

## Type MS01

pH sensor cube



## Operating Instructions

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Operating Instructions 1409/0\_EU-ML 00566496 Original EN

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# 1 ABOUT THE OPERATING INSTRUCTIONS

The Operating Instructions describe the entire life cycle of the product. Please keep the Operating Instructions in a safe place, accessible to all users and any new owners.

**The Operating Instructions contain important safety information.**

Failure to comply with these instructions can lead to hazardous situations.

- ▶ The Operating Instructions must be read and understood.

## 1.1 Symbols used



### **DANGER**

**Warns against an imminent danger.**

- ▶ Failure to observe this warning can result in death or in serious injury.



### **WARNING**

**Warns against a potentially dangerous situation.**

- ▶ Failure to observe this warning can result in serious injury or even death.



### **ATTENTION**

**Warns against a possible risk.**

- ▶ Failure to observe this warning can result in substantial or minor injuries.

### **NOTE**

**Warns against material damage.**

- ▶ Failure to observe this warning may result in damage to the product or system.



Indicates additional information, advice or important recommendations.



Refers to information contained in the Operating Instructions or in other documents.

- ▶ Indicates an instruction to be carried out to avoid a danger, a warning or a possible risk.

→ Indicates a procedure to be carried out.

- » Indicates the result of a specific instruction.

## 1.2 Definition of the word "product"

The word "product" used within these Operating Instructions always refers to the pH sensor cube type MS01.

## 1.3 Definition of the word "system"

The word "system" used within these Operating Instructions always refers to the Online Analysis System type 8905.

## 1.4 Definition of the word "bÜS"

The word "bÜS" used within these Operating Instructions always refers to the fieldbus developed by Bürkert.

## 2 INTENDED USE

**Use of this product that does not comply with the instructions could present risks to people, nearby installations and the environment.**

- ▶ The product is intended solely for the measurement of the pH in water within a 8905 system.
- ▶ This product must be protected against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- ▶ This product must be used in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in the Operating Instructions.
- ▶ Requirements for the safe and proper operation of the product are proper transport, storage and installation, as well as careful operation and maintenance.
- ▶ Only use the product as intended.
- ▶ Observe any existing restraints when the product is exported.

### 3 BASIC SAFETY INFORMATION

This safety information does not take into account:

- any contingencies or occurrences that may arise during assembly, use and maintenance of the product.
- the local safety regulations that the operator must ensure the staff in charge of installation and maintenance observe.



#### **Various dangerous situations.**

To avoid injury take care:

- ▶ to prevent any unintentional power supply switch-on.
- ▶ to carry out the installation and maintenance work by qualified and skilled staff with the appropriate tools.
- ▶ to use the product only if in perfect working order and in compliance with the instructions provided in these Operating Instructions.
- ▶ to observe the general technical rules during the planning and use of the product.
- ▶ not to use this product in explosive atmospheres.
- ▶ not to use this product in an environment incompatible with the materials from which it is made.
- ▶ not to make any external or internal modifications to the product.

#### **NOTE**

##### **Elements / Components sensitive to electrostatic discharges**

- This product contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activated.
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the EN 61340-5-1 norm.
- Also ensure that you do not touch any of the live electrical components.



## **4 GENERAL INFORMATION**

### **4.1 Contact**

To contact the manufacturer of the product use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

The addresses of our international branches can be found on the Internet at: [www.burkert.com](http://www.burkert.com)

### **4.2 Warranty conditions**

The condition governing the legal warranty is the conforming use of the product in observance of the operating conditions specified in these Operating Instructions.

### **4.3 Informations on the internet**

You can find the Operating Instructions and technical data sheets regarding the type MS01 at: [www.burkert.com](http://www.burkert.com)

## 5 DESCRIPTION

The pH sensor cube is used in the system type 8905.

The electrical and fluid connections are made via the backplane of the system type 8905.

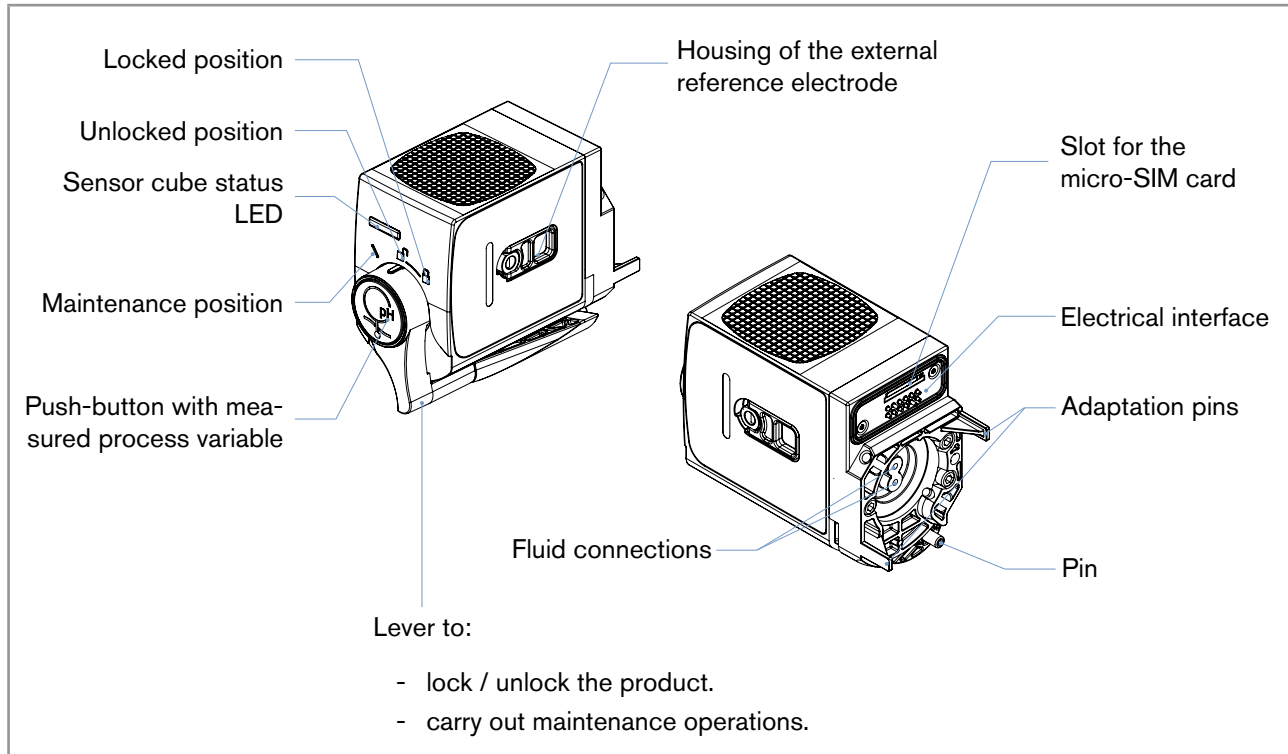


Fig. 1: Description of the product

## 6 TECHNICAL DATA

### 6.1 Conditions of use

Ambient temperature	0 to +40 °C
Air humidity	< 90 %, without condensation
Protection rating acc. to EN 60529	<ul style="list-style-type: none"> <li>▪ IP65, when plugged in the backplane</li> <li>▪ IP20, as standalone product</li> </ul>
Max. height above sea level	2000 m

