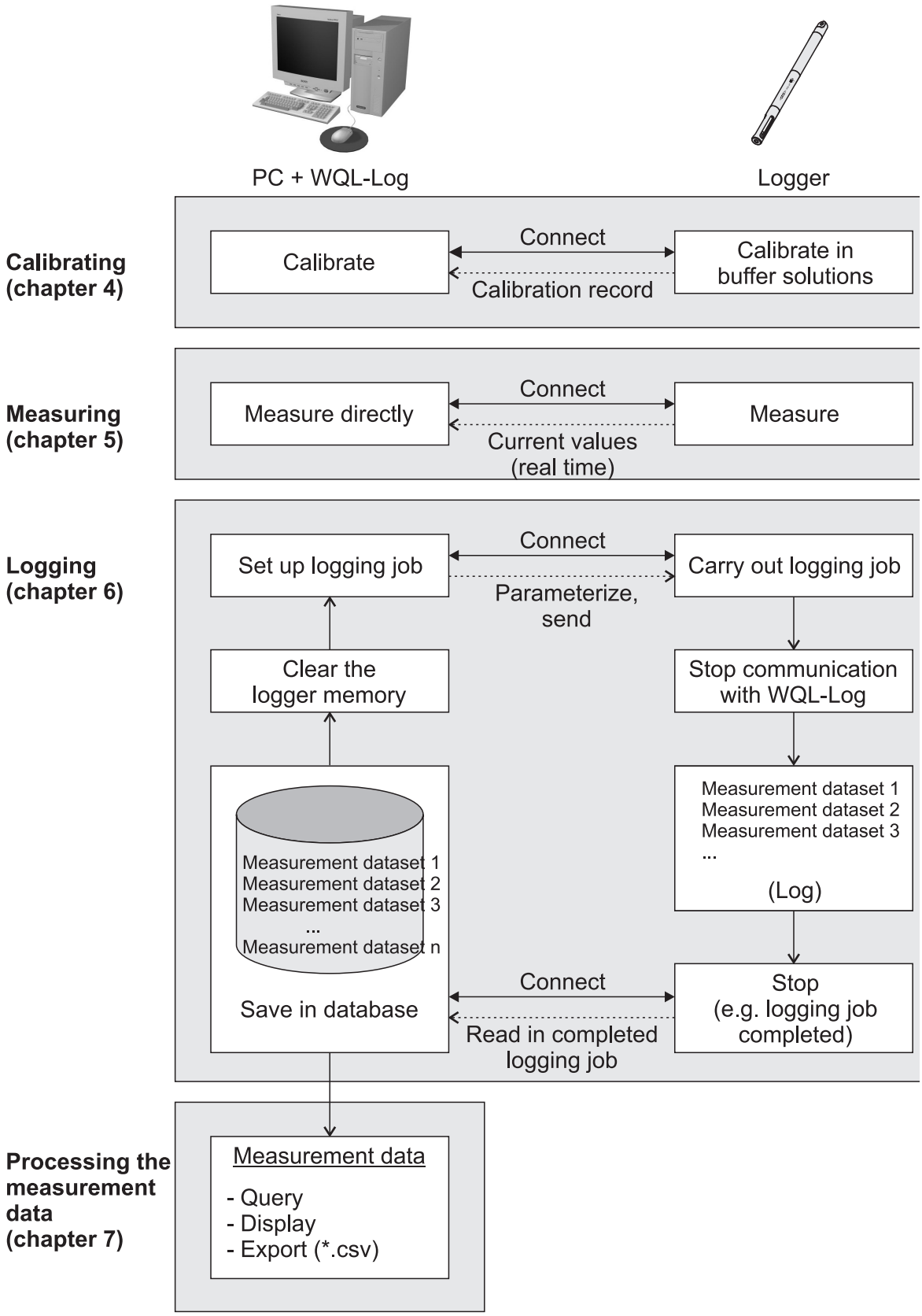


Fig. 1-1 Overview of the communication of the logger and PC program

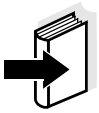
2 Safety

This component operating manual provides 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.



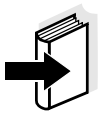
Note
indicates cross-references to other documents, e.g. application reports, operating manuals of electrodes, etc.

3 Commissioning

3.1 Preparing the logger

3.1.1 General information on the installation of the battery and electrode

- 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 get a better grip on the parts.
- Install the battery and electrode in a clean and preferably dry environment. Moisture in the screw joint can affect the functioning of the logger.



Note
Please follow additionally the notes on commissioning in the operating manual of the electrode.

3.1.2 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 13 TECHNICAL DATAWQL-Log). Other batteries of the same size such as alkaline manganese batteries do not provide the required operational voltage.
Operating time, see section 11.4 BATTERY.

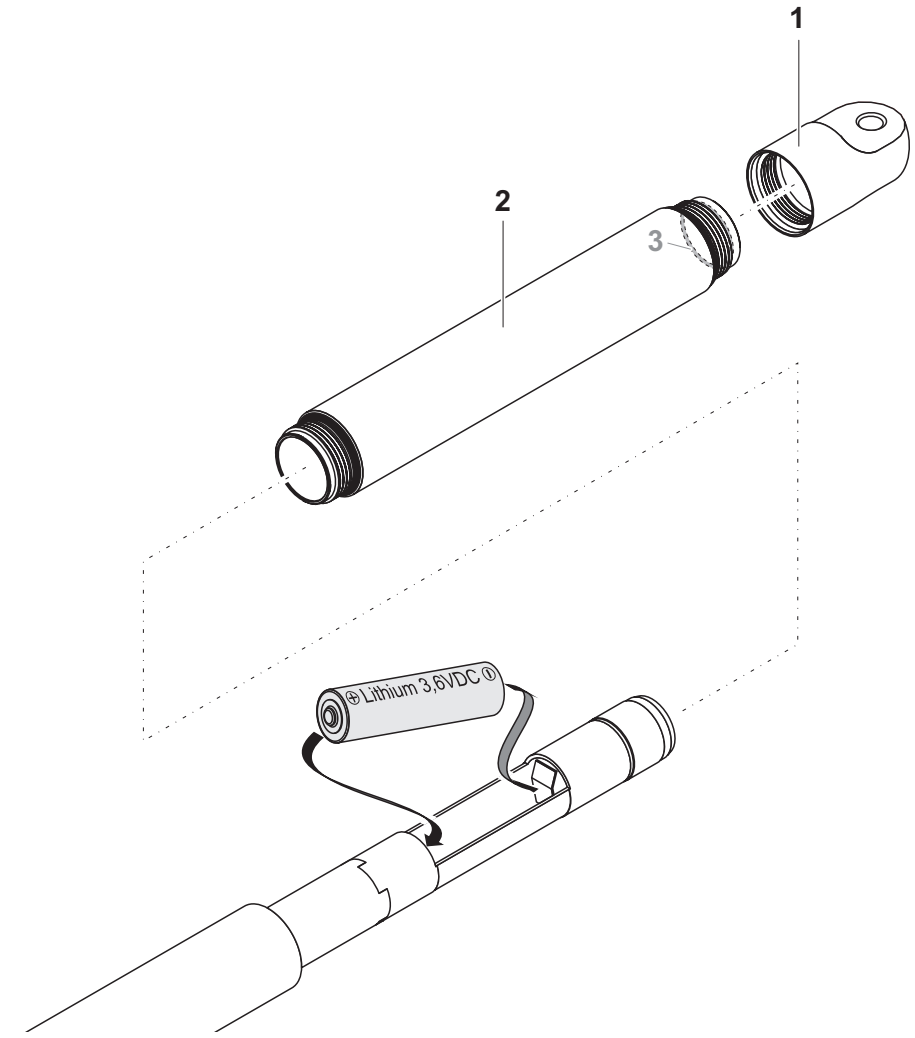


Fig. 3-1 Inserting the battery

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 shorter 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 has been inserted the signal LED flashes once per second. This means the logger has to be connected with the PC to set the date and time (see section 7.3 SETTING THE PARAMETERS AND STARTING THE LOGGING JOB and section 7.4 SIGNAL LED TO INDICATE THE OPERATING CONDITIONS OF THE LOGGER).

3.1.3 Installing the electrode

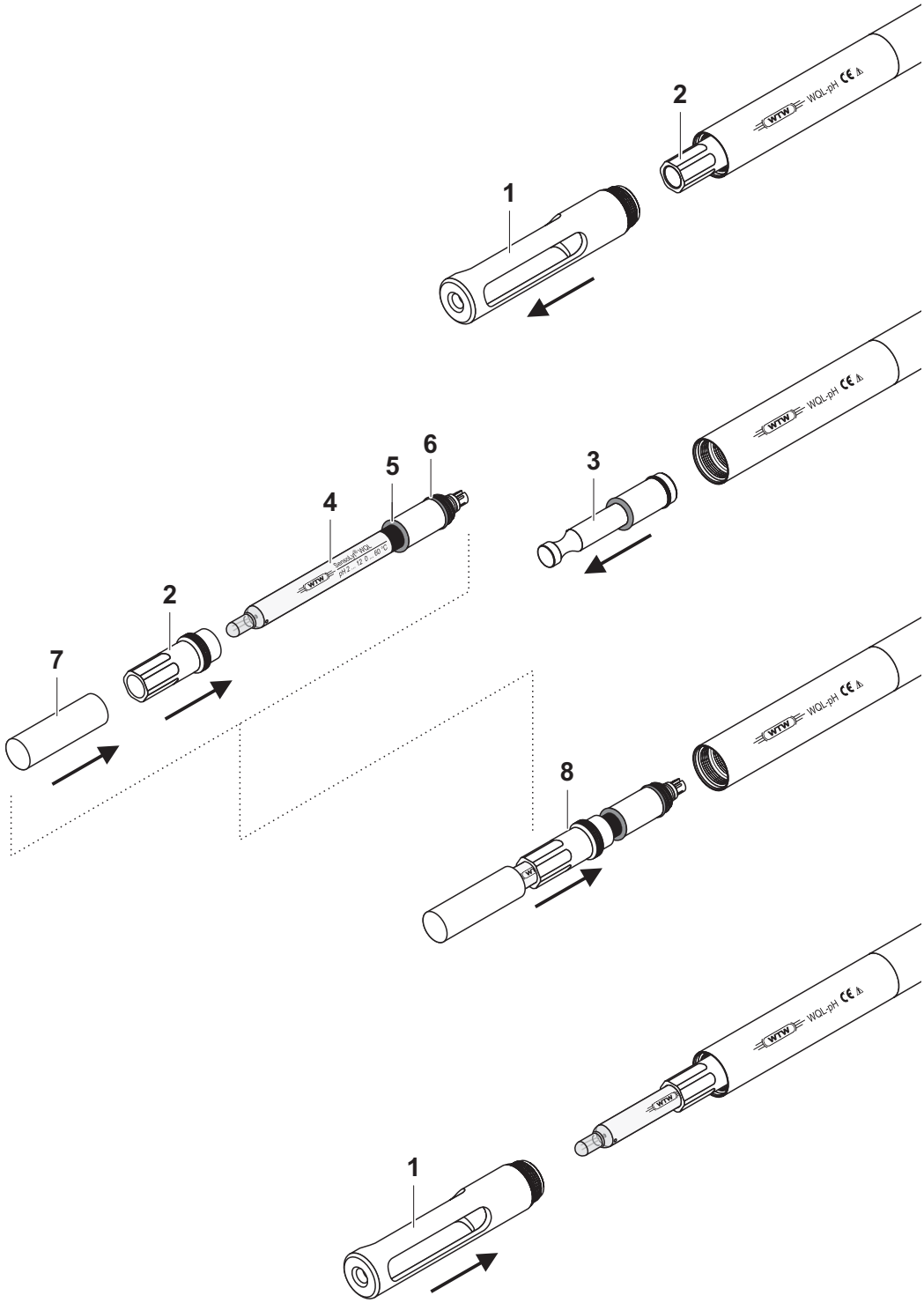


Fig. 3-2 Installing the electrode

1	Unscrew the protective hood (pos. 1 in Fig. 3-2).
2	Unscrew the coupling ring (pos. 2).

3	Pull out the blind plug (pos. 3).
4	Prepare the electrode (pos. 4): – Make sure that both O-rings (pos. 5 and 6) are mounted, clean and dry. – Remove the watering cap (pos. 7) and dab dry the shaft of the electrode with a clean paper towel. – Position the coupling ring (pos. 2) on the shaft of the electrode. – Plug on the watering cap (pos. 7) to protect the electrode for the time of the installation.
5	Insert the thus prepared electrode (pos. 8) in the electrode receptacle: – Position the electrode at the opening and, against the pressure of the air cushion inside, slowly push it in approx. 2 cm, until the air escapes and the counter pressure is noticeably reduced. – Then push in the electrode as far as it will go and turn it until the electrical plug connection locks in place using light pressure. The electrode is completely inserted when it cannot be turned any more.
6	Screw on the coupling ring (pos. 2) by hand to the limit.
7	For calibrating and measuring remove the watering cap.
8	Screw on the protective hood (pos. 1 in Fig. 3-2).

Note
The protection hood can be screwed on for transport or storage even if the watering cap is plugged on. Please follow the notes on the storage of the electrode in the operating manual of the electrode.

3.1.4 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.

