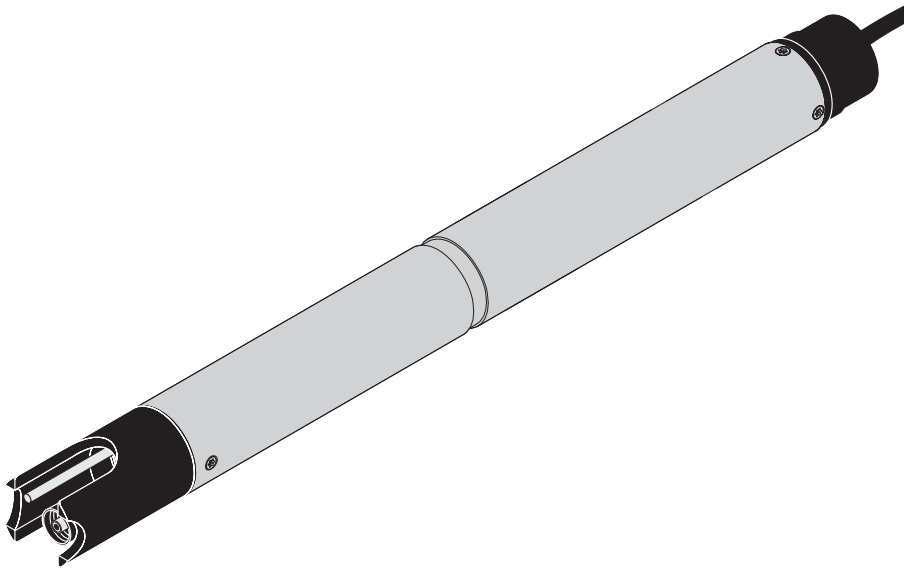
OPERATING MANUAL

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SensoLyt® 700 IQ F

DIQ/S 181 - pH/ORP SENSOR

WTW

a xylem brand

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1 Overview

1.1 Structure of the SensoLyt® 700 IQ F

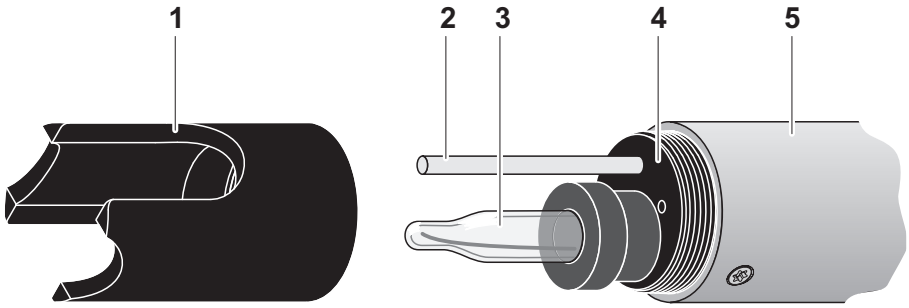


Fig. 1-1 Structure of the pH/ORP sensor

1	Protective hood
2	Temperature sensor
3	Combination electrode (not contained in the scope of delivery)
4	Electrode receptacle
5	Sensor shaft

The pH combination electrodes that can be used are available as accessories (see chapter 6 REPLACEMENT PARTS AND ACCESSORIES).

Monitoring glass breakage

The sensor is equipped with a SensCheck function for monitoring glass breakage.

1.2 Recommended fields of application

In conjunction with the SensoLyt® SEA(-HP), SensoLyt® DWA and SensoLyt® ECA pH combination electrodes as well as the SensoLyt® PtA ORP combination electrode, the SensoLyt® 700 IQ F pH/ORP armature is suitable for stationary pH or ORP measurement in the following fields:

SensoLyt® 700 IQ F

Stationary measurements in water/wastewater applications.

2 Safety

2.1 Safety information

2.1.1 Safety information in the operating manual

This operating manual provides important information on the safe operation of the product. Read this operating manual thoroughly and make yourself familiar with the product before putting it into operation or working with it. The operating manual must be kept in the vicinity of the product so you can always find the information you need.