### 6.2 Conformity to standards and directives

The product conforms to the CE directives of the system type 8905, only when the product type MS01 is plugged in the system type 8905.

### 6.3 Materials the product is made of

Part	Material
Housing	PPE+PS
Seal	EPDM
Lever	PC

### 6.4 Fluid data

<ul style="list-style-type: none"> <li>▪ Type of fluid</li> </ul>	<ul style="list-style-type: none"> <li>▪ Water, without particles: drinking water, industrial water</li> </ul>
<ul style="list-style-type: none"> <li>▪ pH value</li> </ul>	<ul style="list-style-type: none"> <li>▪ pH 4 to 9</li> </ul>
Minimal flow rate	3 l/h; recommended 6 l/h
Water sample pressure	PN6
Water sample temperature	0 to +40 °C, not freezing

## 6.5 Measurement data

pH measurement	
▪ Measuring range	▪ pH 4 to 9
▪ Sensor resolution	▪ pH 0.02
▪ Measurement deviation ("measurement bias", as defined in the standard JCGM 200:2012)	▪ pH $\pm 0.1$
▪ Linearity	▪ pH $\pm 0.05$
▪ Repeatability	▪ pH $\pm 0.05$
▪ Response time (t90)	▪ < 10 s
▪ Measurement sensor	▪ ISFET
▪ Electrolyte of the external reference electrode	▪ 3 mol KCl
Temperature measurement	
▪ Measuring range	▪ 0 to 50 °C
▪ Measurement sensor	▪ Pt1000 Class B, no contact with the water sample
Maintenance interval of the external reference electrode	12 months, nominal, depending on the water quality

## 6.6 Electrical data

Operating voltage	24 V DC through the backplane of the system type 8905
Power consumption	0.8 VA

## 6.7 Communication

Internal communication	through büS
External communication by status LED	according to NAMUR NE 107

## 7 INSTALLATION

### 7.1 Safety instructions

#### NOTE

**Risk of damage to the product due to non-conforming installation.**

- The electrical and fluidic installations can only be carried out by qualified and skilled staff with the appropriate tools.
- Respect the installation instructions for the system.

#### NOTE

**Risk of damage to the product due to the power supply**

- Shut down and isolate the electrical power source before carrying out work on the system.

#### NOTE

**Risk of damage to the product due to the environment**

- Protect the product against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.

### 7.2 Mounting the product on the backplane

The product is plugged in the backplane of the system Type 8905.

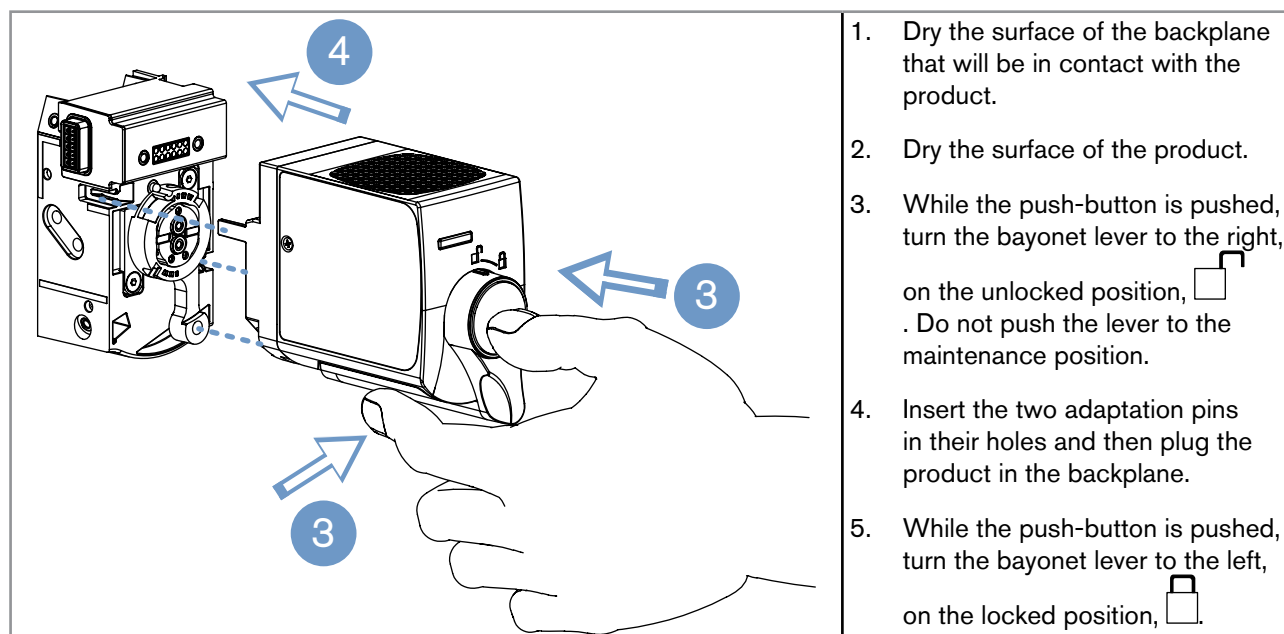


Fig. 2: Mounting a product on the backplane of the system

## 8 ADJUSTMENT AND OPERATION

### 8.1 Safety instructions

#### NOTE

##### **Risk of damage to the product due to non-conforming adjustment.**

- The operators in charge of adjustment must have read and understood the contents of these Operating Instructions.
- The operators in charge of adjustment must have read and understood the contents of the Operating Instructions of the display software type ME21 and/or the contents of the Operating Instructions of the Bürkert Communicator software type 8920 and/or the Operating Instructions of the controller module type ME25.
- In particular, observe the safety recommendations and intended use.
- The product/installation must only be adjusted by suitably trained staff.