3.2 Installing the WQL-Log program

3.2.1 PC requirements

The WQL-Log PC 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
- One free USB interface for each measuring instrument to be connected.

Software requirements

- 32-bit-operating system Windows 2000 Service Pack 4, Windows 7, Windows Server 2003 and higher, Windows Vista or Windows XP

3.2.2 Installation routine

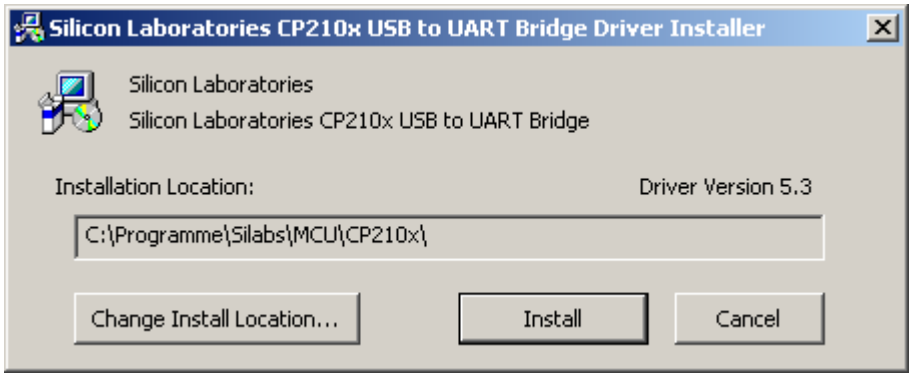
Note
The software is subject to continuous development. The current version of the WQL-Log program is available for download on the Internet under http://www.WTW.com.

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 pH logger and the PC program.

Installing the driver

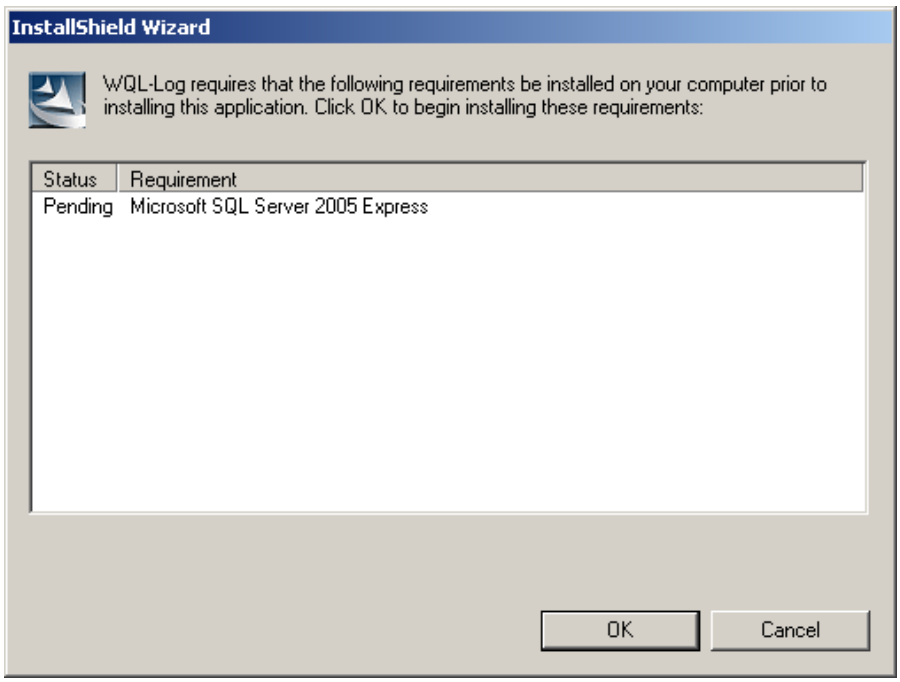
1	Insert the enclosed CD-Rom in the corresponding disk drive of the PC.
2	Open the directory, USB_VCP_driver.
3	Execute the file, CP210xVCPInstaller with a double click.



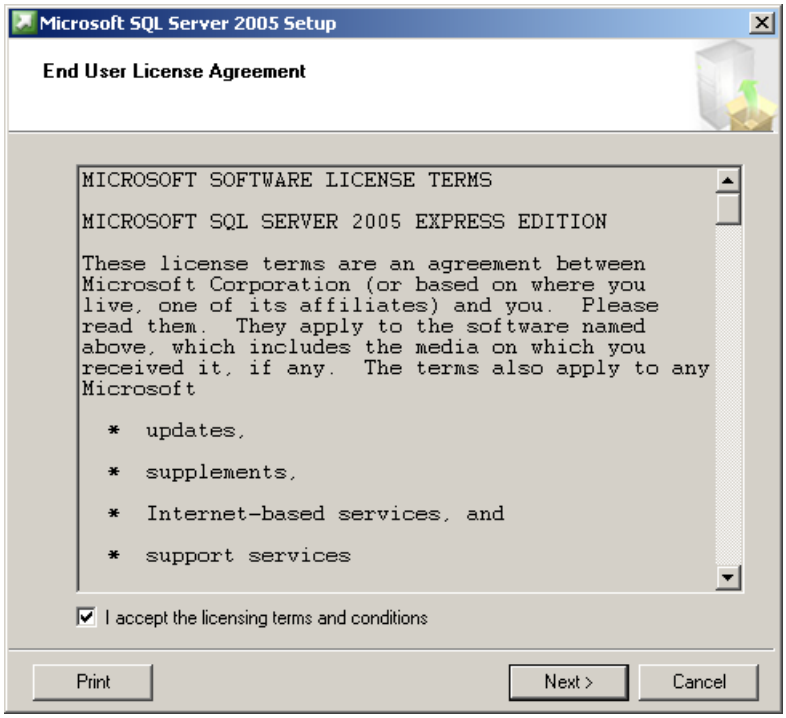
4	Follow the user guidance (click *Install*).
5	Confirm the installation with *OK*. A virtual COM Port has been created with the installation.

Installing the PC program and database server

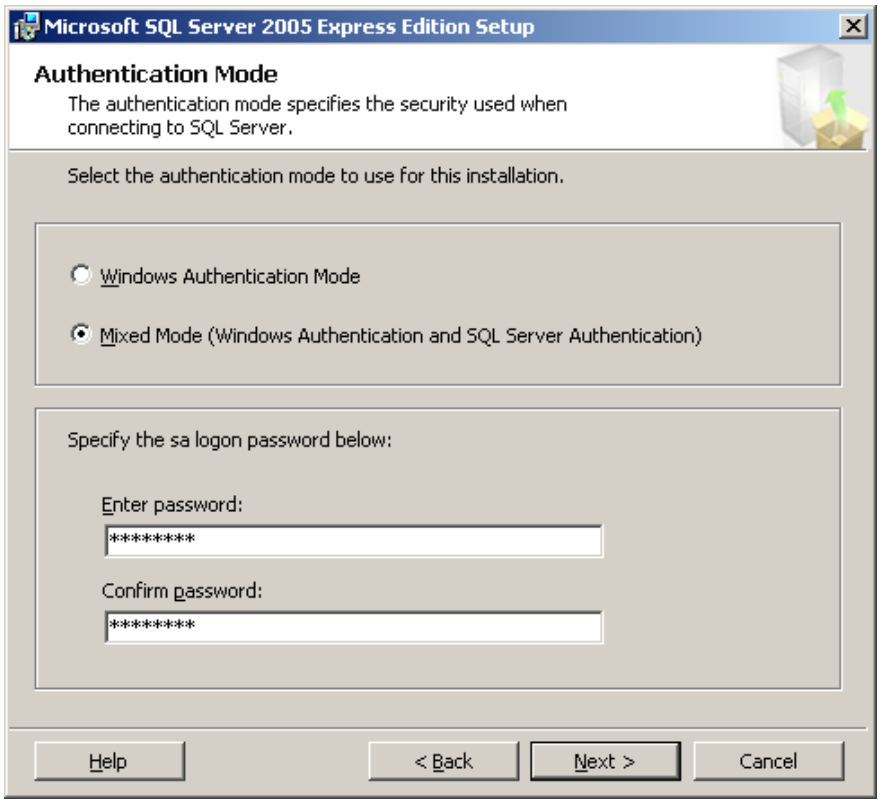
6	Execute the WQLLog_Vxxxx.exe file with a double click (xxxx = current version number). The installation wizard appears.



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



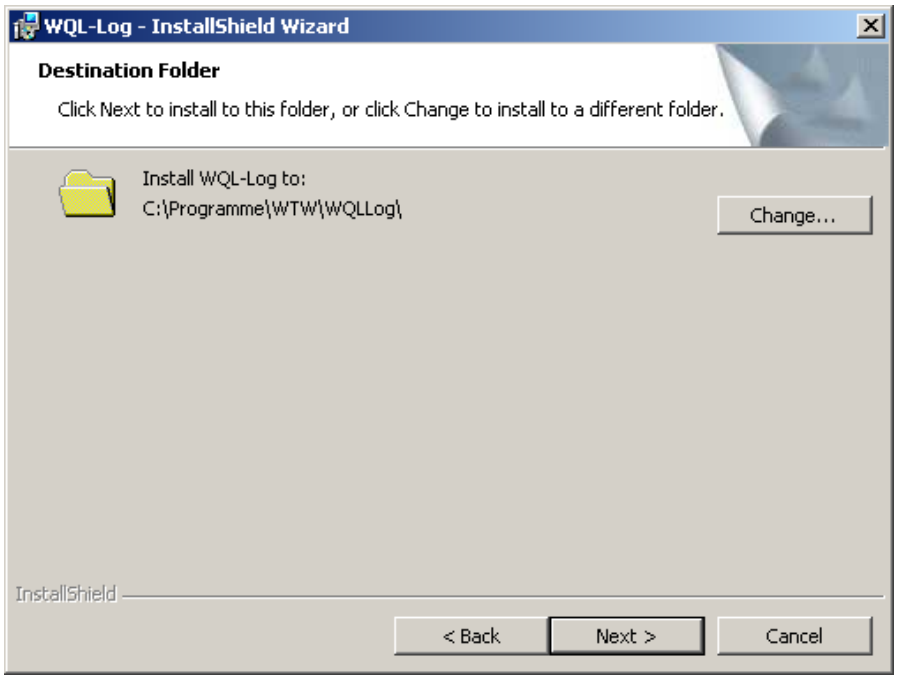
8	Check off the checkbox, *I accept the licensing terms and conditions*.
9	Click *Next*. An information window appears with the components required for the installation.
10	Click *Install*. The installation is carried out. Follow the user guidance (click *Next*) until the *Authentication Mode* window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



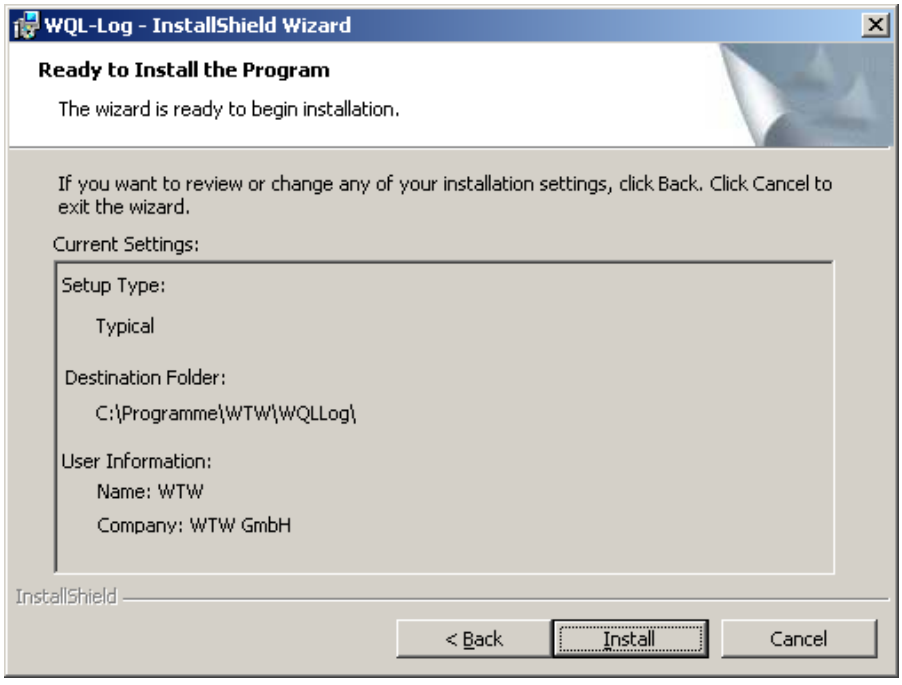
11	Select the *Mixed Mode* option.
12	In the *Enter password* field, enter the password (WTW!2009).
13	Repeat the password entry (WTW!2009) in the *Confirm password* field.

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.