Important safety instructions are highlighted in this operating manual. They are indicated by the warning symbol (triangle) in the left column. The signal word (e.g. "CAUTION") indicates the level of danger:



WARNING
indicates a possibly dangerous situation that can lead to serious (irreversible) injury or death if the safety instruction is not followed.



CAUTION
indicates a possibly dangerous situation that can lead to slight (reversible) injury if the safety instruction is not followed.

NOTE
indicates a situation where goods might be damaged if the actions mentioned are not taken.

2.1.2 Safety signs on the product

Note all labels, information signs and safety symbols on the product. A warning symbol (triangle) without text refers to safety information in this operating manual.

2.1.3 Further documents providing safety information

The following documents provide additional information, which you should observe for your safety when working with the measuring system:

- Operating manuals of other components of the measuring system (DIQ/S 181, accessories)
- Safety datasheets of calibration and maintenance equipment (e.g. cleaning solutions).

2.2 Safe operation

2.2.1 Authorized use

The authorized use of the SensoLyt® 700 IQ F consists of its use as a sensor in the DIQ/S 181.Only the operation and running of the sensor according to the instructions and technical specifications given in this operating manual is authorized (see chapter 8 TECHNICAL DATA). Any other use is considered unauthorized.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

- The product may only be operated according to the authorized use specified above.
- The product may only be supplied with power by the energy sources mentioned in this operating manual.
- The product may only be operated under the environmental conditions mentioned in this operating manual.
- The product may not be opened.

2.2.3 Unauthorized use

The product must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see chapter 8 TECHNICAL DATA).

3 Commissioning

3.1 Scope of delivery

- SensoLyt® 700 IQ F
- The sensor is equipped with a protective hood and protective cap
- Operating manual.

3.2 Installation

Connection cable

How to connect the sensor cable to the terminal strip of the DIQ/S 181 is described in the DIQ/S 181 operating manual in chapter 3 INSTALLATION.

NOTE
The pH/ORP sensor SensoLyt® 700 IQ F may only be submersed in conjunction with a mounted combination electrode. When changing the electrode, avoid the penetration of moisture into the pH/ORP sensor, as the sensor could otherwise be destroyed. Which electrodes can be used together with the pH/ORP sensor SensoLyt® 700 IQ F is given in section 6.1 COMBINATION ELECTRODES.

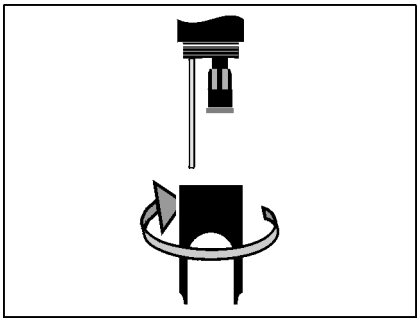
Do not suspend the sensor on the sensor cable. Use an armature or electrode holder. Information on this and other DIQ/S 181 accessories is given in the WTW catalog and on the Internet.

3.3 Commissioning / Getting the sensor ready for measuring

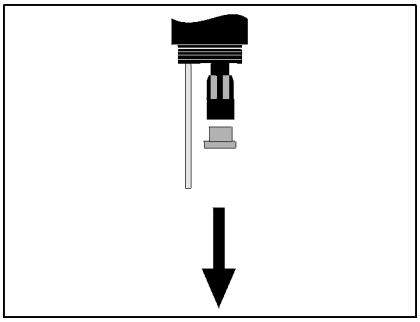
A KCl-filled plastic cap is mounted on the tip of the combination electrode to keep the electrode active during storage (or during longer pauses in measuring). The cap must be removed for measuring.

Mounting the electrode

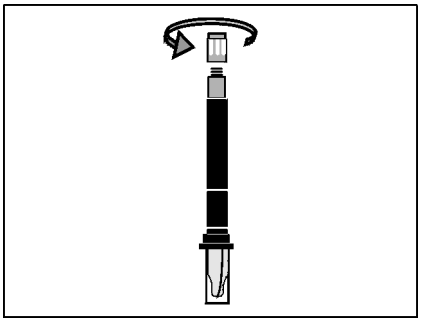
1	Unscrew the protective hood from the sensor.



