

Operating Instructions

CPS47D/77D/97D

Memosens sensors for pH measurement

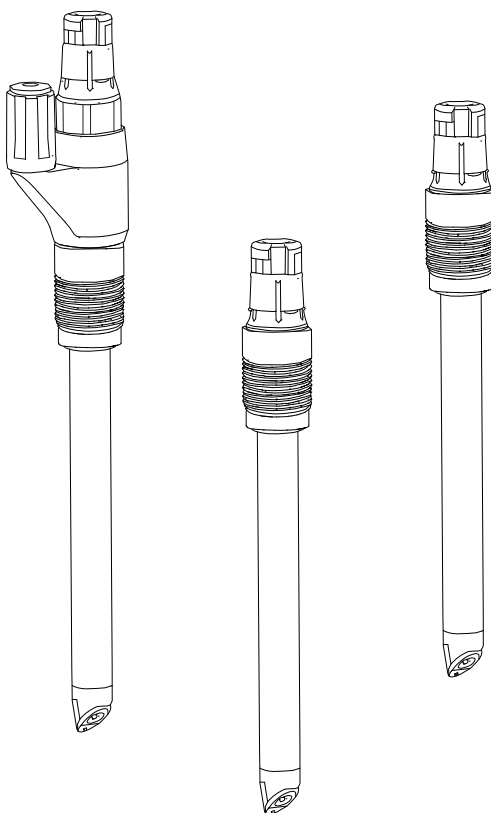


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1 About this document

1.1 Symbols used

Structure of information	Meaning
<p>⚠ DANGER</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.</p>
<p>⚠ WARNING</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.</p>
<p>⚠ CAUTION</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.</p>
<p>NOTICE</p> <p>Cause/situation If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Action/note 	<p>This symbol alerts you to situations which may result in damage to property.</p>

The following manuals which complement these Operating Instructions can be found on the product pages on the Internet:

- Technical Information for the relevant sensor
- Operating Instructions for the transmitter used

2 Basic safety instructions

2.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.



Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Designated use

The sensors are designed for the continuous measurement of the pH value in liquids.



A list of recommended applications is provided in the Technical Information for the relevant sensor.

CPS47D:

- Long-term monitoring or limit monitoring in process engineering
 - Chemical processes
 - Organic chemistry with high levels of organic solvents
 - Low conductivities
 - Clogging media
 - Incinerator plants
- Water treatment
 - Water with low conductivity for Food and Life Sciences

CPS77D:

Hygienic and sterile applications (sterilizable, autoclavable)

- Fermenters
- Biotechnology
- Pharmaceutical industry
- Foods

CPS97D:

- Contaminated media and suspended solids
 - Dispersions
 - Precipitation reactions
 - Emulsions
- Process technology and monitoring of processes with:
 - Rapidly changing pH values
- Chemical processes
- Pulp and paper industry

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

- ▶ If faults cannot be rectified:
products must be taken out of service and protected against unintentional operation.

2.5 Product safety

2.5.1 State of the art

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and European standards have been observed.

2.5.2 Transport and storage

- ▶ All sensors are individually tested and supplied in individual packs.
- ▶ Sensors should be stored in dry rooms at temperatures of 0 to 50 °C (32 to 122 °F).

3 Incoming acceptance and product identification

3.1 Product identification

3.1.1 Nameplate

The nameplate provides you with the following information on your device:

- Manufacturer details
- Order code
- Serial number
- Operating conditions
- Safety information and warnings

► Compare the information on the nameplate with the order.

3.1.2 Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to www.endress.com.
2. Call up the site search (magnifying glass).
3. Enter a valid serial number.
4. Search.
 - ↳ The product structure is displayed in a popup window.
5. Click on the product image in the popup window.
 - ↳ A new window (**Device Viewer**) opens. All of the information relating to your device is displayed in this window as well as the product documentation.

3.1.3 Certificates and approvals

CE mark

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EU directives. The manufacturer confirms successful testing of the product by affixing to it the CE mark.

EAC

The product has been certified according to guidelines TP TC 004/2011 and TP TC 020/2011 which apply in the European Economic Area (EEA). The EAC conformity mark is affixed to the product.

4 Installation

4.1 Installation conditions

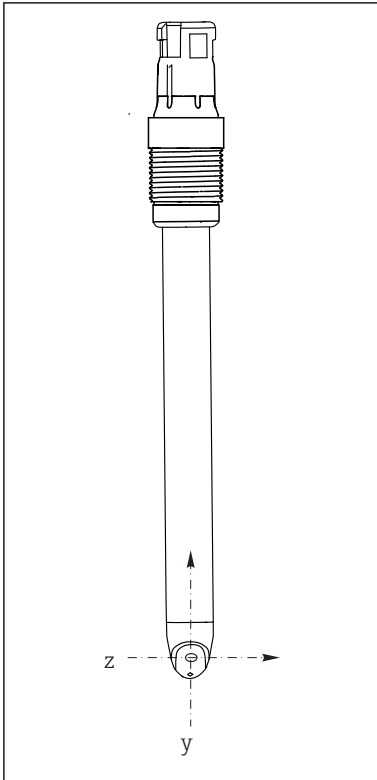
- Before screwing in the electrode, make sure the assembly thread is clean and runs smoothly.
 - Pay attention to the installation instructions provided in the Operating Instructions of the assembly used.
- ▶ Screw in the electrode and tighten by hand 3 Nm (2.21 lbf ft) (specifications only apply if installing in Endress+Hauser assemblies).