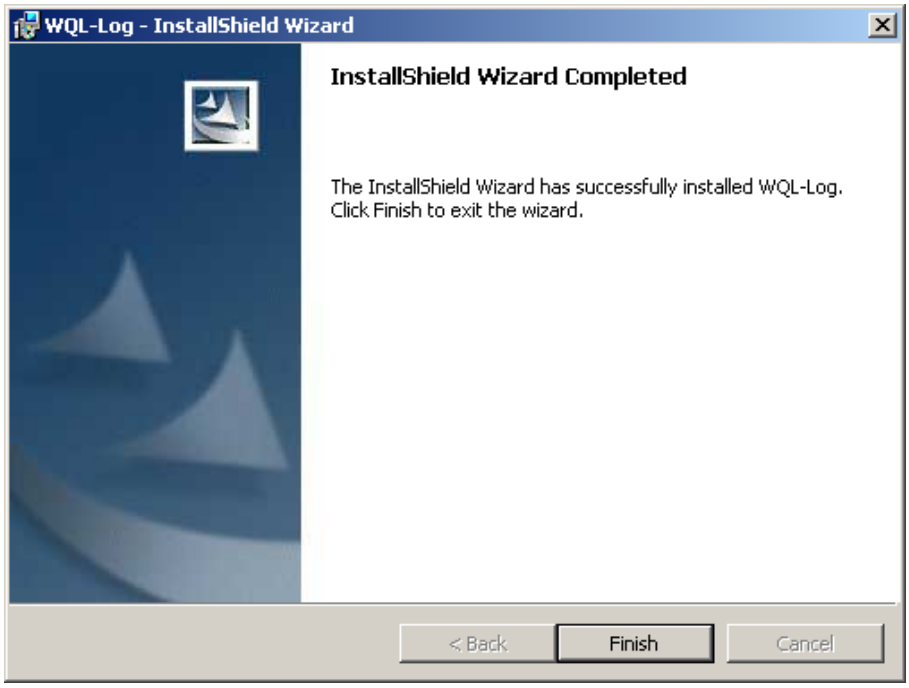
14	Click *Next*. Then follow the user guidance (the default settings should not be changed) until the following display appears:



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



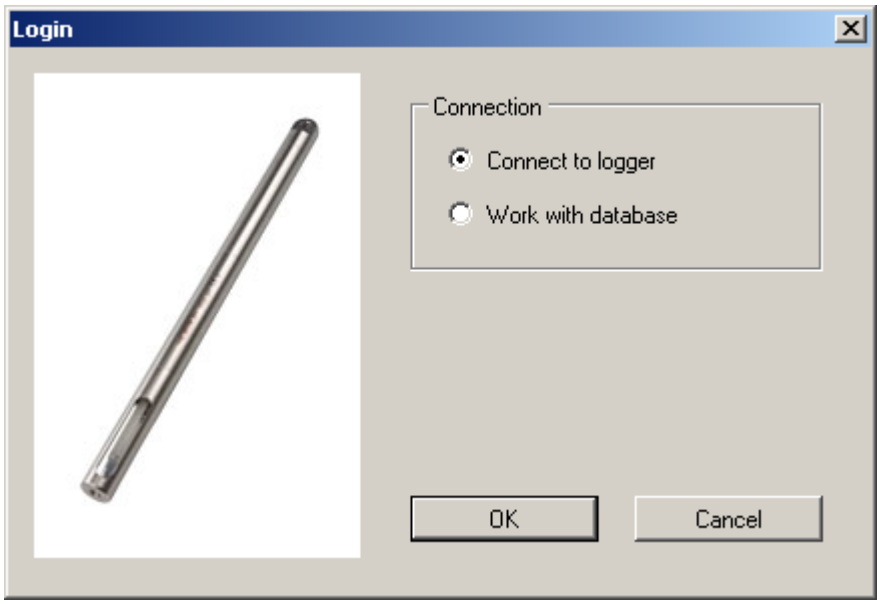
16	Here you find information on the installation. Click *Install*.



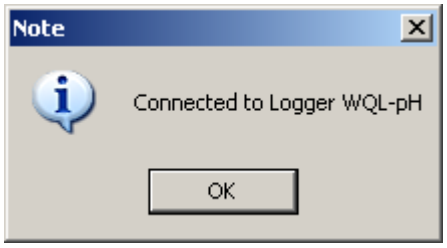
17	Click *Finish* to complete the installation.

3.3 Initial commissioning

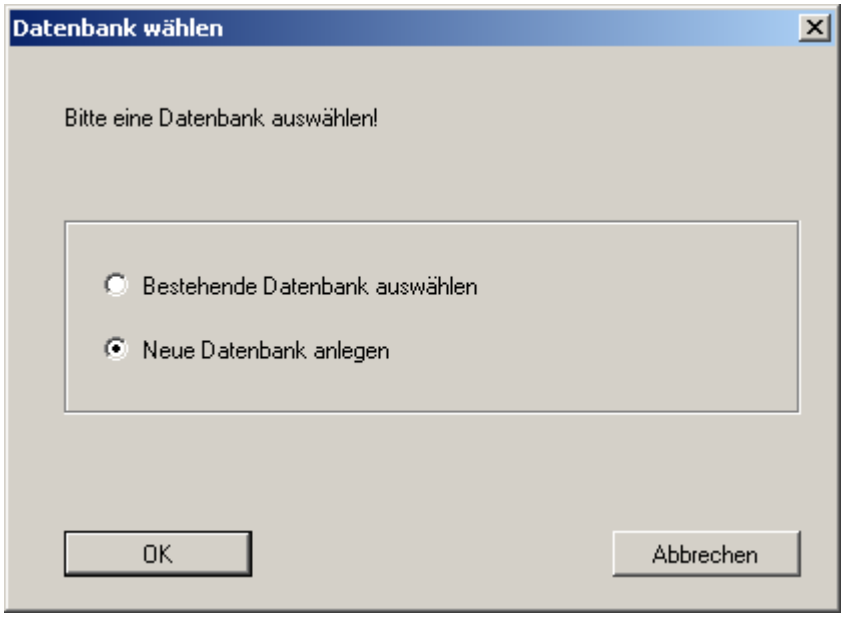
1	Start the WQL-Log program (the relevant icon is on the desktop). The *Login* window appears.



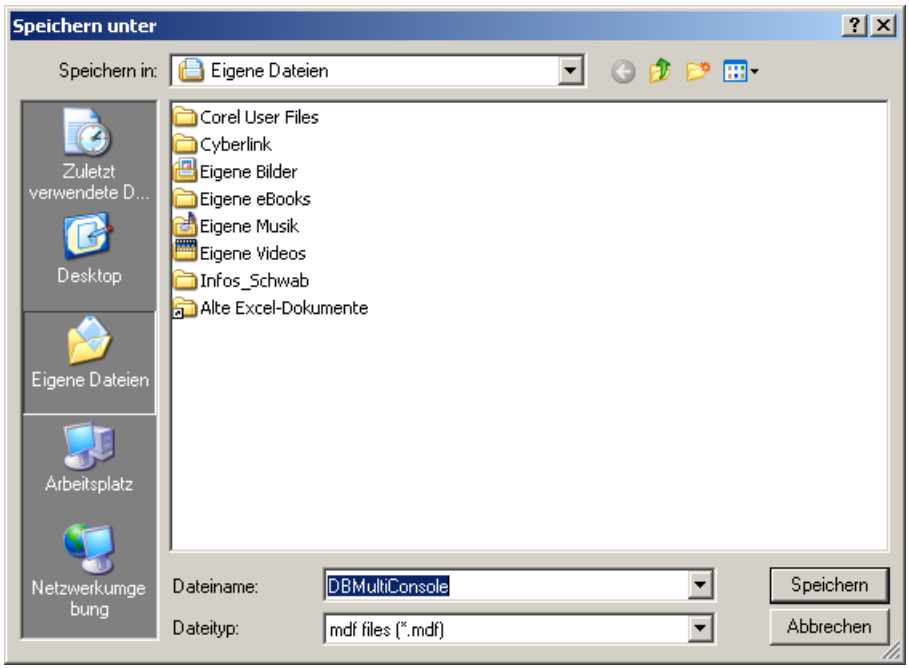
2	If the WQL-pH logger is connected to the PC via a USB cable and should communicate with the WQL-Log PC program: Confirm with OK. The WQL-Log program searches for the connection with the logger.



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



4	Confirm the option, *Neue Datenbank anlegen* (*Create new database)* with *OK*. The window to save the newly created database appears.



5	Change the location and name of the database as necessary. Click *Speichern (Save)*. The database is stored and the message, *Datenbank erfolgreich angelegt* (*Database was successfully created)* appears.
6	Confirm with *OK*. A restart message appears:

7	Confirm with *OK*. The program is terminated.

Note

If the database cannot be created in the preselected directory (error message, "Access denied"), select the following directory as the location:

(Windows program directory)\Microsoft SQL Server\ MSSQL.1\MSSQL\Data

Example:

C:\Programs\Microsoft SQL Server\MSSQL.1\MSSQL\Data

If you are in any doubt contact your system administrator.

3.4 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 the database and to change the system settings.

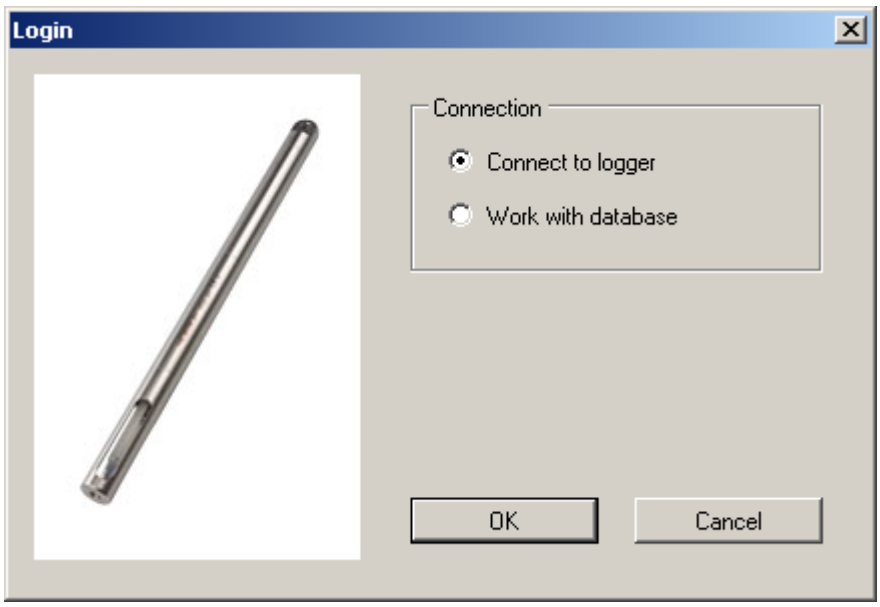
Connected to the logger

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 are read in to the database and are thus available for processing.

You can parameterize 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.

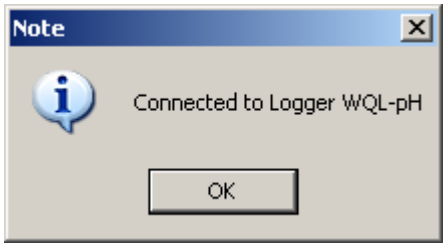
3.5 Starting the WQL-Log program

1	Start the WQL-Log program. The *Login* window appears.

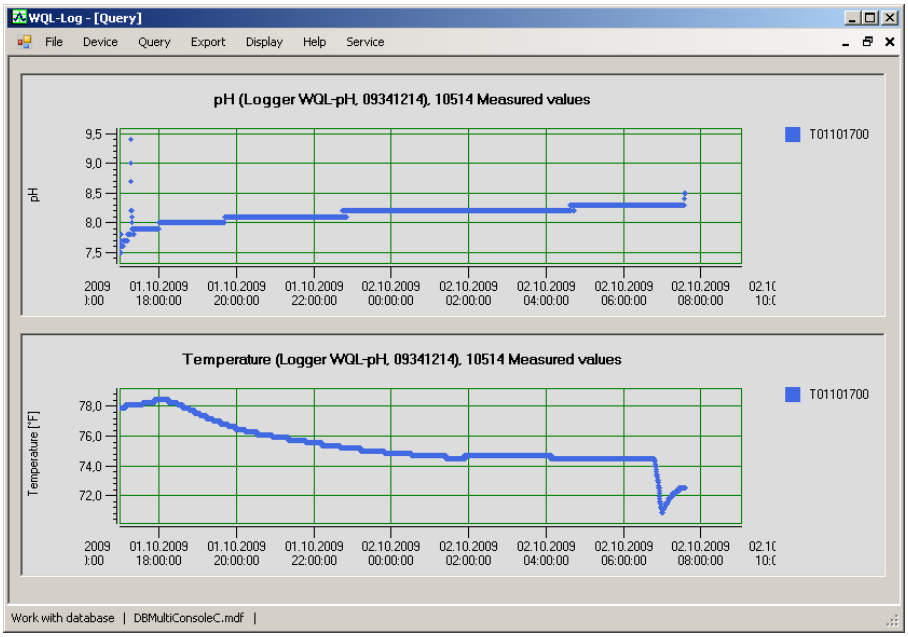


Connection to logger

2	If the WQL-pH 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.

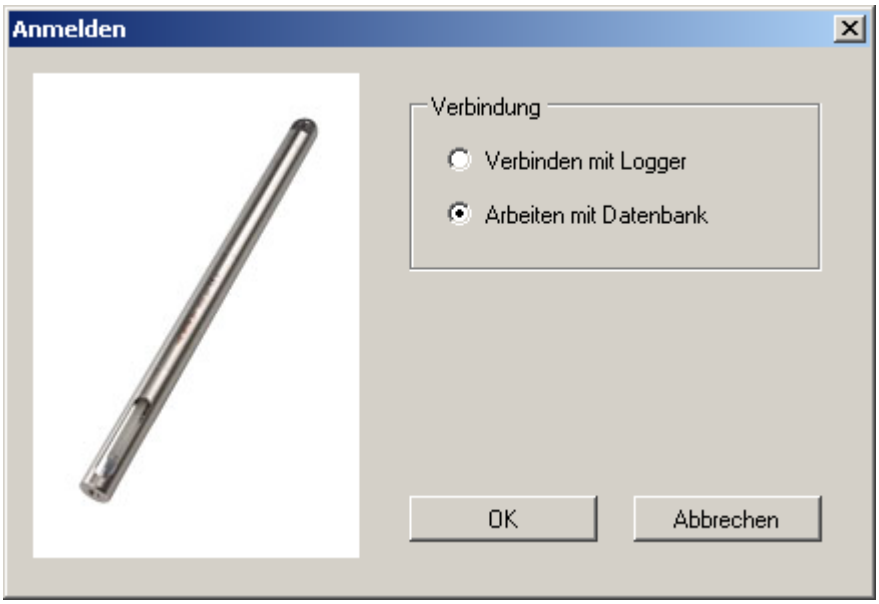


3	Confirm with OK. The data window appears. During the initial commissioning it does not yet contain data to be graphically displayed.