#### NOTE

##### **Risk of damage to the product due to non-conforming commissioning.**

- Before commissioning, make sure that the staff in charge have read and fully understood the contents of these Operating Instructions.
- In particular, observe the safety recommendations and intended use.
- The product / the installation must only be commissioned by suitably trained staff.

#### NOTE

##### **Risk of damage to the product due to non-conforming operation.**

- The operators in charge of operation must have read and understood the contents of these Operating Instructions.
- In particular, observe the safety recommendations and intended use.
- The product/installation must only be operated by suitably trained staff.

### 8.2 How to adjust the product

The adjustment of the product can be made:

- either with the display of the system type 8905. The display of the system is managed by the software type ME21. See chap. 8.4.
- or with a PC and the Bürkert Communicator software type 8920. To get general information about the software type 8920, refer to the Operating Instructions of the type 8920.

## 8.3 Adjustments that must be done

Do the adjustments:

- after the product has been installed in the system.
- after the fluidic and electrical installations have been made on the system.
- after the tightness of the system has been checked.
- after the system has operated for a polarization time of 12 hours.
- Before commissioning the product/system for the first time and for the correct operation of the product and of the system, do the following adjustments for the product:
  - calibrate the offset value of the pH sensor (refer to chap. [8.10](#)) or,
  - calibrate the offset value and the slope value of the pH sensor (refer to chap. [8.10](#)).
- Before commissioning the product/system after a maintenance operation (i.e. replacement of the external reference electrode or replacement of the ISFET sensor), let the system operate for a polarization time of 12 hours and do the following adjustments for the product:
  - if the pH sensor has been replaced, calibrate the offset value and the slope value of the pH sensor (refer to chap. [8.10](#)).
  - if the ISFET sensor has been replaced, calibrate the offset value of the ISFET sensor and calibrate the offset value and the slope value of the pH sensor (refer to chap. [8.10](#)).
- Calibrate the product every month.

## 8.4 General information on the display software type ME21

These Operating Instructions explain the adjustments that are specific to the product type MS01.


→ To get general information about the display software type ME21, refer to the Operating Instructions of the type ME21 that is on the CD delivered with the system and that is also available at [www.burkert.com](http://www.burkert.com).

The Operating Instructions of the display software type ME21:

- give general information on the software, such as: description of the user interface, structure of the menus, description of the possible views ("Device" view for example), description of the navigation buttons...
- explain how to make the general adjustments such as: the display language, the locating of the product...
- explain how to configure and customize the "Desktop" views with values or graphs.
- give general information on the error messages and the operating of the system status light.

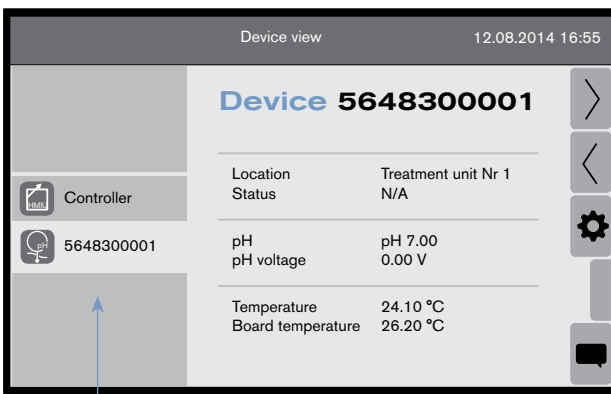
## 8.5 "Device" view of the product


The "Device" view shows some of the measurement data related to the product.

→ If the display shows a "Desktop" view, tap  to access the "Device" view.

→ To display the "Device" view of the product, select the product in the list of devices on the left of the display.

Table 1: "Device" view of the product

 <p>List of devices that are connected to the büS</p>	<p>The following data can be read from the "Device" view of the product:</p> <ul style="list-style-type: none"> <li>▪ the devices that are connected on the büS with their "Unique device name". By default, the "Unique device name" is built up with two numbers: the order code of the product (for example 564830, for the product) and the series number (0001, for example).</li> <li>▪ where the product is geographically located.</li> <li>▪ the measured value of the pH of the water sample.</li> <li>▪ the measured value of the potential difference.</li> <li>▪ the measured value of the temperature of the water sample.</li> <li>▪ the measured value of the temperature of the internal measurement board.</li> </ul>
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→ To display the "Function" view of the product, tap .



## 8.6 "Function" view of the product

The "Function" view shows the functions available for a product and, for each function, the main data related to each function.



To display the "Function" view of the product:

1. select the product in the list of devices, on the left of the display,



2. tap .

Table 2: "Function" view of the product

	<p><b>"Function" view of the büS</b></p> <p>→ To display the "Function" view of the büS the product is connected to, select "büS" in the list of devices on the left of the display.</p> <p>→ Tap  to access the "Parameter" view. See chap. 8.7.</p>
	<p><b>"Function" view of the sensor</b></p> <p>→ To display the "Function" view of the sensor, select "Sensor" in the list of devices on the left of the display.</p> <p>→ Tap  to access the "Parameter" view. See chap. 8.8.</p>

## 8.7 Detailed views of the bÜS function

Table 3: "Parameter" view of the "bÜS" function

Parameter bÜS		
Basic Settings	Unique Device Name	5648300001
	Location	Treatment Unit Nr 1
	Description	
Grouping settings	Physical group	0
	Logical group	0

### "Parameter" detailed view of the bÜS

To set the user-specific data for the identification of the device on the bÜS:

- Unique Device Name of the product.
- Make sure you choose a unique name for the product because the bÜS must recognize the product.
- Make sure you choose a unique name that is self explanatory to identify the product because, if the unique name is changed, all the settings made on the bÜS must be changed.
- Description
- Location
- Grouping setting

Table 4: "Diagnosis" view of the "bÜS" function

Diagnosis bÜS		
bÜS information	Address	126
	Baud rate	500 kbit/s
Device information	Device name	ISFET sensor
	Identity number	564830
	Software identity number	683328
	Software version	A.00.02.42
	Hardware version	A.01.00.00

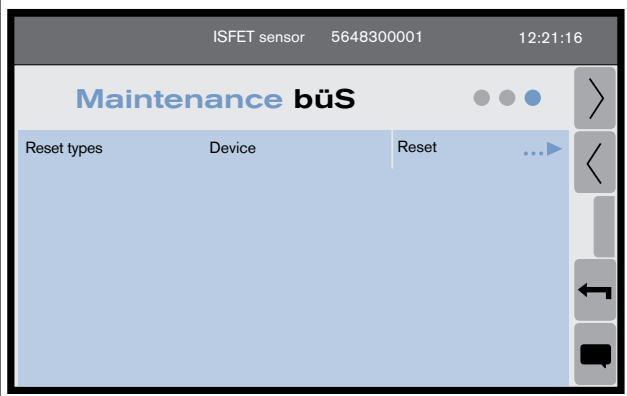
### "Diagnosis" detailed view of the bÜS

To read some bÜS data and device data:

- Address and baud rate
- Device name and device order code (Identity number)
- Software and hardware information
- Information relating to the TFT
- Device driver information

No changes by user are possible.