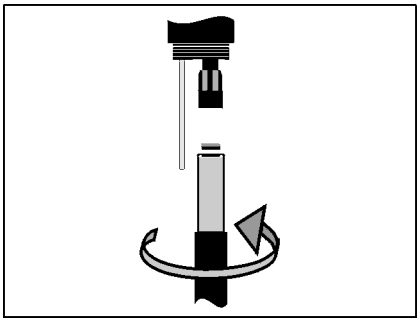
2	Pull off the blind plug from the plug head socket of the sensor.



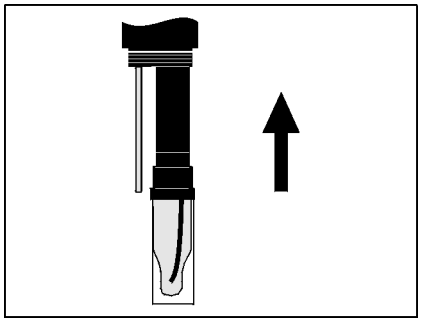
3	Screw the protective cap off the plug head connector of the electrode.



4	Screw the electrode into the plug head socket of the sensor.



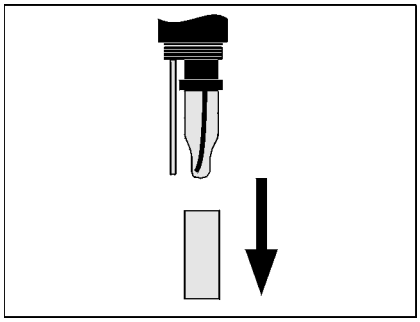
5	Push the unit into the sensor up to the stop.



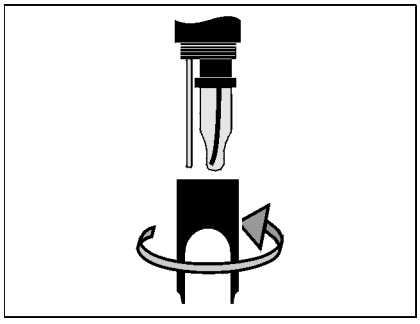
NOTE

Push the connected electrode into the sensor right up to the stop so that the connection is watertight. Leakiness can cause the sensor to be destroyed.

6	For measuring, pull the KCl-filled plastic cap off the combination electrode.



7	Screw the protective hood onto the sensor.



8	If required, assign a user-defined name to the sensor (see DIQ/S 181 operating manual).
9	Set up the sensor (see section 3.4).

10	Calibrate the sensor (see section 4.2).

3.4 Setting table for the SensoLyt® 700 IQ F

Carrying out settings

Using **<S>**, switch from the measured value display to the main menu of the settings. Then navigate to the setting menu (setting table) of the sensor. The procedure is described in detail in the DIQ/S 181 operating manual.

Setting	Selection/values	Explanation
Measuring mode	● *mV* ● *pH*	Unit of the measured value in the measured value display.
Temperature mode	● *°C* ● *°F*	Unit of the temperature measured value (Celsius, Fahrenheit).
Calibration proced. (only with measuring mode pH)	● *CAL TEC AUTO*	● Simplified 2-point calibration, with any two different WTW Technical buffer solutions. The nominal values of the buffer solutions are stored in the sensor. The nominal values do not have to be entered manually.
	● *CAL CON 2P*	● 2-point calibration with the following buffer solutions: 1) pH 7.0 ± 0.5 2) any pH value The nominal values of the buffer solutions have to be entered
	● *CAL CON 1P*	● 1-point calibration with any one buffer solution. The nominal value of the buffer solution has to be entered.

Setting	Selection/values	Explanation
Calibration	● *valid*	Displays and specifies which calibration data the measured value calculation will be based on. *valid* indicates that a valid calibration is available. The value cannot be changed.
	● *invalid*	*invalid* is displayed if the last calibration is invalid and the sensor is blocked for measurement. In this case you can change the value to *last valid*, provided there is a valid calibration stored in the sensor.
	● *last valid*	This is used to activate with the next exit from the setting table with *Save and quit* the last valid calibration stored in the sensor. Next time the setting table is opened, *valid* is displayed.
ORP shift (only with measuring mode mV)	*-100 mV ... +100 mV*	Here you can set the ORP zero point.
Temp. adjustment	*-1.5 K ... +1.5 K*	The temperature compensation enables the adjusting of the temperature sensor to a reference temperature measurement (offsetting the zero point by ±1.5 K). Notes: ● Please position the sensor in a container with a least 2 l water, because of the thermal capacity of the sensor. ● Stirring occasionally, leave the sensor in this container for at least 15 minutes, if the temperature difference between the water and sensor is > 10 K, for at least one hour, then carry out the adjustment.
Save and quit		The settings are stored. The display switches to the next higher level.
Quit		The settings are not stored. The display switches to the next higher level.