4	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 it does not yet contain any data).

Working with the database

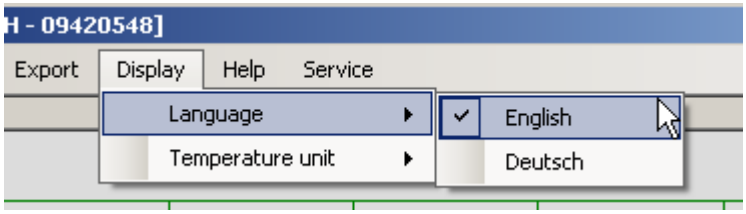


4 Setting the display (language etc.)

With the *Display* menu can set the language and temperature unit for the WQL-Log PC program and the WQL-pH logger.

4.1 Setting the language

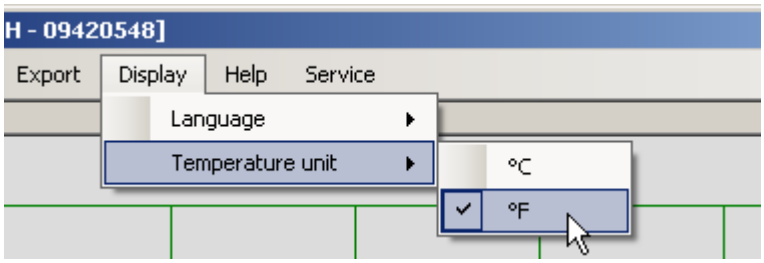
1	In the *Display* menu, select the menu item, *Language*.
2	The options *Deutsch (German) and Englisch (English)* appear.



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.

5 Calibrating for pH measurements

Why calibrate?

During the operation of a pH electrode, the slope and asymmetry of the electrode change with time. Calibrating determines the current slope and asymmetry (zero point) of the electrode and stores them in the logger.

When to calibrate?

Always calibrate:

- During the initial commissioning
- Before starting a logging job
- After installing another electrode

Calibration procedure, *AutoCal* :

AutoCal

is a fully automatic single-point or two-point calibration using the datasets for buffer solutions selected in the *Buffer sets* menu.
The buffer solutions are automatically recognized. Depending on the setting (see page 116), the PC program displays the relevant nominal buffer value or the current electrode voltage in mV. The calibration can be terminated after the first buffer solution. This corresponds to a single-point calibration. For this, the instrument uses the Nernst slope (-59.2 mV/pH at 25 °C) and determines the asymmetry of the electrode.

AutoRead

When calibrating with AutoCal, the AutoRead function is automatically activated. The AutoRead function checks the stability of the measured pH and 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).

Note
In the delivery condition, the WQL-pH logger is equipped with default calibration values (see chapter 10 RESETTING THE LOGGER). To achieve accurate measured values it is essential to calibrate with the electrode before logging.

5.1 Buffer sets

You can use the buffer sets quoted in the table for an automatic calibration. The pH values are valid for the specified temperature values. The temperature dependence of the pH values is taken into account during the calibration.

Buffer set	Menu designation	pH values	at temp.
WTW technical buffer solutions	*TEC*	2.00 4.01 7.00 10.01*	25 °C
Standard buffer solutions according to DIN 19266	*NIST/DIN*	1.679 4.006 6.865 9.180 12.454	25 °C

The TEC calibration for pH 10.01 is optimized for the WTW technical buffer solution TEP 10 Trace or TPL 10 Trace. Other buffer solutions can lead to an erroneous calibration. The correct buffer solutions are given in the WTW catalog or on the Internet.

5.2 Calibration settings

Buffer sets

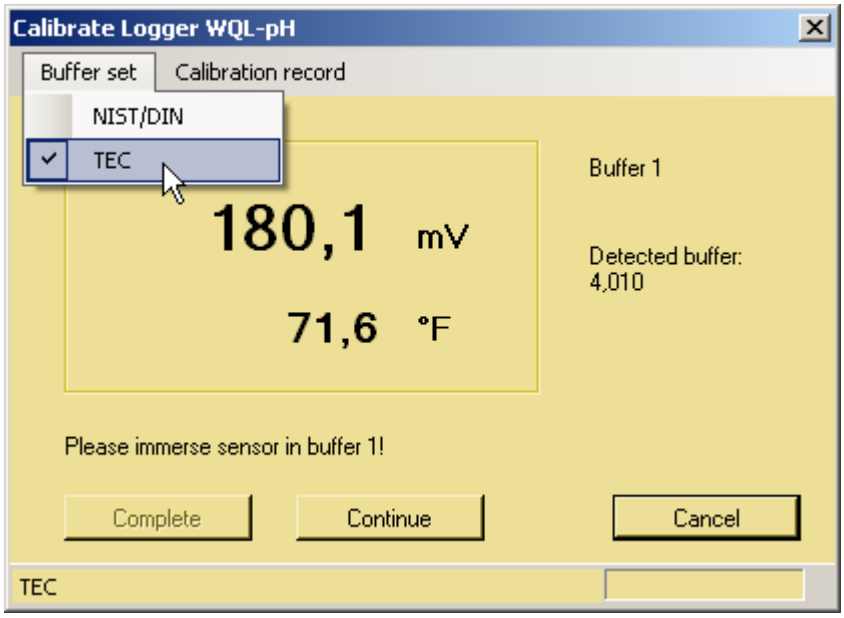
The following buffer sets can be selected:

- *NIST/DIN*
- *TEC*

1	In the *Device* menu, select the menu item, *Calibrate*.
2	The calibration window appears.

Selecting the buffer dataset

You can select the buffer dataset NIST/DIN or TEC.



3	In the *Buffer set* menu, select and confirm the required buffer set with a mouse click. The selected setting is immediately active.

Note

During calibration and direct measurement make sure that neither the calibration or measurement solution nor the logger shaft are electrically grounded (e.g. with a metal stand). Otherwise, this could result in erroneous values.

5.3 Calibrating with AutoCal

Note
Always check the selected buffer set before calibrating.
From the respective buffer set you can use any 2 buffers in any order.

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

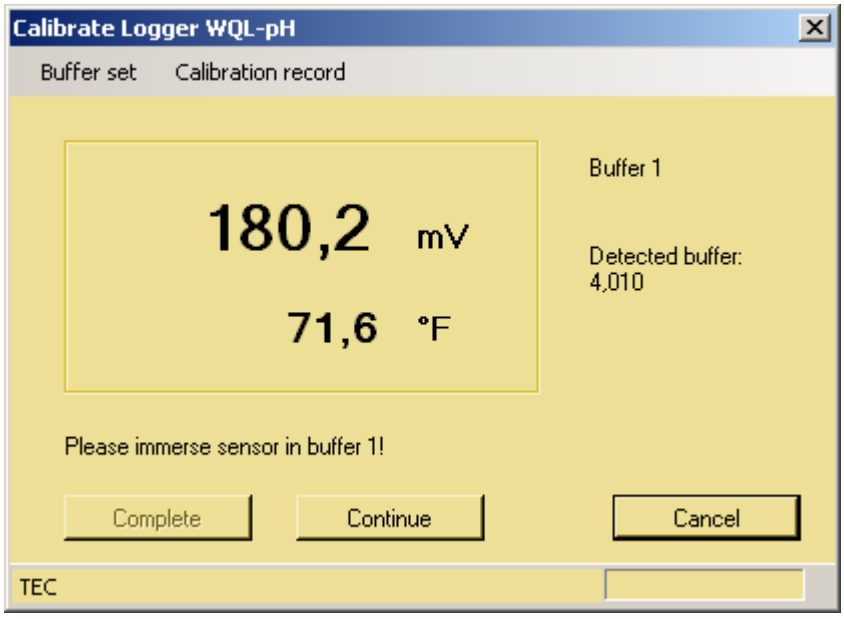
Preparatory activities

1	Connect the WQL-pH logger (with installed electrode) to a USB interface of your PC via the USB cable.
2	Keep the buffer solutions ready.
3	In the *Device* menu, select the menu item, *Calibrate*. The calibration window appears.

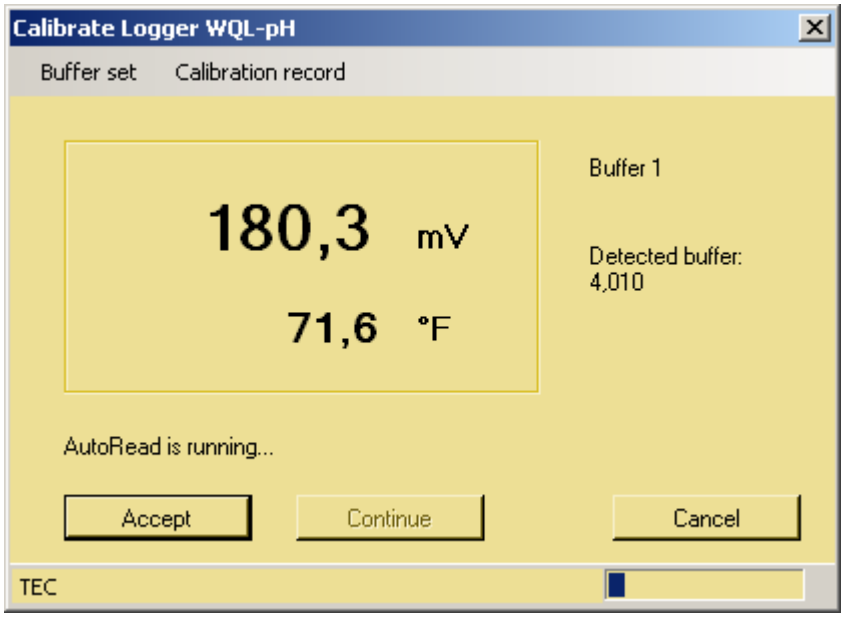
The following example covers the AutoCal calibration using WTW technical buffer solutions.

Calibration

4	Immerse the logger (with the electrode installed) in the first buffer solution.

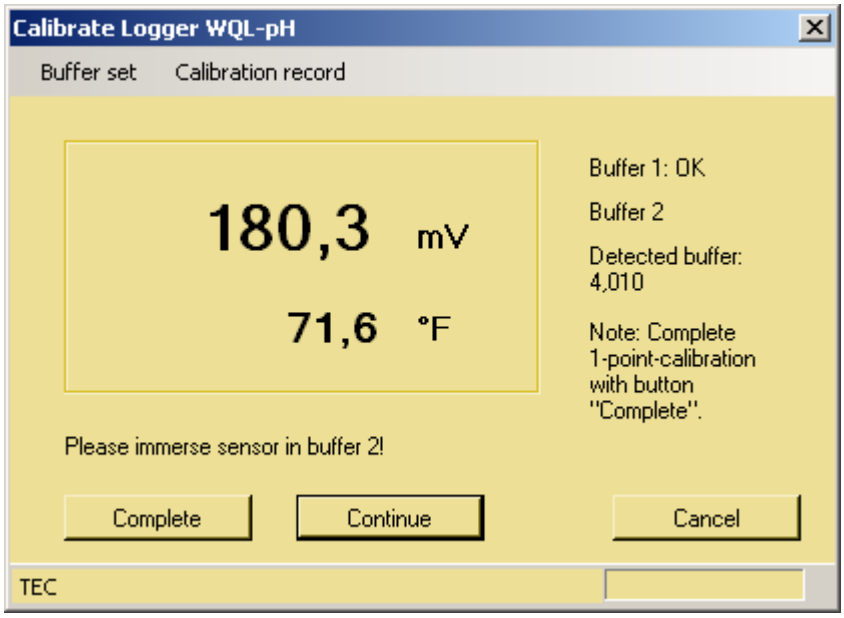


5	Use the *Continue* button to start the measurement.



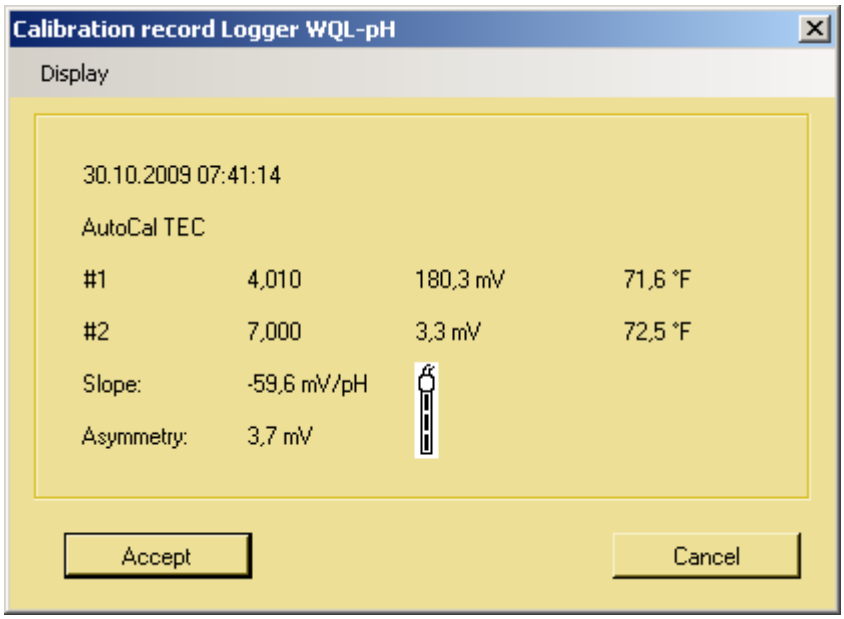
6	The *AutoRead running...* note appears and the electrode voltage U (mV) and temperature are displayed. The prompt for buffer 2 appears as soon as a stable value is recognized.