Table 5: "Maintenance" view of the "büs" function

	<p><b>"Maintenance" detailed view of the büs</b></p> <p>Restart the product for a reset.</p>
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## 8.8 "Parameter" view of the sensor

→ In the "Function" view, tap  to access the "Parameter" view.

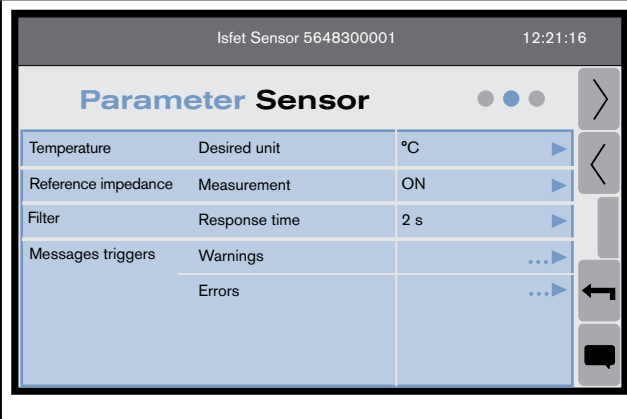
	<p>The "Parameter" view of the sensor makes it possible:</p> <ul style="list-style-type: none"> <li>▪ to change the units of the displayed temperature.</li> <li>▪ to select whether the impedance of the reference electrode is measured or not.</li> <li>▪ to enter the value of the T10-90 response time for the measured signal.</li> <li>▪ to configure the triggering of the warnings, see chap. <a href="#">8.8.1</a>.</li> <li>▪ to configure the triggering of the errors, see chap. <a href="#">8.8.2</a>.</li> </ul>
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Table 6: "Parameter" view of the sensor

### 8.8.1 Configuring the triggering of the warnings


The values of some process variables and the values of some sensor cube variables can be monitored to detect a problem in the process or on the sensor.

For the pH sensor cube, the following values can be monitored:

- the pH of the water sample,
- the temperature of the water sample,
- the impedance of the reference electrode,
- the leakage current of the ISFET sensor.

Procedure:

1. Tap **Warnings ...** in the "Parameter" view of the sensor.
2. Tap **Activation flags** in the "Sensor Parameter" view.
3. Select the process variables and the sensor cube values to be monitored and validate.
4. Set the minimum and/or maximum threshold values.

When the parametered threshold values are reached and the activation flag of the related process variable or sensor cube value is selected, a warning message is generated in the "Messages List": tap  to access the "Messages List". See chap. 9.4 for the troubleshooting details.

### 8.8.2 Configuring the triggering of the errors


The values of some process variables and the values of some sensor cube variables can be monitored to detect a problem in the process or on the product.

For the pH sensor cube, the following values can be monitored:

- the pH of the water sample,
- the temperature of the water sample,
- the impedance of the reference electrode,
- the leakage current of the ISFET sensor.

Procedure:

1. Tap **Errors ...** in the "Parameter" view of the sensor.
2. Tap **Activation flags** in the "Parameter" view of the sensor.
3. Select the process variables and the sensor cube values to be monitored and validate.
4. Set the minimum and/or maximum threshold values.

When the parametered threshold values are reached and the activation flag of the related process variable or sensor cube value is selected, an error message is generated in the "Messages List": tap  to access the "Messages List". See chap. 9.4 for the troubleshooting details.


## 8.9 "Diagnosis" view of the sensor

The "Diagnosis" view makes it possible to read the following values:

- the measured value of the pH of the water sample.
- the measured value of the potential difference.
- the value of the offset of the ISFET sensor, calculated through calibration or entered in the "Maintenance" view.
- the value of the slope of the pH sensor, calculated through calibration or entered in the "Maintenance" view.
- the value of the offset of the pH sensor, calculated through calibration or entered in the "Maintenance" view.
- the measured value of the water sample temperature.
- the measured impedance of the reference electrode.

- the temperature offset that has been entered in the "Maintenance" view of the sensor.
- the measured value of the temperature of the measurement board.
- the measured value of the ISFET leakage current.
- the time the product has already operated.
- the calibration limits of the offset value of the ISFET sensor.
- the calibration limits of the offset value of the pH sensor.
- the calibration limits of the slope value of the pH sensor.




→ From the "Parameter" view of the sensor, tap  to access the "Diagnosis" view.

## 8.10 "Maintenance" view of the sensor

The "Maintenance" view makes it possible:

- to modify the offset value of the ISFET sensor,
- to modify the offset value of the pH sensor,
- to modify the slope value of the pH sensor,
- to automatically calibrate the sensor, with the calibration wizard,
- to modify the offset value of the water sample temperature,
- to check the operating of the product by simulating some data,
- to read the date of the last calibration,
- to read the date of the next due calibration,
- to set the number of days between two calibrations.




→ From the "Parameter" view of the sensor, tap  to access the "Maintenance" view.

### 8.10.1 Calibrating the offset value of the ISFET sensor

The offset of the ISFET sensor is calibrated in the factory.

If the ISFET sensor must be replaced by a new one, the new ISFET sensor must be calibrated.

→ If you know the offset value of the new ISFET sensor, go to the "Maintenance" view of the sensor, tap **pH calibration wizard** **Isfet offset**  and enter the offset value of the ISFET sensor.

→ If you do not know the offset value of the new ISFET sensor, do the following calibration procedure.

1. Connect a peristaltic pump in the water sample inlet circuit of the system, as shown in [Fig. 3](#). If the fluidic connections are not done correctly, the product and the system can be damaged because the pressure in the product and in the system is too high.