4.2 Orientation



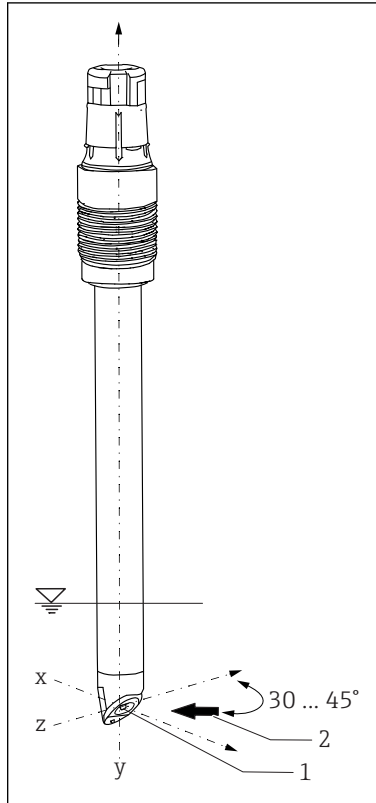
Note the direction of medium flow when installing the sensor.

- ▶ Position the ISFET chip so that it is at an angle of approx. 30 to 45 ° to the flow direction (item 2).
- ↳ Use the rotatable terminal head for this purpose.



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1 Sensor orientation, front view



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2 Sensor orientation, 3D view

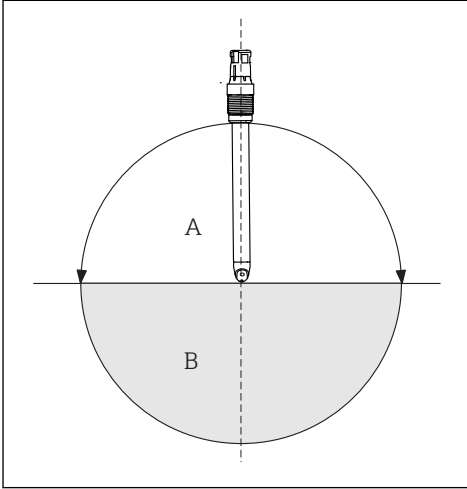
- 1 ISFET chip
- 2 Direction of medium flow

When installing the sensor in an assembly, use the serial number engraved on the terminal head to ensure correct sensor orientation. The engraving is always on the same plane as the ISFET chip and the nameplate (z-y direction).

i ISFET sensors are not designed for use in abrasive media. If these sensors are nevertheless used in such applications, avoid direct flow to the chip. This increases the sensor operating life and improves the sensor drift behavior. The disadvantage is that the pH value displayed is not stable.

4.3 Installation instructions

ISFET sensors can be installed in any position because there is no liquid inner lead. However, in the event of upside-down installation an air bubble¹⁾ may form in the reference system and interrupt the electrical contact between the medium and the junction.



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Make sure to follow the installation instructions in the Operating Instructions of the assembly used.

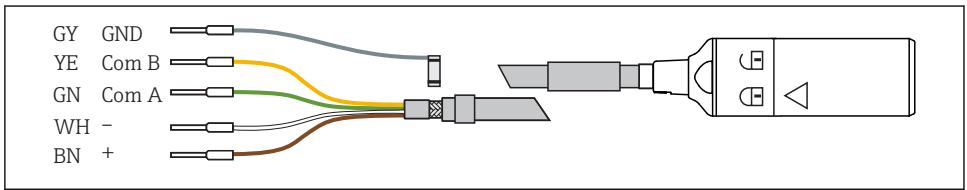
3 Angle of installation

- A Recommended
- B Permitted, please pay careful attention to basic conditions!

1) The sensor is free of air bubbles when delivered from the factory. Air bubbles occur, however, when working with negative pressure, e.g. when emptying a tank.

5 Electrical connection

The sensor is connected to the transmitter via the Memosens data cable CYK10.