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	If you want to carry out a single-point calibration: Press *Complete*. This completes the single-point calibration; the calibration record is displayed (with the Nernst slope of -59.2 mV/pH at 25 °C). Or continue with the two-point calibration:
8	Thoroughly rinse the logger and electrode with deionized water.
9	Immerse the logger in the second buffer solution.
10	Start the measurement with *Continue*. The *AutoRead running...* note appears and the electrode voltage U (mV) and temperature are displayed. The calibration record with the value of the slope (mV/pH) and the value of the asymmetry (mV) is displayed as soon as a stable value is recognized.

Calibration record



11	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 line is determined by linear regression.

Note
You can view the calibration records at any time (see section 5.4 VIEWING THE CALIBRATION RECORDS).

Calibration evaluation

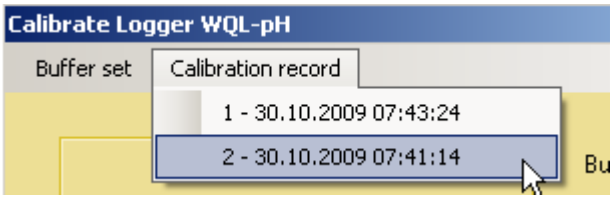
After calibrating, the current system condition is evaluated. The asymmetry and slope are evaluated separately. The probe symbol shows the worse case evaluation of both.

Display	Asymmetry [mV]	Slope [mV/pH]
	-15 ... +15	-60.5 ... -58
	-20 ... +20	-58 ... -57
	-25 ... +25	-61 ... -60.5 or -57 ... -56
 Clean the electrode according to the electrode operating manual	-30 ... +30	-62 ... -61 or -56 ... -50

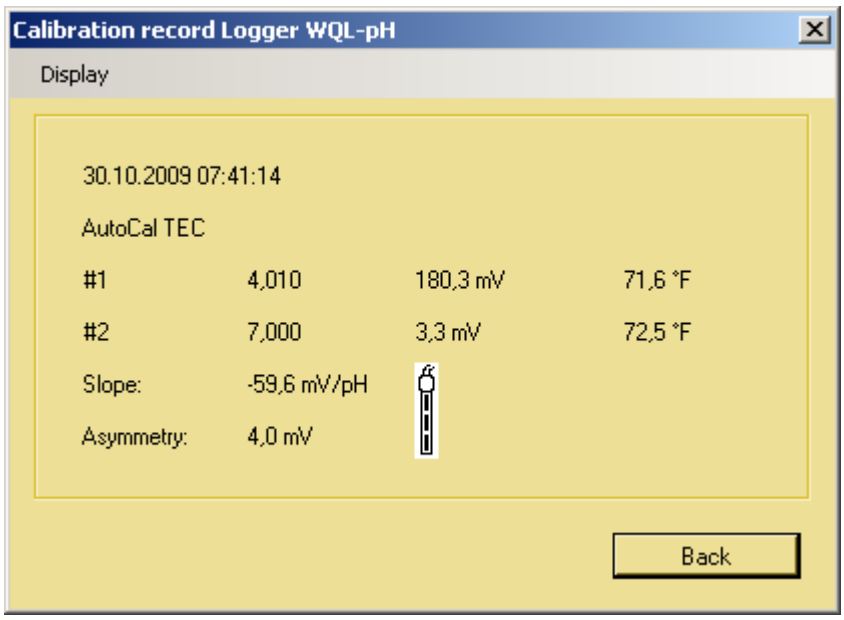
5.4 Viewing the calibration records

The last 10 calibration records are stored in the PC program and can be recalled. Proceed as follows:

1	In the *Device* menu, select the menu item, *Calibrate*.
2	The calibration window appears.
3	Click the menu item, *Calibration record*. A list with the existing calibration records appears.



4	Click the required record. The record is displayed.



5	Return to the calibration window with *Back*.

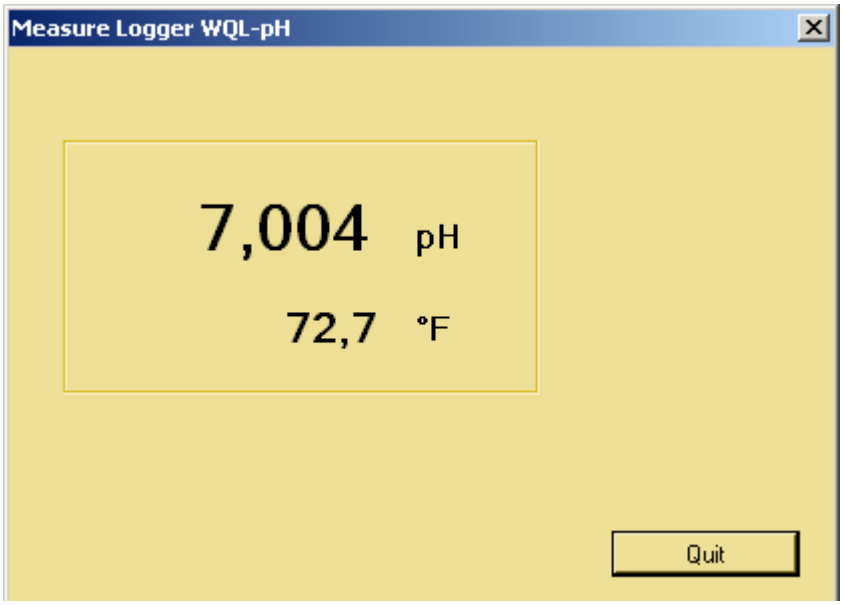
6 Measuring directly

In conjunction with the pH logger, the WQL-Log PC program can directly measure and display the pH value or corresponding electrode voltage of a solution. The directly measured values are not stored in the logger.

Note
During calibration and direct measurement make sure that neither the calibration or measurement solution nor the logger shaft are electrically grounded (e.g. with a metal stand). Otherwise, this could result in erroneous values.

Proceed as follows when you want to measure directly:

1	Connect the WQL-pH logger to the PC with the USB cable.
2	In the *Device/Login* menu, connect the logger to the WQL-Log PC program.
3	If there are any logged data, import them with the query (direct measurement is not possible without importing the logged data).
4	In the *Device* menu, click the *Measure* menu item.
5	Immerse the WQL-pH logger (with installed electrode) in the test sample.
6	The measured value window pops up with the pH or mV value (depending on the setting) and the temperature value of the test sample.



7	Terminate the direct measurement with *Quit.*

7 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.

7.1 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 3.5 STARTING THE WQL-LOG PROGRAM).
3	Register the logger (see section CONNECTION TO LOGGER).
4	If there are measured values in the logger, read them in (see chapter 7.5 READING IN DATA).
5	Clear the logger memory (see section 7.6 OVERVIEW OF THE DATA WINDOW).
6	Calibrate the logger with the electrode (see chapter 5 CALIBRATING FOR PH MEASUREMENTS).
7	Set up the logging job and send it (see section 7.3 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 7.4 SIGNAL LED TO INDICATE THE OPERATING CONDITIONS OF THE LOGGER).
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.).

7.2 Setting up a logging job - setting parameters

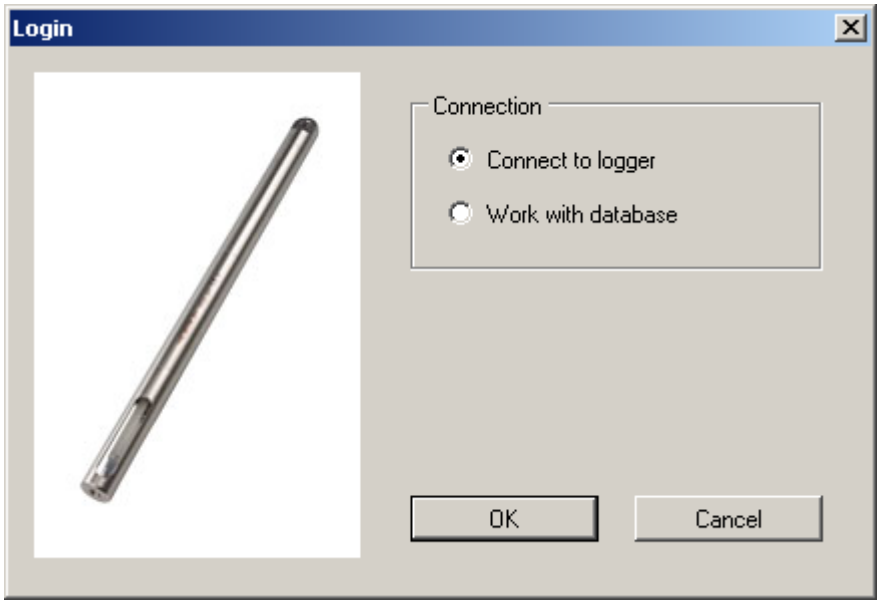
You can set the following parameters for a logging job (i.e. the job to determine and record measured values according to your requirements over a certain period of time):

Tab	Setting	Setting options (default setting in bold)
Recording	Interval	● **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	● 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)
	Stop	● **Time period** (**1 hour** ... 365 days) ● Memory full (the loggers stops logging only when the memory is full, i.e. when 600,000 datasets have been stored)
	Measured value ID	You can assign a measured value ID (consisting of up to 20 alphanumerical characters, no special characters) e.g. the name of the measuring site). Default setting: **default**
pH/mV	Measuring mode	● **pH** ● mV
Time	Automatic time adjustment	● **Yes** (date/time for the logger is automatically synchronized with that of the PC) ● No (date/time for the logger is set manually)

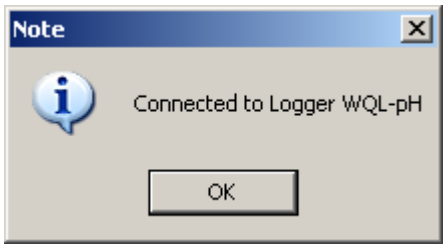
7.3 Setting the parameters and starting the logging job

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

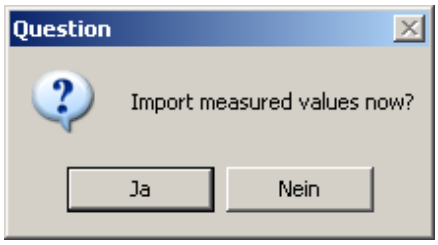
1	Connect the WQL-pH logger to the PC with the USB cable.
2	Start the WQL-Log program. The *Login* window appears.



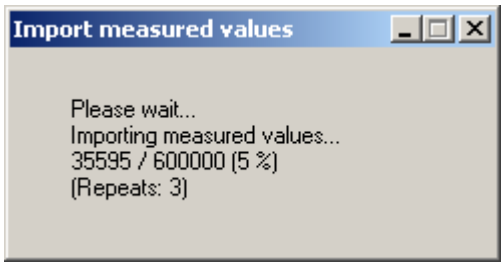
3	Confirm with OK. The WQL-Log program searches for the connection with the logger.



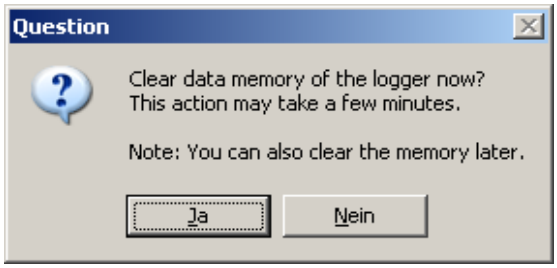
4	Confirm with OK.
5	If the logger contains new data: The prompt to read in the data appears.