4 Measurement / operation

4.1 Measuring



CAUTION
Contact with the sample can lead to danger to the user! Depending on the type of sample, suitable protective measures must be taken (protective clothing, protective goggles, etc.).

Calibrate the combination electrode with the sensor and the measuring system prior to measuring and at regular intervals (depending on the application).

Please pay attention to:

- the minimum immersion depth of the sensor (> 10 cm)
- the measuring range of the electrode used (see operating manual of the electrode).

4.2 Calibration

4.2.1 General information on calibration

Why calibrate?

During the operation of a pH electrode, the slope and asymmetry of the electrode change with time. The calibration procedure determines the current slope and asymmetry of the electrode.

When to calibrate?

Calibrate before measuring and at regular intervals (depending on the application).

Calibration procedures

The calibration procedure *CAL TEC AUTO* enables the fully automatic calibration with WTW Technical buffer solutions. Order information on WTW Technical buffer solutions is provided in chapter 6 REPLACEMENT PARTS AND ACCESSORIES.

The calibration procedure *CAL CON 2P* enables the conventional 2-point calibration with two different buffers (first buffer solution pH 7.0 ± 0.5; second buffer solution: arbitrary).

The calibration procedure *CAL CON 1P* enables the conventional single-point calibration with any one buffer.

Calibration record / calibration history

The result of a calibration procedure is stored in the calibration record and calibration history and can be viewed afterwards (see DIQ/S 181 operating manual).

Maintenance condition

During the calibration procedure the sensor is in the so-called maintenance condition. All linked outputs remain in their current status.

After the calibration procedure has been finished the maintenance condition has to be switched off manually. More detailed information on the maintenance condition is given in the DIQ/S 181 operating manual.

General course of a calibration on the DIQ/S 181

In general, a calibration procedure is carried out as follows on the DIQ/S 181. For details please refer to the DIQ/S 181 operating manual.



Before starting, make sure that the correct calibration procedure is set (see section 3.4 SETTING TABLE FOR THE SENSOLYT® 700 IQ F).

1	Switch to the measured value display with **<M>**.
2	Call up calibration with **<C>**. The maintenance condition of the sensor is switched on in the next step. A message on this appears on the display.
3	Confirm the message with **<OK>**. The maintenance condition is active. The menu-guided calibration routine is started. Follow the instructions on the display. After the calibration routine is finished, the measured value display appears again (the measured value flashes because the sensor is still in the maintenance condition).
4	If the calibration was successful, bring the sensor into the measuring position.
5	Wait for a stable measured value.
6	Switch off the maintenance condition.

4.2.2 Calibrating with *CAL TEC AUTO*

Display indications when calibrating with *CAL TEC AUTO*

Display	Explanation
** Have any two technical buffer solutions ready.*	You can use two different WTW Technical buffer solutions for this. Confirm with **<OK>**.
** Rinse the sensor.* ** Immerse the sensor in the first buffer solution.* ** Wait for a stable measured value.*	Follow the instructions on the display. As soon as the measured value is stable, the next display indication appears.

Display	Explanation
** Rinse the sensor.* ** Immerse the sensor in the second buffer solution.* ** Wait for a stable measured value.*	Follow the instructions on the display. As soon as the measured value is stable, the next display indication appears.
Successfully calibrated. *End of the CAL_TEC_AUTO calibration.*	The values determined for *Slope* and *Asymmetry potential* are displayed. Calibration is finished. Confirm with **<OK>**. The display returns to the measured value display.