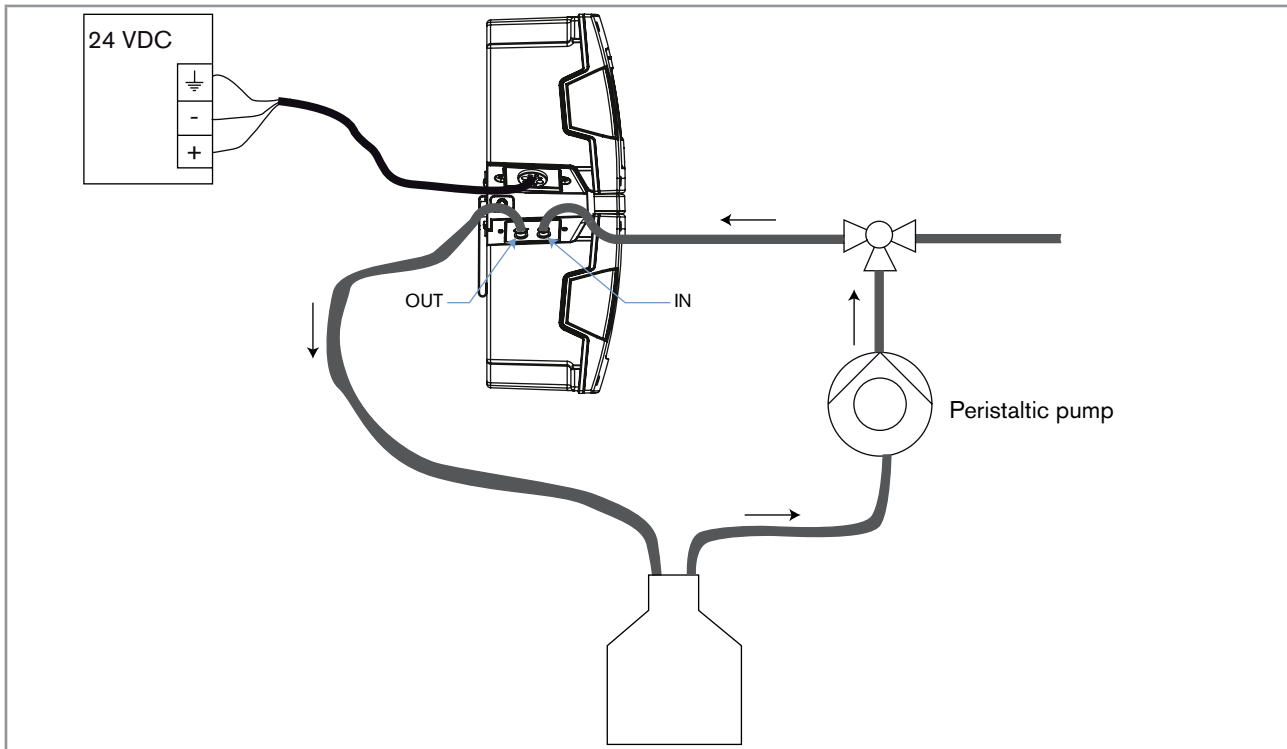



Fig. 3: Installation for the calibration of the sensor in a system type 8905

2. Make sure the direction of the flow is correct.
3. Make sure the fluidic installation for the calibration is tight.
4. Let clean water flow through the system to rinse the product.
5. Prepare a buffer solution with a pH 7 value.
6. In the "Maintenance" view of the sensor, tap **pH calibration wizard** **Zero adjustment** ...▶.
7. Step 1/5: let the buffer solution flow through the product.
8. Tap ▶.
9. Step 2/5: tap **Input buffer value** ▶ and enter the pH value 7 of the buffer solution.
10. Validate.
11. Tap ▶.
12. Step 3/5: when the pH measurement is stable, tap ▶.

## 13. Step 4/5:

- if the calibration has succeeded, the calculated offset value is displayed. Tap  to go to the step 5/5.
- if an error message is displayed, refer to [Table 7](#).
- if a warning message is displayed, refer to [Table 8](#).

## 14. Step 5/5: validate or cancel the calibration.

Table 7: Error message at the end of the calibration of the ISFET sensor



<b>Displayed message</b>	Computed calibration value out of error limits
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	The sensor calibration has failed because the calculated offset value is out of the error range.
<b>What to do?</b>	→ Send the product back to Bürkert.



Table 8: Warning message at the end of the calibration of the ISFET sensor

<b>Displayed message</b>	Computed calibration value out of warning limits
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	The calculated offset value is out of the warning range because a wrong buffer solution has been used for the calibration.
<b>What to do?</b>	<p>→ Make sure the buffer solution used is the correct one.</p> <p>→ If it is not the correct one, abort the calibration, use a correct buffer solution and do the complete calibration procedure again.</p> <p>→ You can choose to either validate or cancel the calibration.</p> <ul style="list-style-type: none"> <li>▪ If you validate the calibration, the new calculated offset value is used to determine the pH value, and the last calibration date is updated.</li> <li>▪ If you cancel the calibration, the current offset value is used to determine the pH value, and the last calibration date is not updated.</li> </ul>

### 8.10.2 Calibrating the offset and/or slope values of the pH sensor

To measure pH values with as less deviation as possible you must calibrate the pH sensor.

This can be done:

- either by adjusting by hand the slope value and/or the offset value of the pH sensor: in the "Maintenance" view of the sensor, tap **pH Slope**  and enter a slope value and/or tap **pH Offset**  and enter an offset value.
- or by doing a 1 point calibration procedure to automatically adjust the offset value of the pH sensor. See chap. [8.10.3](#).
- or by doing a 2 point calibration procedure to automatically adjust the offset value and the slope value of the pH sensor. See chap. [8.10.4](#).

### 8.10.3 Doing a 1 point calibration procedure of the pH sensor



#### Danger due to the nature of the fluid

- ▶ Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

Do a 1 point calibration procedure to automatically adjust the offset value of the pH sensor.

1. Connect a peristaltic pump in the water sample inlet circuit of the system, as shown in [Fig. 3, chap. 8.10.1](#). If the fluidic connections are not done correctly, the product and the system can be damaged because the pressure in the product and in the system is too high.
2. Make sure the direction of the flow is correct.
3. Make sure the fluidic installation for the calibration is tight.
4. Let clean water flow through the system to rinse the product.
5. Prepare a buffer solution with a pH value as close as possible to the water sample and with a pH value that is compatible with all the sensor cubes of the system.
6. In the "Maintenance" view of the sensor, tap **pH calibration wizard 1 point** ...▶.
7. Step 1/5: let the buffer solution flow through the product.



