

Operating Instructions

Combined pH/ORP sensors

CPS16E, CPS76E and CPS96E

pH and ORP measurement
Sensors with Memosens 2.0 technology



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1 About this document

1.1 Warnings

Structure of information	Meaning
 DANGER Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.
 WARNING Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
 CAUTION Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
 NOTICE Cause/situation If necessary, Consequences of non-compliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols

	Additional information, tips
	Permitted
	Recommended
	Not permitted or not recommended
	Reference to device documentation
	Reference to page
	Reference to graphic
	Result of an individual step

1.2.1 Symbols on the device

	Reference to device documentation
	Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

1.3 Documentation

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

In addition to these Operating Instructions, an XA with "Safety instructions for electrical apparatus in the hazardous area" is also included with sensors for use in the hazardous area.

- Please follow instructions on use in the hazardous area carefully.



Safety instructions for electrical apparatus in explosion-hazardous areas for ATEX and IECEx approval, XA01991C



Safety instructions for electrical apparatus in explosion-hazardous areas for JPN Ex approval, XA02244C



Safety instructions for electrical apparatus in explosion-hazardous areas for NEPSI Ex approval, XA02113C



Safety instructions for electrical apparatus in explosion-hazardous areas for INMETRO approval, XA02082C



Safety instructions for electrical apparatus in explosion-hazardous areas for CSA C/US approval, XA02235C



Safety instructions for electrical apparatus in explosion-hazardous areas for UK Ex approval, XA02588C



Safety instructions for electrical apparatus in explosion-hazardous areas for KOR Ex approval, XA02739C

2 Basic safety instructions

2.1 Requirements for the 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 Intended use

The sensors are designed for continuous measurement of the pH value, ORP and rH value in liquids.



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

Any use other than that intended puts the safety of people and the measuring system at risk. Therefore, any other use is not permitted.

The manufacturer is not liable for harm caused by improper or unintended use.

2.3 Workplace safety

The operator is responsible for ensuring compliance with the following safety regulations:

- 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.

Procedure for damaged products:

1. Do not operate damaged products, and protect them against unintentional operation.
2. Label damaged products as defective.

During operation:

- If errors cannot be rectified,
take products out of service and protect them against unintentional operation.

2.5 Product safety

2.5.1 State-of-the-art technology

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 international standards have been observed.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

1. Verify that the packaging is undamaged.
 - ↳ Notify the supplier of any damage to the packaging.
Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
 - ↳ Notify the supplier of any damage to the delivery contents.
Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
 - ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
 - ↳ The original packaging offers the best protection.
Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

3.2 Product identification

3.2.1 Nameplate

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

- Manufacturer identification
 - Extended order code
 - Serial number
 - Safety information and warnings
 - Certificate information
- Compare the information on the nameplate with the order.

3.2.2 Identifying the product

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. Page search (magnifying glass symbol): Enter valid serial number.
3. Search (magnifying glass).
 - ↳ The product structure is displayed in a popup window.

4. Click the product overview.

- ↳ Here you will find information pertaining to your device, including the product documentation.

3.2.3 Manufacturer address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
70839 Gerlingen
Germany

or

Endress+Hauser Conducta Inc.
4123 East La Palma Avenue, Suite 200
Anaheim, CA 92807 USA

3.3 Storage and transport

NOTICE

Freezing of internal buffer and inner electrolyte!

The sensors can crack at temperatures lower than -15 °C (5 °F).

- ▶ If transporting the sensors, make sure to package them so they are appropriately protected against frost.

All sensors are individually tested and supplied in individual packs. The sensors are fitted with a wetting cap. The cap contains a KCl-containing liquid that prevents the sensor from drying out. The liquid does not need to cover the pH glass membrane. The 100% humidity inside the cap is sufficient to keep the sensor ready for measurement.

- ▶ If a wetting cap is not used to store the sensor, store the sensor in a KCl solution (3 mol/l) or in a salt-enriched buffer solution (preferably CPY20 pH 7).



Do not allow the sensor to dry out, This can lead to permanent measurement errors or sensor failure.