4.2.3 Calibrating with *CAL CON 2P*

Display indications during 2-point calibration with *CAL CON 2P*

Display	Explanation
** Have buffer pH 7,0 ± 0,5 and any second buffer solution ready.*	For this calibration procedure, use two buffer solutions whose pH value at the current temperature is known: – First buffer solution pH 7.0 ± 0.5 – Second buffer solution: arbitrary
** Rinse the sensor.* ** Immerse the sensor in the first buffer solution pH 7,0 ± 0,5.* ** Wait for a stable measured value.*	Follow the instructions on the display. As soon as the measured value is stable, the next display indication appears.
** Enter the pH value of the first buffer solution.*	Confirm with **<OK>**. Enter the nominal pH value of the first buffer solution according to the displayed temperature with **<▲▼>** and confirm with **<OK>**.
** Rinse the sensor.* ** Immerse the sensor in the second buffer solution.* ** Wait for a stable measured value.*	Follow the instructions on the display. As soon as the measured value is stable, the next display indication appears.

Display	Explanation
** Enter the pH value of the second buffer solution.*	Confirm with **<OK>**. Enter the nominal pH value of the second buffer solution according to the displayed temperature with **<▲▼>** and confirm with **<OK>**.
Successfully calibrated. *End of the CAL_CON_2P calibration.*	The values determined for *Slope* and *Asymmetry potential* are displayed. Calibration is finished. Confirm with **<OK>**. The display returns to the measured value display.

4.2.4 Calibrating with *CAL CON 1P*

Display indications during 1-point calibration with *CAL CON 1P*

Display	Explanation
** Have any buffer solution ready.*	For this you can use any one buffer solution if its pH value at the current temperature is known. The calibration will be the more exact the nearer the pH value of the buffer solution is to that of the test sample.
** Rinse the sensor.* ** Immerse the sensor in the buffer solution.* ** Wait for a stable measured value.*	Follow the instructions on the display. As soon as the measured value is stable, the next display indication appears.
** Enter the pH value of the buffer solution.*	Confirm with **<OK>**. Enter the nominal pH value of the buffer solution according to the displayed temperature with **<▲▼>** and confirm with **<OK>**.
Successfully calibrated. *End of the CAL_CON_1P calibration.*	The values determined for *Slope* and *Asymmetry potential* are displayed. Calibration is finished. Confirm with **<OK>**. The display returns to the measured value display.

4.2.5 Calibration result

Calibration evaluation

After calibrating, the calibration data and current state of the sensor are evaluated automatically. The asymmetry and slope are evaluated separately. The values must be within the following ranges:

Slope: -50 ... -62 mV/pH
Asymmetry: -45 ... +45 mV

If one of the two values is outside the specified range the calibration is evaluated as not successful, i.e. the sensor could not be calibrated.

A calibration procedure can have the following results:

Possible calibration results

Display after calibrating	Log book entries (meaning/actions)
Measured value display	Sensor was successfully calibrated. Calibration data see calibration history.
"----"	Sensor could not be calibrated. Sensor blocked for measurement. – Carry out maintenance activities immediately (see operating manual). – View the calibration history. – Check the calibration conditions and calibration standard.

Information on the contents and structure of the log book, and how to call it up, is given in the Log book chapter of the DIQ/S 181 operating manual.

4.2.6 Reactivating a valid calibration

The SensoLyt® 700 IQ F provides a feature with witch you can reactivate the last valid calibration if necessary. Thus you can immediately continue to measure if a calibration failed.

Reactivating old calibration data is a temporary measure. Take into consideration that the sensor may provide wrong measured values. Ensure the correct functioning of the sensor by checking and/or recalibrating it.

Reactivating the calibration data

1	Open the setting table (see section 3.4).
2	In the *Calibration* menu, select the setting *last valid* and then exit the setting table with *Save and quit*.

5 Maintenance and changing the electrode

5.1 General maintenance instructions

The SensoLyt® 700 IQ F pH/ORP sensor operates maintenance-free.

Please read the maintenance of the combination electrode in the relevant operating manual.