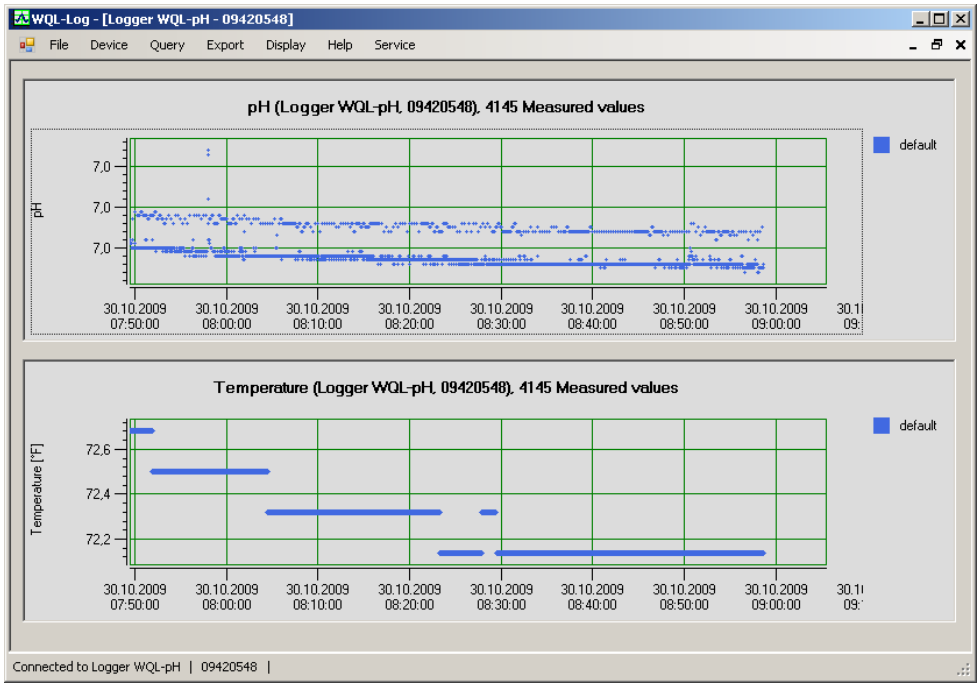
6	Confirm the reading in of the data with *OK*. The reading process can take some time (depending on the number of datasets to be read in).



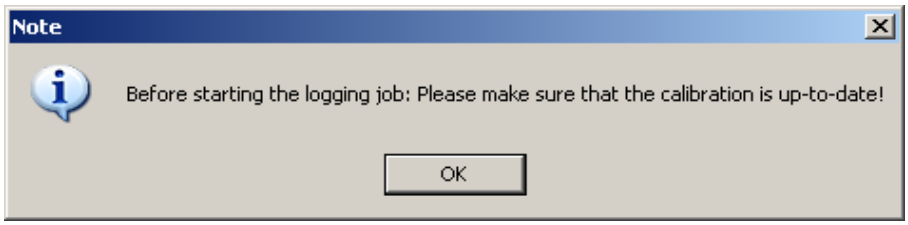
7	When the reading of the measured values is completed, a message appears (confirm with *OK*) and the prompt to erase the measured value memory.



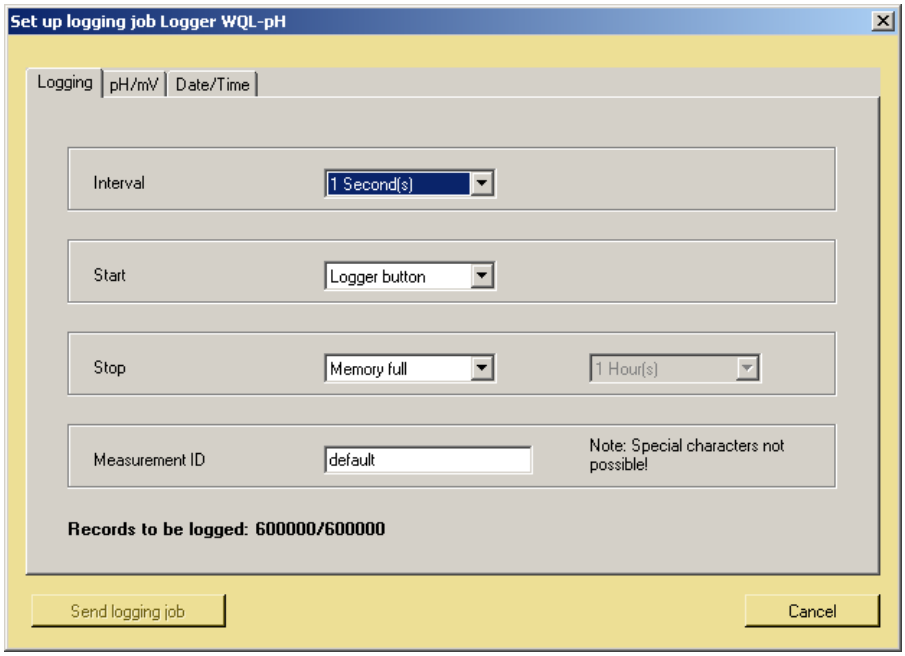
8	Press *OK* or *Cancel*. The data window appears with a graphic of the read-in data, no matter whether or not the data memory was erased.



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



10	Confirm with *OK*. The *Logging* tab appears, the first tab of the window, *Set up logging job*.



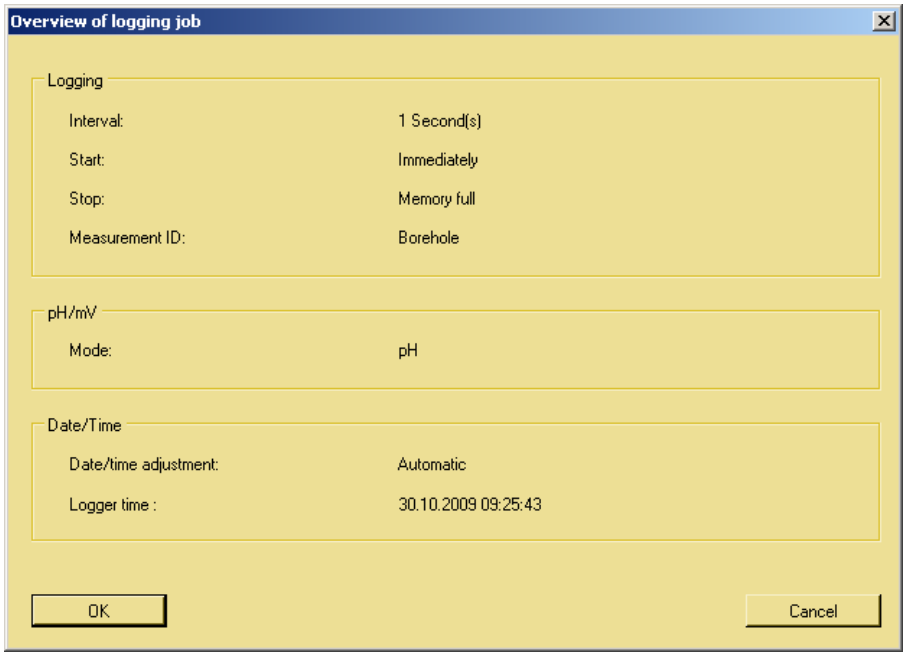
11	*Interval:* To set the logging interval, click the arrow on the right side of the setting field. A drop-down menu appears with the possible intervals. Select the required interval with a mouse click.
12	*Start*: To set the start of the logging, click the arrow on the right side of the setting field. A drop-down menu appears with the starting times. Select the required starting time with a mouse click.
13	*Stop*: 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 *Time period* was selected:
14	To set the time period of the logging, click the arrow on the right side of the second setting field. A drop-down menu appears with the possible time periods. Select the required time period with a mouse click.

15	Enter the measured value ID (up to 20 alphanumerical characters, no special characters).
16	Click the *pH/mV* tab.
17	Select the required mode for the logging, *pH* or *mV*.
18	Click the *Time* tab.
19	Select *Yes* or *No* for the automatic date/time adjustment. If *No* was selected, click the arrows on the right side of the selection fields and set the date and time for the logger.

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

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



22	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.

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.

7.4 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
One short flashing per second	● 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.
Two short flashings, then a pause of 3 seconds	The logger is ready to log and can be started with the logger key button.
A short flashing every 15 seconds	The logging job is running (the logger is logging).

Notes

- The flashing stops after 2 minutes to save energy. Pressing the logger key button starts the flashing for 2 minutes 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).

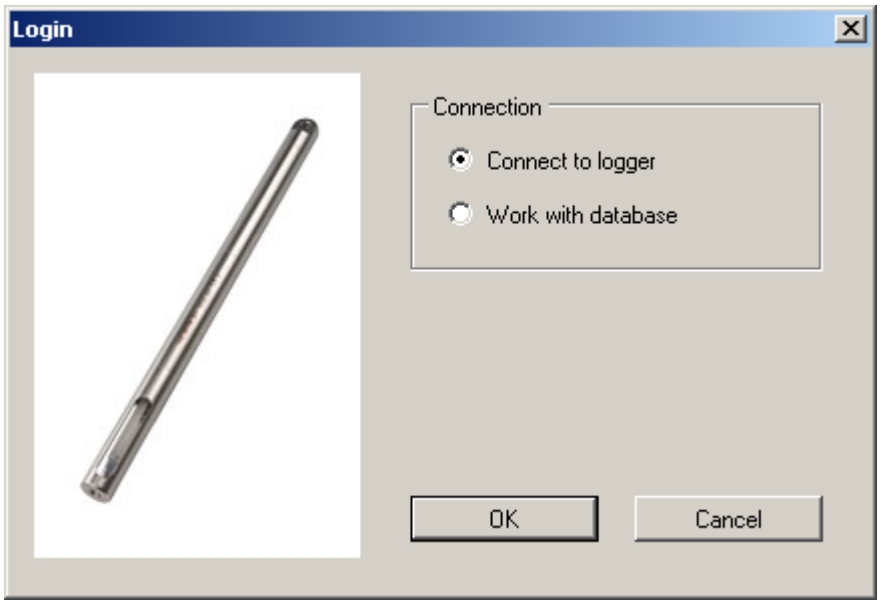
7.5 Reading in data

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

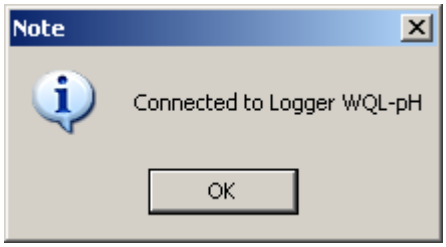
Note
If the logger contains new data, the prompt to read in the data appears automatically when the logger is connected to the PC program. If data stored in the logger are not read in, the logger cannot be connected to the PC program (data protection!).

To read in the data of the logging job, proceed as follows:

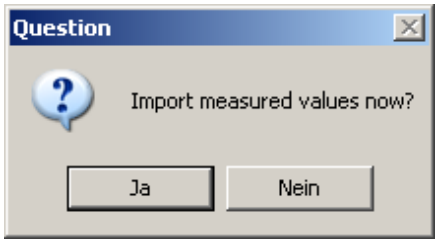
1	Connect the WQL-pH logger to the PC with the USB cable.
2	Start the WQL-Log program. The *Login* window appears.



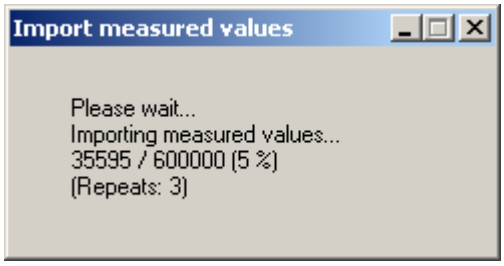
3	Confirm with OK. The WQL-Log program searches for the connection with the logger.



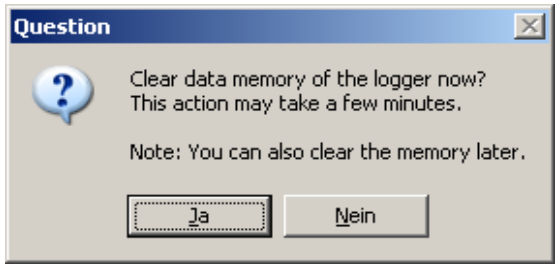
4	Confirm with OK.
5	If the logger contains new data: The prompt to read in the data appears.



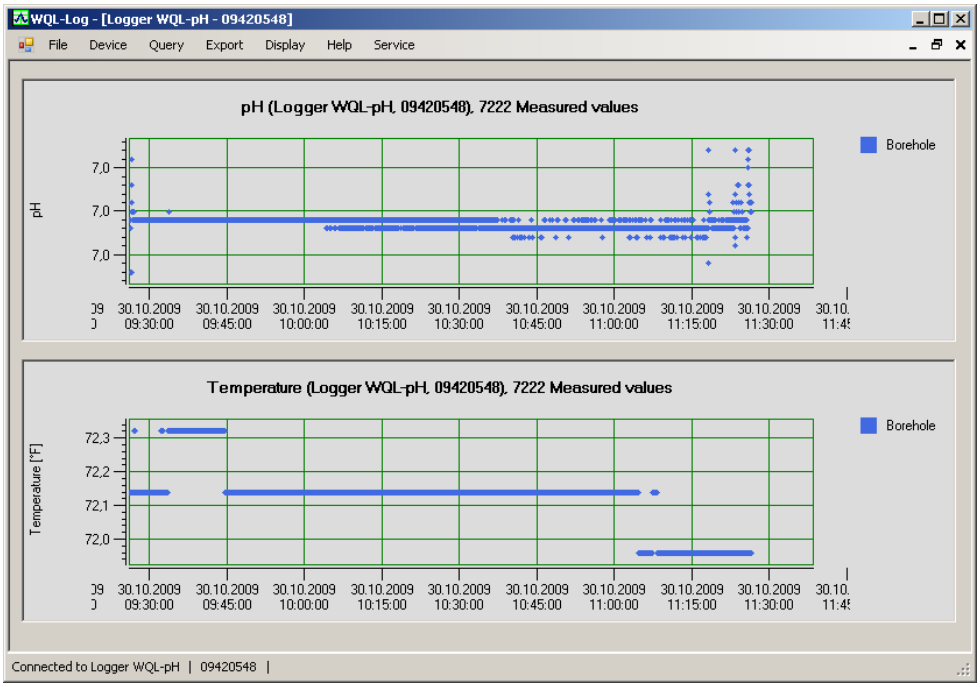
6	Confirm the reading in of the data with *OK*. The reading process can take some time (depending on the number of datasets to be read in).