8. Tap

9. Step 2/5: tap **Input buffer value** ▶ and enter the pH value of the buffer solution.

10. Validate.



11. Tap

12. Step 3/5: when the pH measurement is stable, tap



13. Step 4/5:

- if the calibration has succeeded, the calculated offset value is displayed and the date of the last calibration is

updated (see chap. [8.10.7](#)). Tap



- if an error message is displayed, refer to [Table 9](#).
  - if a warning message is displayed, refer to [Table 10](#).
14. Step 5/5: validate or cancel the calibration.



Table 9: Error message at the end of the 1 point calibration of the pH sensor



<b>Displayed message</b>	Computed calibration value out of error limits
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	The sensor calibration has failed because the calculated offset value is out of the error range.
<b>What to do?</b>	<ol style="list-style-type: none"> <li>1. Compare the calculated offset value with the calibration limits that can be read in the "Diagnosis" view.</li> <li>2. Replace the external reference electrode by a new one.</li> <li>3. Do the calibration again.</li> <li>4. If the calibration fails again, replace the product by a new one.</li> </ol>

Table 10: Warning message at the end of the 1 point calibration of the pH sensor

<b>Displayed message</b>	Computed calibration value out of warning limits	
<b>Symbol displayed on the Unique Device Name of the product</b>		
<b>Possible cause</b>	The calculated offset value is out of the warning range because:	
	<ul style="list-style-type: none"> <li>▪ either a wrong buffer solution has been used for the calibration.</li> </ul>	<ul style="list-style-type: none"> <li>▪ or the external reference electrode is aging.</li> </ul>
<b>What to do?</b>	<ol style="list-style-type: none"> <li>1. Make sure the buffer solution used is the correct one.</li> <li>2. If it is not the correct one, abort the calibration.</li> <li>3. Use a correct buffer solution and do the complete calibration procedure again.</li> </ol>	<p>→ You can choose to either validate or cancel the calibration.</p> <ul style="list-style-type: none"> <li>▪ If you validate the calibration, the new calculated offset value is used to determine the pH value, and the last calibration date is updated.</li> <li>▪ If you cancel the calibration, the current offset value is used to determine the pH value, and the last calibration date is not updated.</li> </ul> <p>→ Plan to replace the external reference electrode.</p>

### 8.10.4 Doing a 2 point calibration procedure of the pH sensor




#### Danger due to the nature of the fluid

- ▶ Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

Do a 2 point calibration procedure to automatically adjust the offset value and the slope value of the pH sensor.

1. Connect a peristaltic pump in the water sample inlet circuit of the system, as shown in Fig. 3, chap. 8.10.1. If the fluidic connections are not done correctly, the product and the system can be damaged because the pressure in the product and in the system is too high.
2. Make sure the direction of the flow is correct.


3. Make sure the fluidic installation for the calibration is tight.
4. Let clean water flow through the system to rinse the product.
5. Prepare two buffer solutions with pH values that are compatible with all the sensor cubes of the system.
6. In the "Maintenance" view of the sensor, tap **pH calibration wizard 2 point** .
7. Step 1/8: let the first buffer solution flow through the product.

8. Tap .

9. Step 2/8: tap **Input value of buffer 1**  and enter the pH value of the buffer solution.

10. Tap  to validate.

11. Tap .

12. Step 3/8: when the pH measurement is stable, tap .

13. Let clean water flow through the system to rinse the product.


14. Step 4/8: : let the second buffer solution flow through the product.

15. Tap .

16. Step 5/8: tap **Input value of buffer 2**  and enter the pH value of the buffer solution.


17. Tap  to validate.

18. Tap .

19. Step 6/8: when the pH measurement is stable, tap .

20. Step 7/8:

- if the calibration has succeeded, the calculated slope value and the calculated offset value are displayed and the

date of the last calibration is updated (see chap. [8.10.7](#)). Tap  to go to the step 8/8.

- if an error message is displayed, refer to [Table 11](#).
- if a warning message is displayed, refer to [Table 12](#).

21. Step 8/8: validate or cancel the calibration.

Table 11: Error message at the end of the 2 point calibration of the pH sensor

<b>Displayed message</b>	Computed calibration value out of error limits	
<b>Symbol displayed on the Unique Device Name of the product</b>		
<b>Possible cause</b>	The sensor calibration has failed because the calculated offset value and/or the calculated slope value are out of the error range. → Compare the calculated offset value and the calculated slope value with the calibration limits that can be read in the "Diagnosis" view.	
	▪ If the offset value is out of the error limits:	▪ If the slope value is out of the error limits:
<b>What to do?</b>	<ol style="list-style-type: none"> <li>1. Replace the external reference electrode by a new one.</li> <li>2. Do the calibration again.</li> <li>3. If the calibration fails again, replace the product by a new one.</li> </ol>	→ Send the product back to Bürkert to have the ISFET sensor replaced.

Table 12: Warning message at the end of the 2 point calibration of the pH sensor

Computed calibration value out of warning limits	
<b>Displayed message</b>	
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The calculated offset value and/or the calculated slope value are out of the warning range:</p> <ul style="list-style-type: none"> <li>▪ If the slope value is out of the warning limits:</li> <li>▪ either a wrong buffer solution has been used for the calibration.</li> </ul>
<b>What to do?</b>	<ul style="list-style-type: none"> <li>1. Make sure the buffer solution used is the correct one.</li> <li>2. If it is not the correct one, abort the calibration.</li> <li>3. Use a correct buffer solution and do the complete calibration procedure again.</li> </ul> <p>→ You can choose to either validate or cancel the calibration.</p> <ul style="list-style-type: none"> <li>▪ If you validate the calibration, the new calculated offset value is used to determine the pH value, and the last calibration date is updated.</li> <li>▪ If you cancel the calibration, the current offset value is used to determine the pH value, and the last calibration date is not updated.</li> </ul> <p>→ Plan to replace the external reference electrode.</p> <p>→ Send the product back to Bürkert to have the ISFET sensor replaced.</p>

### 8.10.5 Adjusting the offset value of the temperature

The temperature measured by the sensor can be corrected with an offset value.

1. In the "Maintenance" view of the sensor, tap **Temperature Offset** and enter the value of the temperature offset, in the displayed temperature units.
2. To change the units of the temperature, go to the "Parameter" view of the sensor, tap **Temperature Desired unit** and choose the temperature units: the offset value of the temperature is automatically converted.