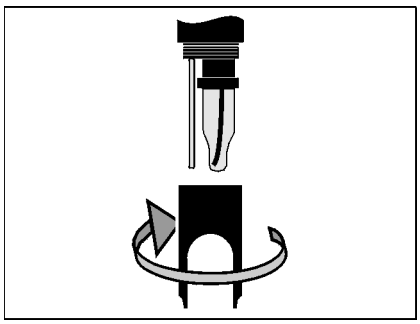
CAUTION
Contact with the sample can lead to danger to the user! Depending on the type of sample, suitable protective measures must be taken (protective clothing, protective goggles, etc.).

CAUTION
If the glass of the pH electrode breaks, there is a danger of cuts from the splinters of glass!

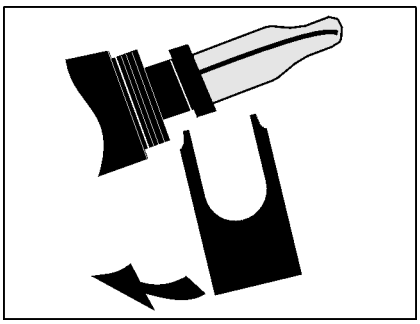
5.2 Replacing the electrode

If it is necessary to replace an electrode, proceed as follows:

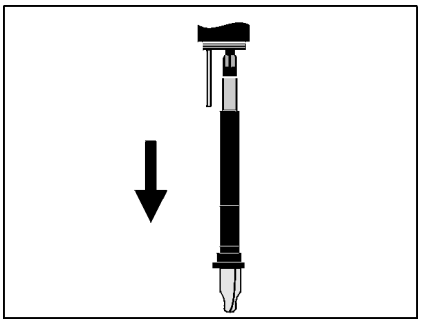
1	Unscrew the protective hood from the sensor.



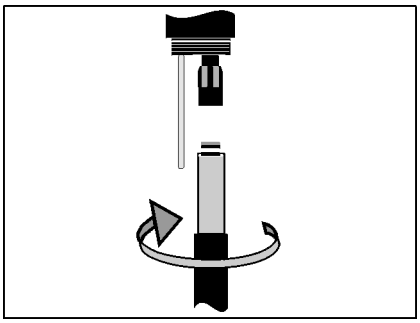
2	Use the protective hood as a tool to lever out the electrode.



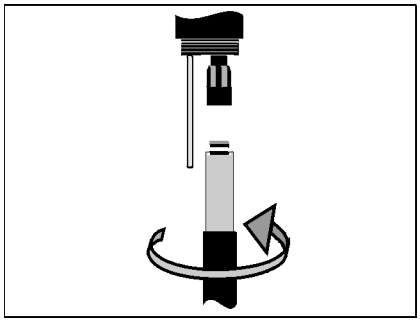
3	Carefully pull out the electrode until the plug head screwed fitting can be seen.



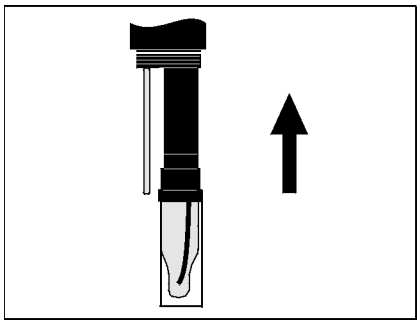
4	Unscrew the combination electrode from the plug head socket (for disposal, see section 5.3).



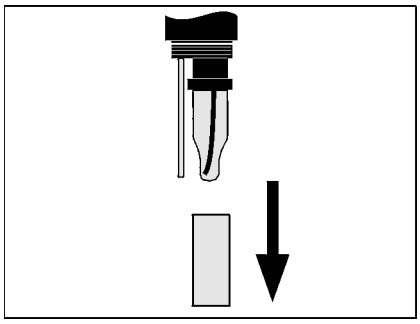
5	Screw in a new combination electrode.



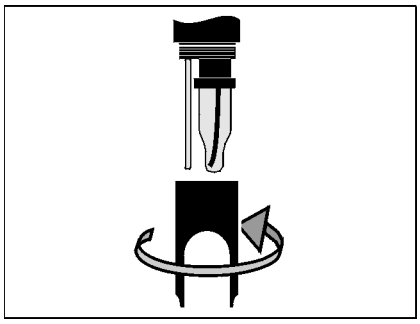
6	Push the unit into the sensor up to the stop.