7	When the reading of the measured values is completed, a message appears (confirm with *OK*) and the prompt to erase the measured value memory.



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



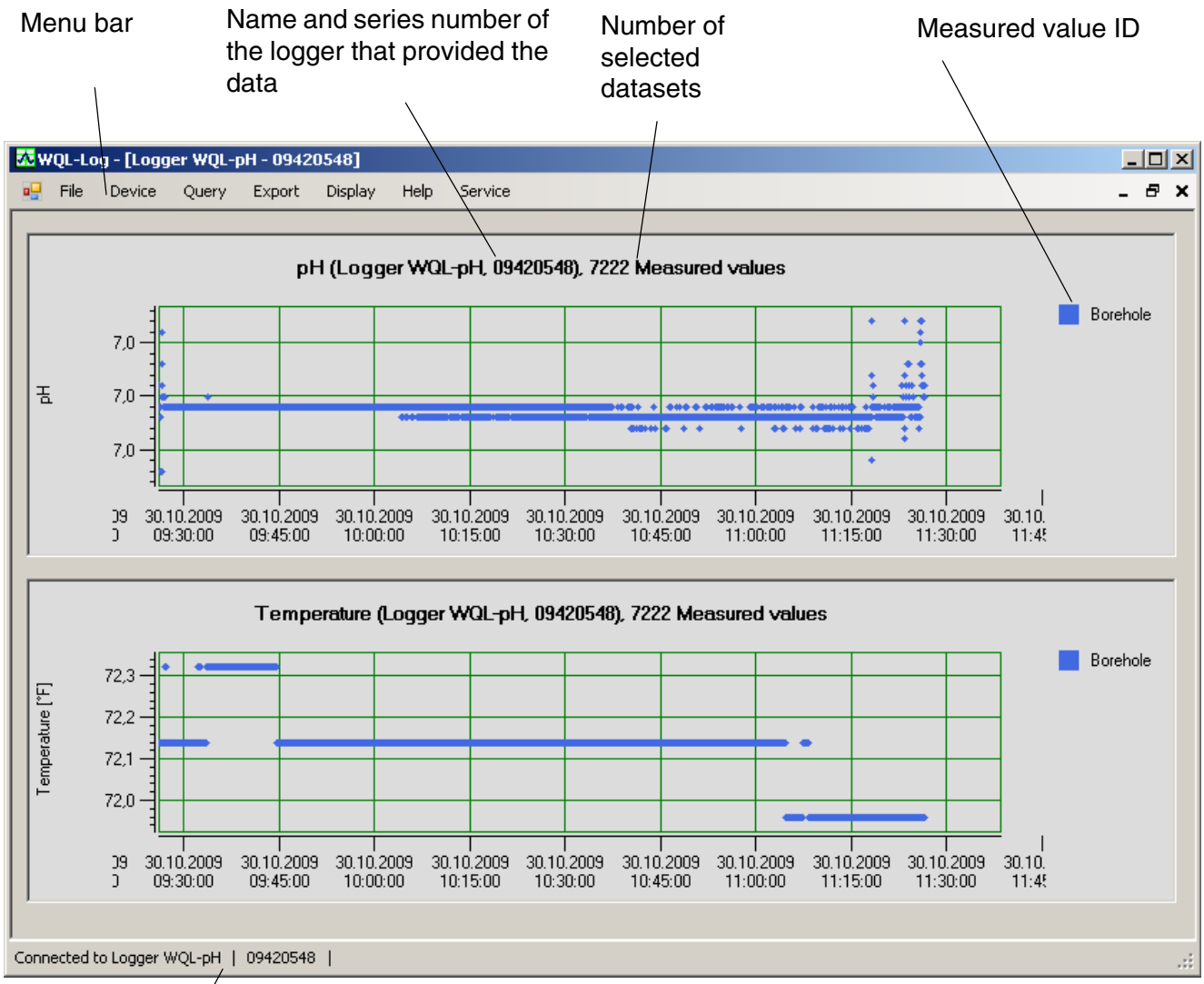
Note

When the logger is connected to the WQL-Log PC program, any existing new measured values must be read in. If data stored in the logger are not read in, the logger cannot be connected to the PC program (data protection!).

7.6 Overview of the data window

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

The data window is structured as follows:



7.7 Clearing the logger memory

The query to clear the logger memory always appears after the data from the logger have been read in to the database. If the logger memory is not cleared after the data has been read in, the query to clear the data reappears during the setting up of a new logging job. At this point of time the logger memory has to be cleared so the logging job can be set up.

You can also clear the logger memory manually.

Note
There is no danger of clearing data that have not been read in as the data stored in the logger have to be read in (compulsory guide) when the logger is connected. If data stored in the logger are not read in, the logger cannot be connected to the PC program.

Proceed as follows to clear the logger memory:

1	In the *Device* menu, select the menu item, *Memory/Clear memory*.
2	A security prompt appears. Confirm the security prompt with *OK*.
3	The data is cleared. A message appears after the clearing that informs you that the memory was cleared. Confirm the message with *OK*.

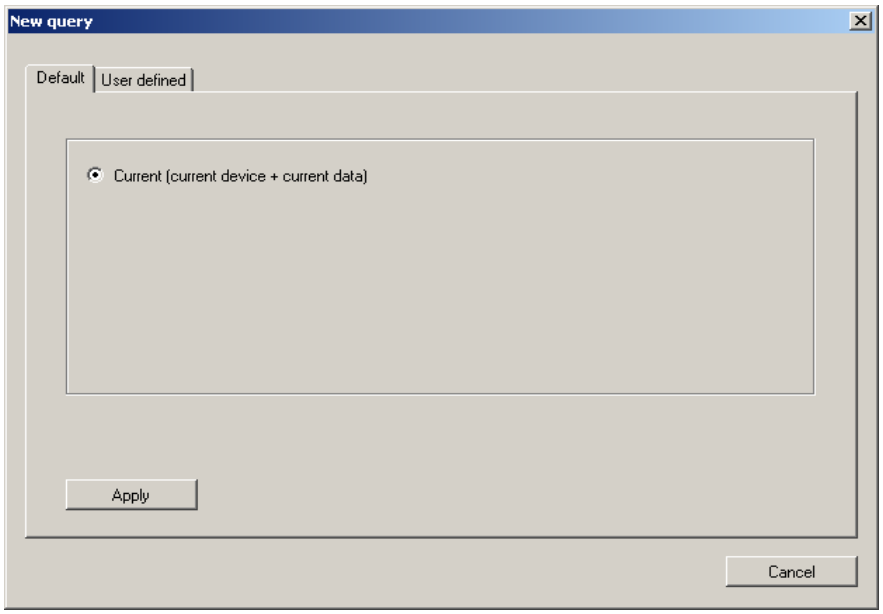
8 Processing measurement data

8.1 Querying data

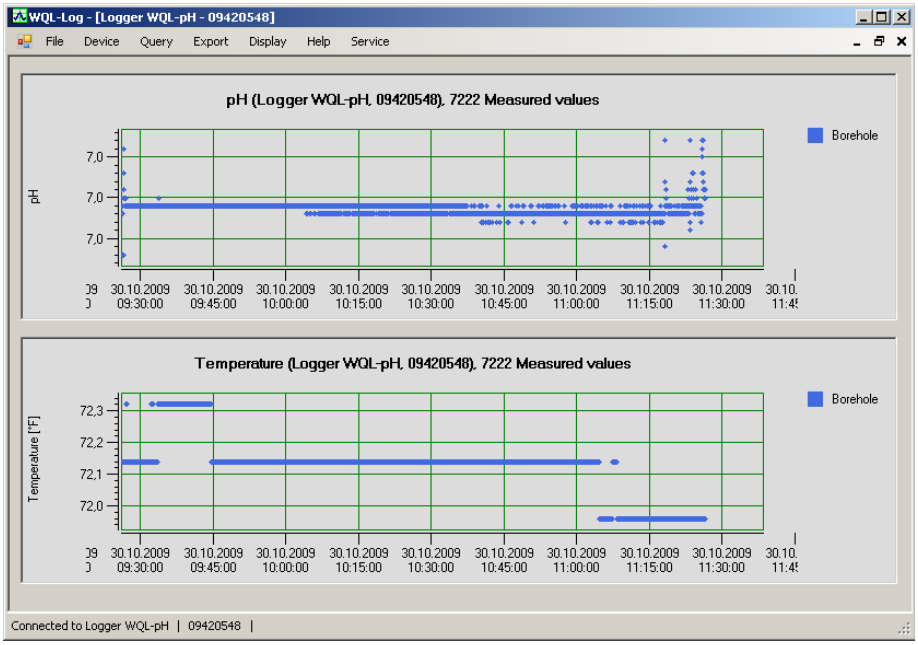
The data recorded by the logger and stored in the database can be displayed as a graphic via the *Query* menu item. Proceed as follows:

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 pH value or voltage value and temperature.

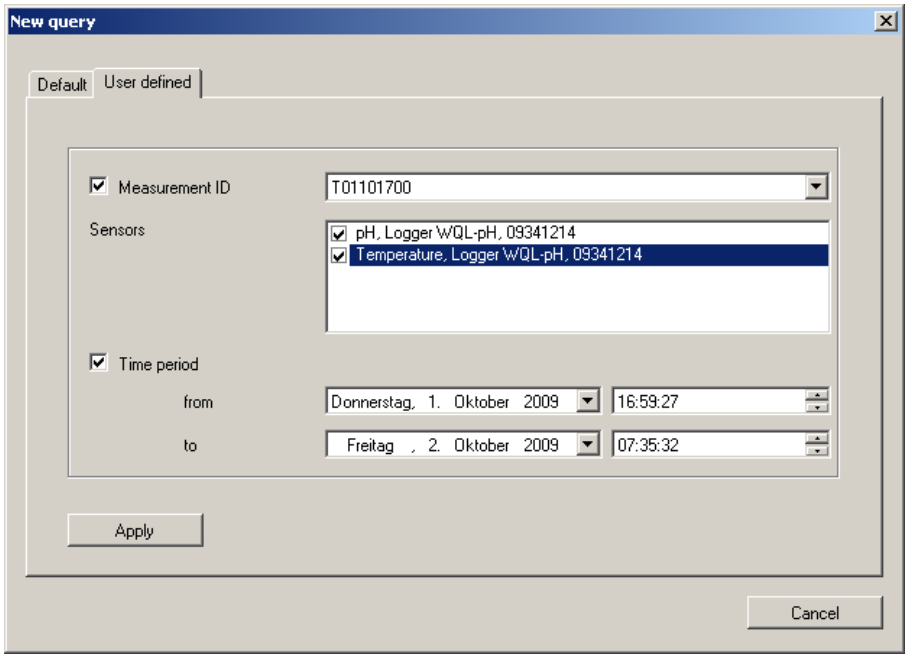


Note

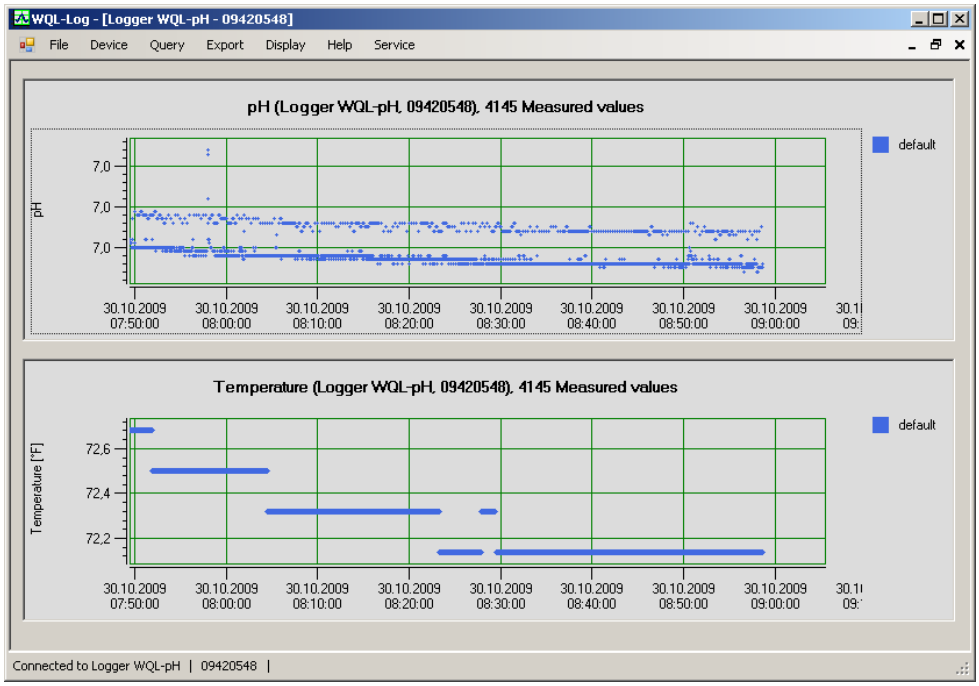
The series number of the connected logger is displayed in the bottom left corner of the data window (see section 7.6 OVERVIEW OF THE DATA WINDOW).