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4 Memosens data cable CYK10

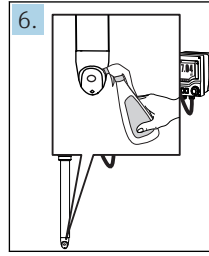
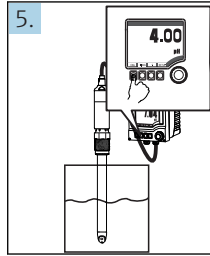
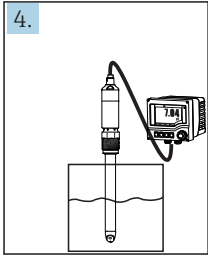
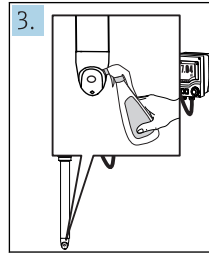
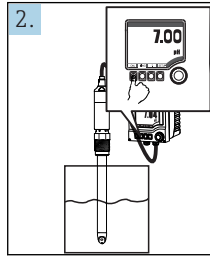
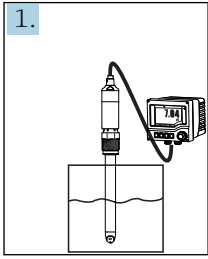
6 Commissioning

6.1 Calibration and measurement

- ▶ Remove the protection cap for calibration and measurement.
- ▶ ISFET sensors which are stored dry must be immersed in water for at least 15 minutes before use. A closed-control loop is created when the measuring system is switched on. The measured value adjusts to the real value during this time (approx. 5 to 8 minutes). This settling behavior occurs every time the film of liquid between the pH-sensitive semiconductor and the reference lead is interrupted. The settling time depends on the length of the interruption.
- ▶ If the protection cap is no longer used to store the sensor, store the sensor in a KCl solution (3 mol/l) or buffer solution.
- ▶ Do not store the sensor in distilled water!
- ▶ The frequency at which a sensor calibration or sensor inspection is performed depends on the operating conditions (fouling, chemical load).
- ▶ Two-point calibration is required for ISFET sensors. Use a high-quality buffer from Endress+Hauser, e.g. CPY20.



ISFET sensors with Memosens technology do not need to be calibrated when they are connected for the first time. Calibration is only required if very strict accuracy requirements must be met or if the sensor has been in storage for longer than three months.



1. Immerse the sensor into a defined buffer solution (e.g. pH 7).
2. Perform the calibration at the measuring device:
 - (a) In the case of pH sensors and manual temperature compensation, set the measurement temperature.
 - (b) Enter the pH value of the buffer solution.
 - (c) Start calibration.
 - (d) The value is accepted once it has stabilized.
3. Rinse the sensor with distilled water. Do not dry the sensor!
4. Immerse the ISFET sensor into the second buffer solution (e.g. pH 4).
5. Perform the calibration at the measuring device:
 - (a) Enter the pH value of the second buffer solution.
 - (b) Start the calibration.
 - (c) The value is accepted once it has stabilized.

The device calculates the operating point and slope and displays the values. Once the adjustment values have been accepted, the device is adjusted to the new ISFET sensor.
6. Rinse the ISFET sensor with distilled water.

7 Maintenance

7.1 Maintenance tasks

7.1.1 Cleaning the sensor

- ▶ Clean the sensor before each calibration.

Clean away fouling on the sensor as follows depending on the type of fouling:

1. Oily and greasy films:

Clean with grease remover, e.g. alcohol, perhaps hot water and (alkaline) agents containing surfactants (e.g. dishwashing detergent).

2. Lime, cyanide and metal hydroxide buildup and low solubility (lyophobic) organic buildup:

Dissolve buildup with diluted hydrochloric acid (3 %) and then rinse thoroughly with plenty of clear water.

3. **⚠ WARNING**

Thiocarbamide

Harmful if swallowed. Limited evidence of carcinogenicity. Possible risk of harm to the unborn child. Dangerous for the environment with long-term effects!

- ▶ Wear protective goggles, protective gloves and appropriate protective clothing.
- ▶ Avoid all contact with the eyes, mouth and skin.
- ▶ Avoid discharge into the environment.

Sulfidic buildup (from flue gas desulfurization or sewage treatment plants):

Use a mixture of hydrochloric acid (3 %) and thiocarbamide (commercially available) and then rinse thoroughly with plenty of clear water.

4. Buildup containing proteins (e.g. food industry):

Use a mixture of hydrochloric acid (0.5 %) and pepsin (commercially available) and then rinse thoroughly with plenty of clear water.

5. **NOTICE**

Pressurized water can damage the seal!

- ▶ Do not direct pressurized water straight onto the chip.

Fibers, suspended substances:

Rinse with pressurized water or possibly with surface-active agents.

6. Readily soluble biological buildup:

Rinse with pressurized water.

7. Sensors with very long response time:

Use a mixture that contains hydrofluoric acid and consists of nitric acid (10%) and ammonium fluoride (50 g/l).

⚠ WARNING**Hydrofluoric acid**

Risk of serious or fatal injury from caustic burns!

- ▶ Wear goggles to protect eyes.
- ▶ Wear protective gloves and appropriate protective clothing.
- ▶ Avoid all contact with the eyes, mouth and skin.
- ▶ If using hydrofluoric acid, use plastic vessels only.

8 Repair

8.1 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

To ensure the swift, safe and professional return of the device:

- ▶ Refer to the website www.endress.com/support/return-material for information on the procedure and conditions for returning devices.



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www.addresses.endress.com