7	For measuring, pull the KCl-filled plastic cap off the combination electrode.



8	Screw the protective hood onto the sensor.



9	Calibrate the sensor and the electrode with the measuring system (see section 4.2 CALIBRATION).

5.3 Disposal

Sensor

We recommend disposing of the sensor as electronic refuse.

Combination electrodes

If no official regulations apply to the contrary, used and defective electrodes can be treated as household waste.

6 Replacement parts and accessories

6.1 Combination electrodes

pH combination electrodes

Model	Order no.
SensoLyt® SEA	109 115
SensoLyt® DWA	109 119
SensoLyt® ECA	109 117
SensoLyt® SEA-HP	109 118

ORP combination electrode

SensoLyt® PtA	109 125

6.2 General accessories

Technical buffer solutions for pH calibration

Buffer (bottles of 1 liter)	pH value	Order no.
TEP 4	4.01	108 700
TEP 7	7.0	108 702
TEP 10 Trace	10.01	108 703

Protective hood

Model	Order no.
SensoLyt® 700 SK	109 194

7 What to do if ...

No measured value

Cause	Remedy
Sensor not connected	Connect the sensor
Unknown	Refer to log book

Measurement does not function

Cause	Remedy
Watering cap still on the electrode	Pull off watering cap and calibrate
Electrode not connected	Connect the electrode
Liquid has penetrated into the sensor	Sensor defective, send it back
Sensor not connected	Connect the sensor
Incorrect instrument setting	Correct the instrument setting

Sensor cannot be calibrated

Cause	Remedy
The slope of the electrode is outside the tolerance (see section 4.2.5)	– Condition the electrode – If the slope continues to be outside the tolerance: Replace the electrode
Slope of the electrode too low	Replace the electrode
Asymmetry of the electrode too high	Replace the electrode
Sensor is operated with ORP electrode	Use pH electrode

Measurement provides implausible measured values

Cause	Remedy
Not calibrated	Calibration
Electrode not connected or defective	Check electrode and electrode connection
Electrode contaminated	Clean electrode
Liquid has penetrated into the sensor	Sensor defective, send it back

Cause	Remedy
Incorrect instrument setting	Correct the instrument setting (*Measuring mode* pH or mV)

Measured value flashing

Cause	Remedy
Maintenance condition is active	– If the maintenance condition was activated manually (e.g. by pressing the **<C>** key): Switch off the maintenance condition manually in the menu *PROPERTIES* (see DIQ/S 181 operating manual) – If the maintenance condition was activated automatically (e.g. by the cleaning system): The maintenance condition will be deactivated automatically

8 Technical data

8.1 Measuring characteristics

Measuring principle

Potentiometric measurement using a combination electrode; Integrated microprocessor electronics, shielded 2-wire connection for power and data transmission.

Measuring range

pH	0.00 ... 14.00 pH (depending on the electrode)
ORP	-2000 mV ... +2000 mV (depending on the electrode)

Resolution

pH	0.01 pH
ORP	1 mV

Temperature measurement

Temperature sensor	Integrated NTC
Measuring range	- 5 °C ... + 60 °C (23 ... 140 °F)
Accuracy	± 0.5 K
Resolution	0.1 K
Response time t_{99} of the temperature sensor	< 15 s

Temperature compensation

In the range 0 °C ... 60 °C (32 ... 140 °F)

8.2 Application characteristics

Temperature range

Measuring medium	0 °C ... + 60 °C (32 ... 140 °F)
Storage/transport	- 5 °C ... + 65 °C (23 ... 149 °F)

Allowed pH range of the measuring medium

4 ... 12

Pressure resistance

Sensor with sensor cable:

Max. allowed overpressure with electrode SensoLyt® SEA, DWA, PtA installed	10^5 Pa (1 bar) [if installed in a pipe: 10^6 Pa (10 bar)*]

Max. allowed overpressure with electrode SensoLyt® ECA installed	10^5 Pa (1 bar) [if installed in a pipe: 6 x10^5 Pa (6 bar)*]
Max. allowed overpressure with electrode SensoLyt® SEA-HP installed	10^5 Pa (1 bar) [if installed in a pipe: 10^6 Pa (10 bar)**]

* temperature dependent (see safety instruction below)
** in the entire temperature range

The SensoLyt® 700 IQ F meets the requirements according to article 3(3) of the directive 97/23/EC ("pressure equipment directive").