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.



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.

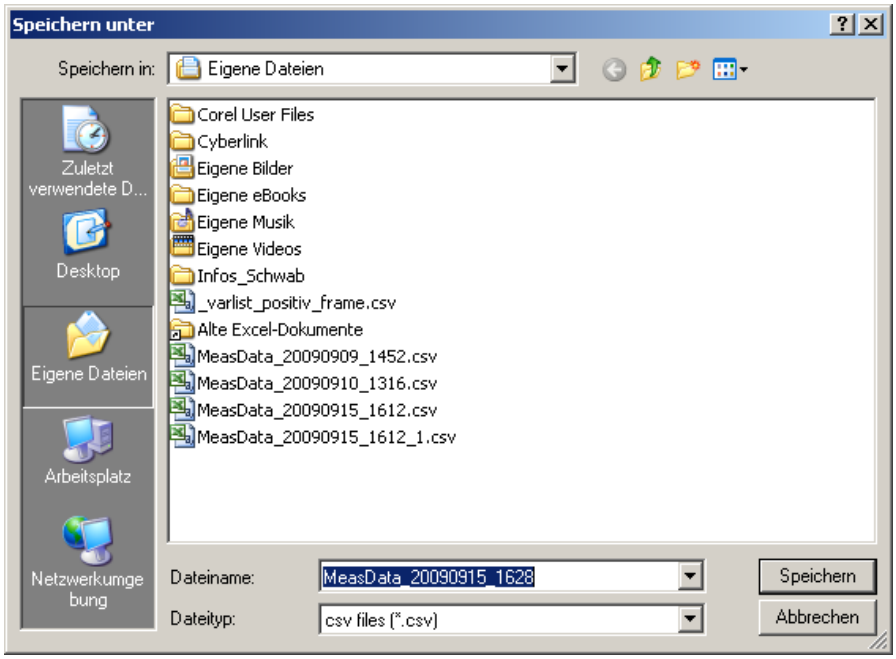
8.2 Exporting data

The data displayed as a graphic with the aid of the *Query* menu can be exported to a *.csv file. 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 should 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	Save the data to be exported in the required directory and with the required file name. The WQL-Log PC program suggests a file name.

Note
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 the number 1, 2 etc. to the suggested file names.

9 Info menus

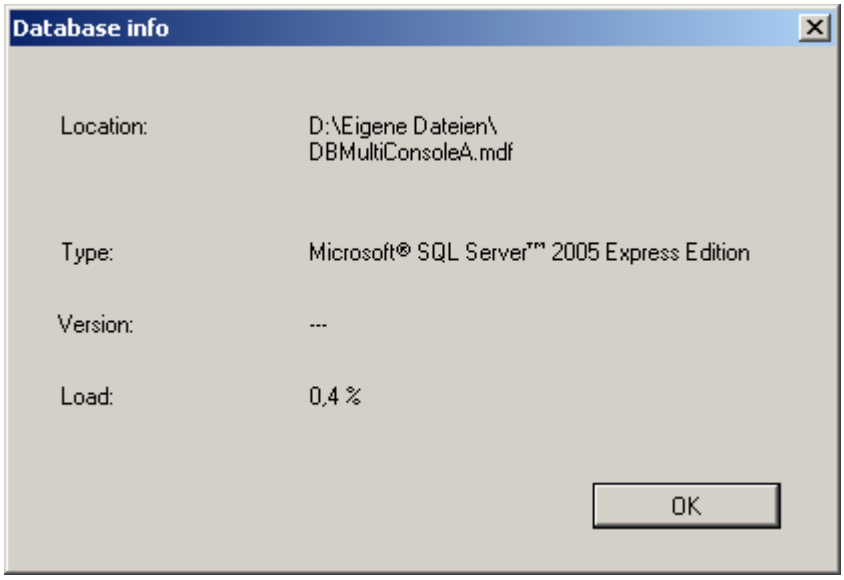
9.1 Database information

The data read in from the logger are saved in a database. You can query the name, location, type and utilization (in %) of this 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.

100,000 datasets need approx. 6.5 MB. Thus the database can store approx. 15 million datasets.

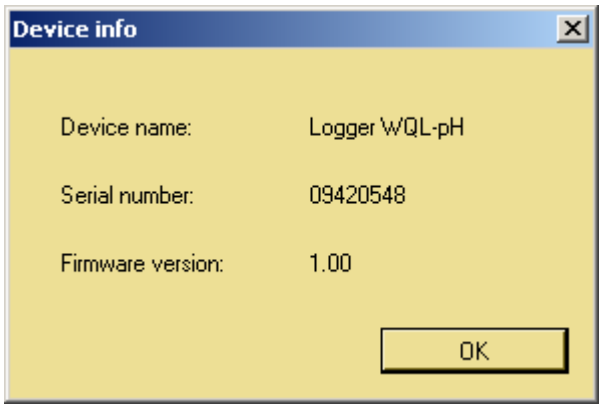
9.2 Device information

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.

9.3 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.

10 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	None
Measuring mode	pH
Date, time	01.01.2008, 00:00
Calibration	Default values (Nernst slope = -59,2 mV/pH at 25 °C, asymmetry = 0 mV)

Resetting to default condition

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

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

11 Maintenance, cleaning, storage

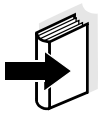
11.1 General maintenance instructions

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 get a better grip on the parts. Should the coupling ring for the electrode be stuck, for example after a long-term logging job, you can use a wrench (wrench size 16 mm) on the hexagon.
- In the screwed condition, no gaps may be visible at the joints.
- Change the electrode in a clean and preferably dry environment. Thoroughly dry all parts. Moisture in the screw joint can affect the functioning of the logger.
- Prior to unscrewing any screw joints, clean the exterior of the logger (see section 11.2 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.

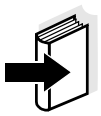
11.2 Exterior cleaning

Clean the logger with tapwater and a soft sponge or brush. Remove the protective hood. The electrode should be cleaned with a soft toothbrush or paintbrush under running tap water.



Note
For the cleaning of the electrode please also read the operating manual of the electrode.

11.3 Replacing the electrode



Note
When replacing the electrode the general maintenance instructions in section 11.1 must be followed.

The electrode is replaced in the same way as it was installed during the commissioning (see section 3.1.3 INSTALLING THE ELECTRODE).

11.4 Battery

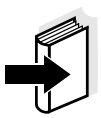
11.4.1 Battery service life

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 sec	3 months
5 sec	5 months
10 sec	7 months
30 sec	11 months
1 min	13 months
5 min	15 months
10 min and longer	16 months

Note
When inserting the battery, note down the installation time on the battery to be able to estimate the remaining operational lifetime. When a battery is inserted, the logger consumes a small amount of energy even when it is not working. Therefore, we recommend to remove the battery during longer measuring breaks.

11.4.2 Battery replacement



Note
When replacing the battery the general maintenance instructions in section 11.1 must be followed.

The battery is replaced in the same way as it is inserted during the commissioning (see section 3.1.2 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 (01.01.2008, 00:00) when the power supply is interrupted.

We recommend to connect the logger to the PC for the time of the battery replacing process so the logger is supplied with power via the USB connection 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 7.4 SIGNAL LED TO INDICATE THE OPERATING CONDITIONS OF THE LOGGER):

Case 1: Logging job active at the time of interruption

- The logging job is terminated.
- The time is reset to the default condition.
- All data logged up to this point of time are retained and are automatically saved on the PC the next time the logger is connected to the PC.
- The terminated logging job can be continued with a corresponding new logging job. 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 the default condition.
- Prior to setting up the next logging job, you have to set the time if the automatic time synchronization is switched off.

Case 3: Battery removed for storage

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

11.5 Storage

For longer storage periods we recommend to leave the electrode installed and to remove the battery and store it separately. Plug the watering cap filled with the suitable reference electrolyte on the clean electrode (see electrode operating manual).

If the logger is stored without the electrode, close the electrode receptacle with the enclosed blind plug to protect the plug connector from dirt and moisture. When doing so make sure that both O-rings of the blind plug are in place (pos. 1 and 2 in Fig. 11-1).

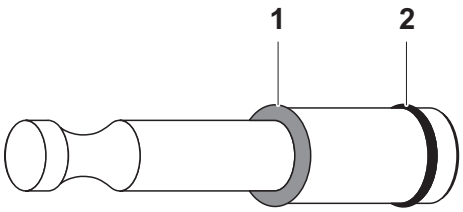


Fig. 11-1 Blind plug

Store the logger in a dry place while observing the storing conditions according to chapter 11.5 STORAGE. Low temperatures usually delay the aging of the electrode.

12 What to do if...

12.1 Calibration and measuring

Lengthy stability check with AutoRead

Cause	Remedy
No stable measured value	Provide stable measuring conditions (e.g. temperature)

Implausible measured values

Cause	Remedy
– Electrode not installed or defective	– Check electrode and electrode connection
– No calibration performed	– Calibrate
– Watering cap still on the electrode	– Pull off watering cap and calibrate
– Electrode contaminated	– Clean electrode
– Liquid penetrated into the plug connector	– Rinse the plug connector with deionized water, clean and dry it

Logger does not react

Cause	Remedy
– Battery depleted	– Insert new battery (see section 11.4)

System cannot be calibrated

Cause	Remedy
– Slope of the electrode not within tolerance (see section 5.3)	– Condition the electrode – If the slope is still outside the tolerance, replace the electrode – Check the buffer solutions
– Slope of the electrode too low	– Replace electrode
– Asymmetry of the electrode too high	– Replace electrode

12.2 Communication of the logger and PC program

Reading in of measured values is aborted

Cause	Remedy
– Communication problem	– Repeat the read in process

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 Technical data

13.1 Measurement characteristics

Measuring principle

Potentiometric measurement by means of combination electrode

pH measurement	Measuring range **	0.000 ... +20.000
	Resolution	0.001
	Accuracy **	≤ 0.005 ± 1 digit
mV measurement	Measuring range **	-1000.0 ... +1000.0 mV
	Resolution	0,1 mV
	Accuracy **	≤ 0.2 mV ± 1 digit
Temperature measurement	Temperature sensor	Automatic recognition of the temperature sensor of the electrode: NTC 30 (30 kΩ at 25 °C / 77 °F) or Pt1000
	Measuring range **	-5.0 ... 105 °C (+23 ... 221 °F)
	Resolution	0.1 K
	Accuracy **	≤ 0.1 K ± 1 digit

** Note:
The measuring ranges and accuracy exclusively refer to the measuring electronics of the logger without the electrode. For the measuring ranges and accuracy of the operable logger, the specifications of the electrode and buffer solutions have also to be taken into account.

Logger function	Measuring interval	adjustable: 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

13.2 Application characteristics

Measuring medium

Allowed temperature range	0 ... 60 °C (32 ... 140 °F)
Allowed pH range	2 ... 12

Pressure resistance

IP 68 (1 x 10^6 Pa or 10 bar)

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

Storage conditions

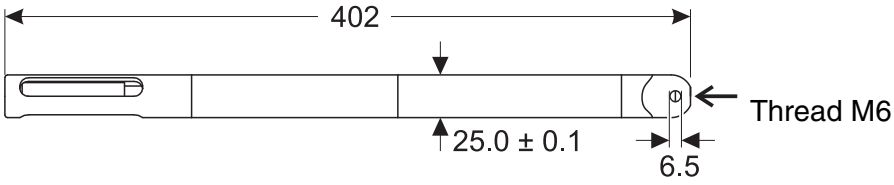
Recommended storing type	Electrode installed with the watering cap put on, or electrode receptacle closed with blind plug, battery removed
Storage temperature	-25 ... 65 °C (-13 ... 149 °F) (electrode removed)

13.3 General data

Test certificates

CE

Dimensions (in mm)



Weight

860 g (with SensoLyt® WQL electrode)

Electrode connection

SMEK socket

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
Plug connector for electrode	PEEK, contacts gold-plated

Material (continued)

Housing of the control panel	PVC-U
Key button	Silicone
Seals	FPM (Viton)
Blind plug	POM
Shackle	Stainless steel V4A *

* 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

13.4 Electrical data

Power supply

Battery	Lithium thionyl chloride battery 3.6 V, size AA, 2600 mAh
Operational life	At least 3 months, depending on measuring interval

Electrical safety

Protective class	III

USB interface

Type	USB 1.1
Baud rate	38400
Socket type	Mini USB
Cable length	max. 3 m

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