Sensors must be stored in dry rooms at temperatures of 0 to 50 °C (32 to 122 °F).

3.4 Scope of delivery

The scope of delivery comprises:

- Ordered version of the sensor
- Operating Instructions
- Safety instructions for the hazardous area (for sensors with Ex approval)
- Supplementary sheet for optionally ordered certificates

3.5 Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.

2. Open the product page.
3. Select **Downloads**.

4 Installation

4.1 Installation requirements



Follow the Operating Instructions for the assembly used for detailed information on installing the assembly.

1. Before screwing in the sensor, make sure the assembly thread, the O-rings and the sealing surface are clean and undamaged and that the thread runs smoothly.
2. Hand-tighten the sensor with a torque of 3 Nm (2.21 lbf ft) (Only applies when installing in Endress+Hauser assemblies).

4.1.1 Orientation

⚠ CAUTION

Pressurization of sensor due to prolonged use under increased process pressure

Possibility of sudden rupture and injury from glass splinters!

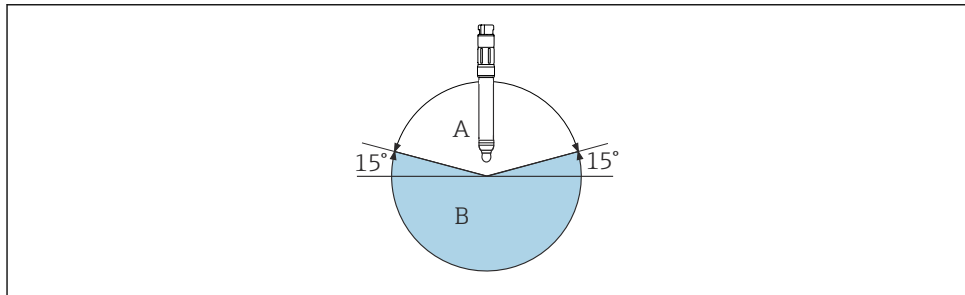
- ▶ Avoid fast heating of these pressurized sensors if they are used under reduced process pressure or under atmospheric pressure.
- ▶ When handling these sensors, always wear protective goggles and appropriate protective gloves.
- Do not install the sensors upside-down.
- The angle of inclination from the horizontal must be at least 15°.

NOTICE

Angle of inclination of the sensor less than 15°

An air bubble forms in the glass bulb and there is then no guarantee that the pH membrane is completely covered with inner electrolyte!

- ▶ Select the installation angle of the sensor so that it does not drop below 15°.



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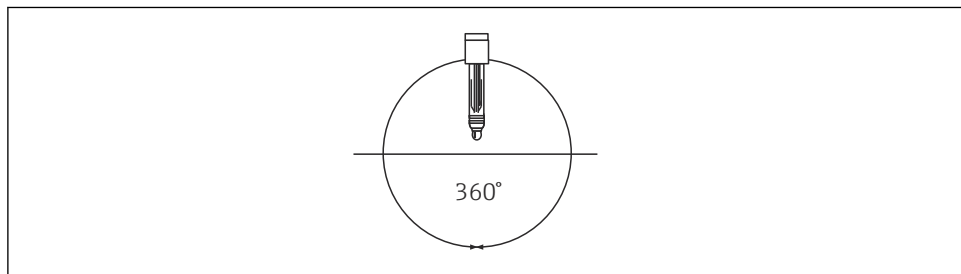
- 1 Installation angle at least 15° from the horizontal

A Permitted orientation

B Forbidden orientation

Orientation of sensors for upside-down installation:

- The sensors are suitable for upside-down installation in accordance with the order code for "Reference system".
- Install the sensors at any angle.



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 2 Any installation angle

4.2 Post-installation check

Put the sensor into operation only if you can answer "yes" to the following questions:

- Are the sensor and cable undamaged?
- Is the orientation correct?