Depth of immersion

with electrode SensoLyt® SEA(-HP), DWA, PtA, ECA, SEA-HP installed	min. 10 cm; max. 10 m

NOTE
The pressure resistance of the operable pH/ORP armature can be restricted by the pressure resistance of the electrode. When selecting the electrode make sure it is suitable for the intended pressure and temperature range.

Type of protection

Sensor with sensor cable:

Sensor with an electrode including sensor cable installed	IP 68, 1 bar (10^5 Pa)

Operating position

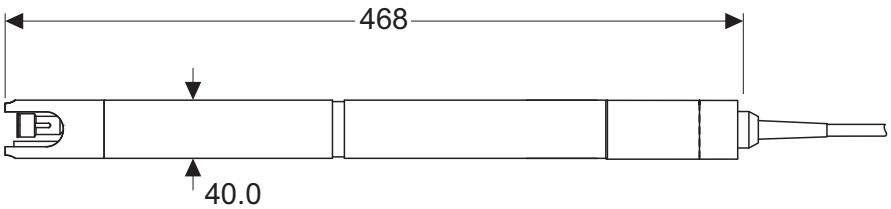
Any

Fields of application

SensoLyt® 700 IQ F	Stationary measurements in water/wastewater applications

8.3 General data

Dimensions (mm)



Weight with electrode (with sensor cable)	SensoLyt® 700 IQ F	Approx. 1400 g
Electrodes that can be integrated	pH combination electrodes	SensoLyt® SEA, SEA-HP, DWA, ECA
	ORP electrodes	SensoLyt® PtA
Material	Shaft	V4A stainless steel 1.4571 *
	Protective hood	PVC
	Electrode receptacle	POM
	Temperature sensor	V4A stainless steel 1.4571 *

* Stainless steel can be sensitive to corrosion with chloride concentrations ≥ 500 mg/ln.

Automatic sensor monitoring (SensCheck function)

Function for glass breakage monitoring of the pH electrode

Meter safety	Applicable norms	– EN 61010-1 – UL 3111-1 – CAN/CSA C22.2 No. 1010.1

8.4 Electrical data

Nominal voltage	max. 24 VDC, via the DIQ/S 181 (for details see DIQ/S 181 operating manual, chapter TECHNICAL DATA)
Power consumption	0.2 W
Protective class	III

9 Indexes

9.1 Explanation of the messages

This chapter contains a list of all the message codes and related message texts for the SensoLyt® 700 IQ F sensor.



Information on

- the contents and structure of the log book and
- the structure of the message code

see DIQ/S 181 operating manual, chapter LOG BOOK.

9.1.1 Error messages

Message code	Message text
EA1	*Meas. range exceeded or undercut* ** Check process* ** Select other meas. range*
EA2	*Sensor temperature too high!* ** Check process and application*
EA3	*Sensor temperature too low!* ** Check process and application*
EC1	*Sensor could not be calibrated,* *Sensor blocked for measurement* ** Check calibration conditions and calibration standard* ** View calibration history* ** Service sensor immediately* *(see operating manual)*
EI3	*Operational voltage too low* ** Check installation and cable lengths, Follow installation instructions* ** Power supply module overloaded* ** Check terminal and module connections* ** Defective component, replace components*
EI4	*Operational voltage too low, no operation possible* ** Check installation and cable lengths, Follow installation instructions* ** Power supply module overloaded* ** Check terminal and module connections* ** Defective component,* *replace components*
ES1	*Component hardware defective* ** Contact service*

Message code	Message text
ESA	*SensCheck: pH electrode defective, glass broken* ** Replace pH electrode*

9.1.2 Informative messages

Message code	Message text
IC1	*Sensor has been successfully calibrated* ** For calibration data, see calibration history*
IC4	*Last valid calibration has been activated. Make sure the sensor operates correctly.*

Xylem |ˈzīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

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