### 8.10.6 Simulating some data

Check the operating (for example, make sure the warning and/or error limits are correctly set) of the product and/or process by simulating some data.

1. In the "Maintenance" view of the sensor, tap **Simulation Status** and choose "ON" to activate the simulation.
2. Validate.
3. To simulate a pH value, tap **Simulation pH** and enter the pH value to be simulated.
4. To simulate a temperature value, tap **Simulation Temperature** and enter the temperature value to be simulated.

### 8.10.7 Reading the date of the last calibration

To read the date of the last calibration that has succeeded.

→ In the "Maintenance" view of the sensor, read the date in the field **Calibration schedule Last calibration**.

### 8.10.8 Reading the date of the next due calibration

To read the date of the next calibration that must be done.

→ In the "Maintenance" view of the sensor, read the date in the field **Calibration schedule Next calibration**.

### 8.10.9 Setting the time interval between two calibrations

To set the time interval, in days, between two calibrations:

1. In the "Maintenance" view of the sensor, tap **Calibration schedule Interval in days**.
1. Enter the number of days between two calibrations. We recommend to calibrate the product every month.
2. Validate.

When the due calibration date is reached, a warning message is displayed in the Messages List.

## 9 MAINTENANCE AND TROUBLESHOOTING

### 9.1 Safety instructions



#### WARNING

**Risk of injury due to non-conforming maintenance.**

- ▶ Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.

#### NOTE

**Risk of damage to the product due to the power supply**

- Shut down and isolate the electrical power source before carrying out work on the system.

### 9.2 Cleaning of the product



#### DANGER

**Risk of injury due to the nature of the detergent.**

- ▶ Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.


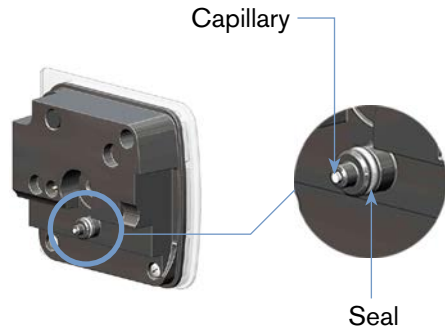


The product can be cleaned with a cloth dampened with water (max. 40 °C) or with an acid detergent (with max. 5% of hydrochloric acid).

### 9.3 Replacing the external reference electrode

The external reference electrode must be replaced if the error calibration limits for the offset value of the pH sensor are exceeded.

Procedure to replace the external reference electrode:

<ol style="list-style-type: none"> <li>1. Remove the pH sensor cube from the system as described in the Operating Instructions of the system type 8905.</li> <li>2. Lift the drop lever of the reference electrode and turn it by a quarter turn to the left.</li> </ol>	
<ol style="list-style-type: none"> <li>3. Pull the lever to remove the external reference electrode.</li> <li>4. Dispose of the used external reference electrode. Keep to the existing provisions on the subject of waste disposal and environmental protection.</li> </ol>	




<p>5. If necessary, clean the empty seating of the electrode reference with a dry cloth or cotton swabs.</p> <p>6. Prepare the new reference electrode.</p> <p>7. Carefully remove the protective cap because it contains some KCl.</p>	
<p>8. Make sure the seal is in its groove on the external reference electrode.</p> <p>9. If necessary, remove the solid deposits from the capillary.</p> <p>10. Moisten the seal with water. If not, the seal can be damaged.</p>	 <p>Capillary</p> <p>Seal</p>
<p>11. Lift the drop lever of the reference electrode and turn it by a quarter turn to the left.</p> <p>12. Insert the new external reference electrode fully.</p>	
<p>13. Turn the drop lever by a quarter turn to the right and lower it fully in its seating.</p>	
<p>14. Mount the pH sensor cube back in the system as described in the Operating Instructions of the system type 8905.</p>	


## 9.4 Troubleshooting if no message is displayed

<p><b>Colour of the product status LED</b></p>	<p>OFF</p>
<p><b>Possible cause</b></p>	<p>The product / the system is not energized.</p>
<p><b>What to do?</b></p>	<ol style="list-style-type: none"> <li>1. Check the wiring.</li> <li>2. Make sure the voltage supply is 24 V DC.</li> <li>3. Check that the power supply source is working properly.</li> </ol>


## 9.5 Troubleshooting if the status LED of the product is red or orange


If an error or a warning message has been generated by the system:

- the status light of the system is red or orange,
- the status LED of the product is red or orange,
- the symbol  or  appears on the Unique Device Name of the product, in the list of devices,
- the symbol  appears in the top left corner of the display.

→ Tap  to access the "Messages List".


### 9.5.1 Message "Too high leakage current"


<b>Displayed message</b>	Too high leakage current
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The leakage current of the ISFET sensor is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the high threshold of the leakage current is selected,</li> <li>▪ and the high threshold set for the leakage current of the ISFET sensor has been reached.</li> </ul>
<b>What to do?</b>	→ Send the product back to Bürkert to have the ISFET sensor replaced.

<b>Displayed message</b>	Too high leakage current
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The leakage current of the ISFET sensor is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the high threshold of the leakage current is selected,</li> <li>▪ and the high threshold set for the leakage current of the ISFET sensor has been reached.</li> </ul>
<b>What to do?</b>	<p>→ Acknowledge the warning message: the product continues to operate.</p> <p>→ or, send the product back to Bürkert to have the ISFET sensor replaced.</p> <p>→ or replace the product by a new one.</p>





### 9.5.2 Message "Too low leakage current"

<b>Displayed message</b>	Too low leakage current
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The leakage current of the ISFET sensor is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the low threshold of the leakage current is selected,</li> <li>▪ and the low threshold set for the leakage current of the ISFET sensor has been reached.</li> </ul>
<b>What to do?</b>	→ Deselect the error "activation flag" for the low threshold of the leakage current.


<b>Displayed message</b>	Too low leakage current
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The leakage current of the ISFET sensor is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the low threshold of the leakage current is selected,</li> <li>▪ and the low threshold set for the leakage current of the ISFET sensor has been reached.</li> </ul>
<b>What to do?</b>	→ Deselect the warning "activation flag" for the low threshold of the leakage current.