5 Electrical connection

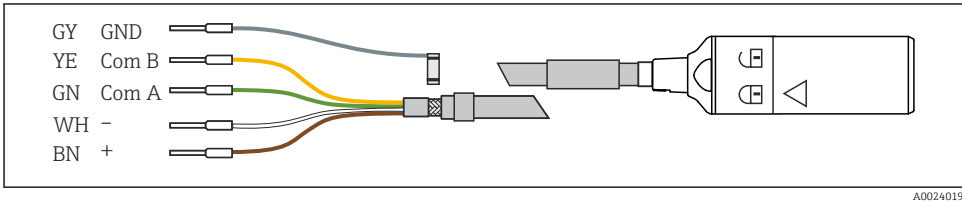
WARNING

Device is live!

Incorrect connection may result in injury or death!

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

5.1 Connecting the sensor



 3 *Measuring cable CYK10 or CYK20*

- ▶ Connect the Memosens measuring cable, e.g. CYK10 or CYK20, to the sensor.



For further information on cable CYK10, see BA00118C.

6 Commissioning

6.1 Preparatory steps

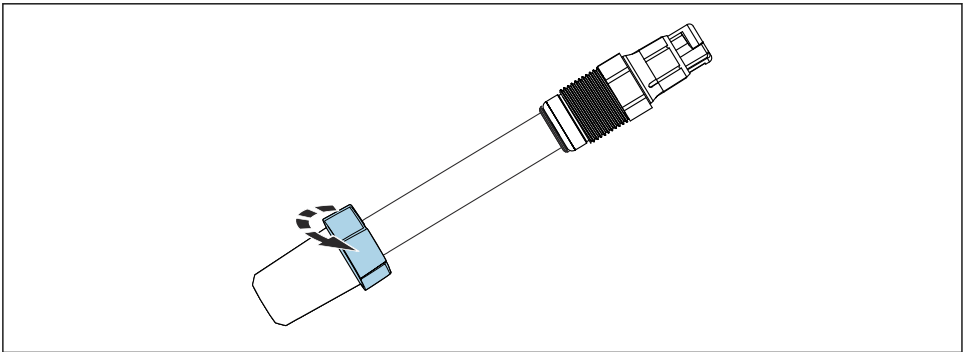
NOTICE

If, for temporary storage, the protective cap is refitted on a moist sensor, KCl may crystallize out. This can lead to the cap drying out.

- Ensure that the sensor is dry when the protective cap is fitted.

Before commissioning the sensor, remove the wetting cap with bayonet connector or the protective cap:

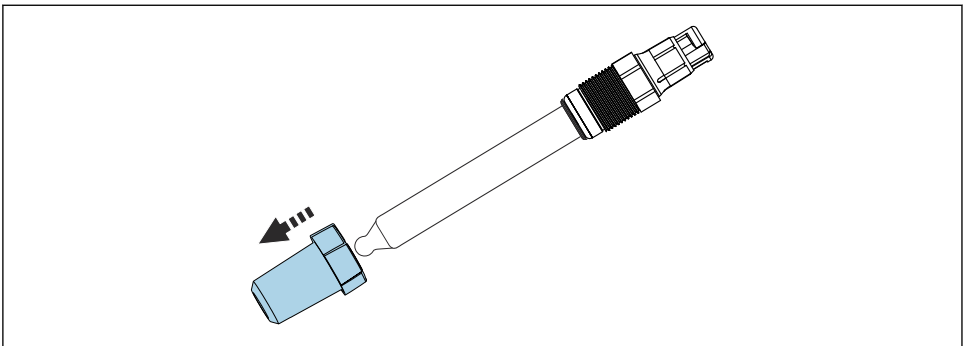
1. Turn the upper part of the wetting cap.



A0041481

-  4 Releasing the wetting cap with bayonet connector

2. Carefully remove the wetting cap from the sensor.



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-  5 Removing the wetting cap with bayonet connector

6.1.1 Calibration and adjustment

The frequency at which a sensor calibration or sensor inspection is performed depends on the operating conditions, e.g. fouling and chemical load.

i The new combined pH/ORP sensors with Memosens technology do not need to be calibrated. Calibration is only required if very strict measurement accuracy requirements must be met, or if the sensor has been in storage for longer than 3 months.