### 9.5.3 Message "Too high pH value"

<b>Displayed message</b>	Too high pH value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The pH value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the high threshold of the pH value is selected,</li> <li>▪ and the high threshold set for the pH value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


<b>Displayed message</b>	Too high pH value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The pH value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the high threshold of the pH value is selected,</li> <li>▪ and the high threshold set for the pH value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


### 9.5.4 Message "Too low pH value"

<b>Displayed message</b>	Too low pH value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The pH value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the low threshold of the pH value is selected,</li> <li>▪ and the low threshold set for the pH value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


<b>Displayed message</b>	Too low pH value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The pH value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the low threshold of the pH value is selected,</li> <li>▪ and the low threshold set for the pH value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


### 9.5.5 Message "Too high temperature value"

<b>Displayed message</b>	Too high temperature value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The temperature value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the high threshold of the water sample temperature value is selected,</li> <li>▪ and the high threshold set for the water sample temperature value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


<b>Displayed message</b>	Too high temperature value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The temperature value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the high threshold of the water sample temperature value is selected,</li> <li>▪ and the high threshold set for the water sample temperature value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


### 9.5.6 Message "Too low temperature value"

<b>Displayed message</b>	Too low temperature value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The temperature value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the low threshold of the water sample temperature value is selected,</li> <li>▪ and the low threshold set for the water sample temperature value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


<b>Displayed message</b>	Too low temperature value
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The temperature value of the water sample is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the low threshold of the water sample temperature value is selected,</li> <li>▪ and the low threshold set for the water sample temperature value has been reached.</li> </ul>
<b>What to do?</b>	→ Check the process.


### 9.5.7 Message "Too high reference impedance"

<b>Displayed message</b>	Too high reference impedance
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The impedance of the reference electrode is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the high threshold of the impedance of the reference electrode is selected,</li> <li>▪ and the high threshold set for the impedance of the reference electrode has been reached.</li> </ul>
<b>What to do?</b>	<ol style="list-style-type: none"> <li>1. Go into the "Diagnostic" view of the sensor to read the impedance value of the reference electrode.</li> <li>2. Make sure the high threshold is consistent with the value of the conductivity of the water sample.</li> <li>3. If necessary, replace the external reference electrode.</li> <li>4. If the external reference electrode has been replaced, calibrate the pH sensor.</li> </ol>

<b>Displayed message</b>	Too high reference impedance
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The impedance of the reference electrode is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers</b> <b>Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the high threshold of the impedance of the reference electrode is selected,</li> <li>▪ and the high threshold set for the impedance of the reference electrode has been reached.</li> </ul>
<b>What to do?</b>	<ol style="list-style-type: none"> <li>1. Go into the "Diagnostic" view of the sensor to read the impedance value of the reference electrode.</li> <li>2. Make sure the high threshold is consistent with the value of the conductivity of the water sample.</li> <li>3. Plan to replace the external reference electrode.</li> </ol>

### 9.5.8 Message "Too low reference impedance"

<b>Displayed message</b>	Too low reference impedance
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The impedance of the reference electrode is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers</b> <b>Errors</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the error "activation flag" for the low threshold of the impedance of the reference electrode is selected,</li> <li>▪ and the low threshold set for the impedance of the reference electrode has been reached.</li> </ul>
<b>What to do?</b>	→ Deselect the error "activation flag" for the low threshold of the impedance of the reference electrode.

<b>Displayed message</b>	Too low reference impedance
<b>Symbol displayed on the Unique Device Name of the product</b>	
<b>Possible cause</b>	<p>The impedance of the reference electrode is out of range.</p> <p>The message is displayed when the following settings have been made in <b>Messages triggers</b> <b>Warnings</b> ▶ ("Parameter" view of the sensor):</p> <ul style="list-style-type: none"> <li>▪ the warning "activation flag" for the low threshold of the impedance of the reference electrode is selected,</li> <li>▪ and the low threshold set for the impedance of the reference electrode has been reached.</li> </ul>
<b>What to do?</b>	→ Deselect the warning "activation flag" for the low threshold of the impedance of the reference electrode.

## 10 SPARE PARTS AND ACCESSORIES



### CAUTION

**Risk of injury and/or damage caused by the use of unsuitable parts.**

Incorrect accessories and unsuitable replacement parts may cause injuries and damage the product and the surrounding area.

- ▶ Use only original accessories and original replacement parts from Bürkert.

Accessory	Order code
Buffer solution, pH = 5	566031
Buffer solution, pH = 7	418541
Buffer solution, pH = 8	on request
External reference electrode	566084

## 11 PACKAGING, TRANSPORT

### NOTE

#### Damage due to transport

Transport may damage an insufficiently protected product.

- Transport the product in shock-resistant packaging and away from humidity and dirt.
- Do not expose the product to temperatures that may exceed the admissible storage temperature range.
- Protect the electrical interfaces using protective plugs.

## 12 STORAGE

### NOTE

#### Poor storage can damage the product.

- ▶ Depending on the duration of the storage time, obey the storage instructions in the chapter [12.1](#) to [12.3](#).
- ▶ After any storage period, obey the instructions in chap. [12.4](#).

### 12.1 To store the product for a maximum of 4 days

1. Rinse the product with tap water.
2. Purge the product with air at a max. pressure of 2 bar.
3. Store the product at room temperature (about 23 °C ±10 °C).
4. Store the product in a dry place away from dust.

## 12.2 To store the product for more than 4 days and less than 1 month

1. Rinse the product with tap water.
2. DO NOT PURGE THE PRODUCT because it will dry out.
3. Store the product at room temperature (about 23 °C ±10 °C).
4. Store the product in a dry place away from dust.

## 12.3 To store the product for a more than 1 month

1. Remove the external reference electrode.
2. Rinse the product with tap water.
3. Purge the product with air at a max. pressure of 2 bar.
4. Store the product at room temperature (about 23 °C ±10 °C).
5. Store the product in a dry place away from dust.

## 12.4 After storage

Before commissioning a product that has been stored:

1. Mount a new external reference electrode. See chap. [9.3](#).
2. Plug the product in the system.
3. While the power supply of the system is OFF, let the water sample flow through the product for at least 2 hours.
4. Calibrate the product. See chap. [8.10](#).

## 13 DISPOSAL OF THE PRODUCT

→ Dispose of the product and its packaging in an environmentally-friendly way.

### NOTE

**Damage to the environment caused by products contaminated by fluids.**

- Keep to the existing provisions on the subject of waste disposal and environmental protection.



### Note:

Comply with the national and/or local regulations which concern the area of waste disposal.