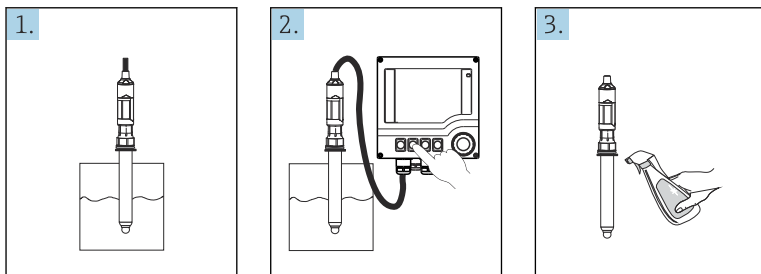
- For two-point calibration, use quality buffer solutions from Endress+Hauser, e.g. CPY20.

NOTICE

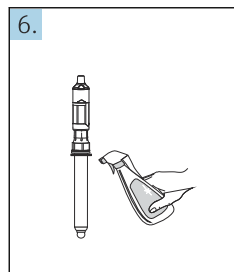
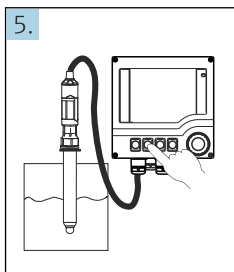
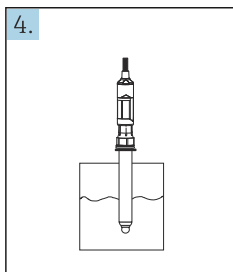
Severe value drifting can occur if pH/ORP sensors are stored dry!

- Immerse them in water for at least 24 hours before use.
- Store the sensor in a KCl solution (3 mol/l) or buffer solution (pH 7.00).

pH and ORP:



- 1.** Immerse the sensor in a defined buffer solution (e.g. pH 7 or 220 mV).
 - 2.** Perform the calibration at the measuring device:
 - (a) Set the measurement temperature in the case of manual temperature compensation.
 - (b) Enter the pH value or mV 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!
- Calibration finished for ORP measurement.

pH only:

4. Immerse the sensor in 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 zero point and slope and displays the values. Once the adjustment values have been accepted, the device is adjusted to the new pH sensor.

6. Rinse the sensor with distilled water.

7 Maintenance

7.1 Maintenance tasks

7.1.1 Cleaning the sensor

WARNING

Mineral acids

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.

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.

CAUTION

Corrosive chemicals

Risk of chemical burns to the eyes and skin and risk of damage to clothing and equipment!

- ▶ It is absolutely essential to protect the eyes and hands properly when working with acids, alkalis and organic solvents!
- ▶ Wear protective goggles and safety gloves.
- ▶ Clean away splashes on clothes and other objects to prevent any damage.
- ▶ Comply with instructions in the safety data sheets for the chemicals used.

Possible cleaning aids:

- Brush with soft bristles
- Soft cloth
- Sponge

- ▶ First rinse the sensor with clean water to remove liquid residues.

In case of fouling and deposits:

1. Clean the sensor with a solution of detergent and warm water.
2. Carefully scrub the sensor with a soft brush.
3. Rinse the sensor thoroughly with warm tap water.

⚠ WARNING**Mineral acids**

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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, or hot water with an alkaline agent.

2. Lime 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. Sulfidic buildup (from flue gas desulfurization or wastewater 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 protein (e.g. in the food industry):

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

5. Readily soluble biological buildup:

Rinse with pressurized water.

After cleaning, rinse the sensor thoroughly with plenty of water and then recalibrate it.

Regeneration of slow-reacting pH sensors

- ▶ Use a mixture that contains hydrofluoric acid and consists of nitric acid (10 %) and ammonium fluoride (50 g/l (6.7 oz/gal)).

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.

www.endress.com/support/return-material

8.2 Disposal

The device contains electronic components. The product must be disposed of as electronic waste.

- Observe the local regulations.



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

9 Accessories



For detailed information on accessories, see the "Technical Information" for the relevant sensor.

10 Technical data



For detailed information on technical data, see the "Technical Information" for the relevant sensor.



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