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Operating Instructions
pH sensors CPSx1E, CPFx1E
ORP sensors CPSx2E, CPFx2E

pH and ORP measurement
Sensors with Memosens 2.0 technology

Endress+Hauser
People for Process Automation

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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 used

- Additional information, tips
- Permitted or recommended
- Not permitted or not recommended
- Reference to device documentation
- Reference to page
- Reference to graphic
- Result of a 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 hazardous areas, Memosens 2.0 pH/ORP for ATEX and IECEx approval, XA01991C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for JPN Ex approval, XA02244C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for NEPSI Ex approval, XA02113C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for INMETRO approval, XA02082C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for CSA C/US-approval, XA02235C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for UK Ex approval, XA02588C

Safety instructions for electrical apparatus in hazardous areas, Memosens 2.0 pH/ORP for Korea 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 pH sensors CPSx1E, CPFx1E are designed for the continuous measurement of the pH value in liquids.

The ORP sensors CPSx2E, CPFx2E are designed for the continuous measurement of the oxidation reduction potential in liquids.

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

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 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 details
- Order code
- Serial number
- Safety information and warnings
- Certificate information

▶ Compare the information on the nameplate with the order.

3.2.2 Product identification

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. Open 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.

3.2.3 Manufacturer's address

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

or

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

3.3 Storage and transport

All sensors are individually tested and supplied in individual packs. The sensors are equipped with a moistening cap with a bayonet lock. The cap contains a special liquid that prevents the sensor from drying out.

- If a moistening cap is not used to store the sensor, store the sensor in a KCl solution (3 mol/l) or buffer solution.

Do not allow the sensor to dry out, as this can result in permanent measurement errors.

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

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.

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 via the Product Configurator at www.endress.com.

1. Select the product using the filters and search field.
2. Open the product page.

The **Configuration** button opens the Product Configurator.

4 Mounting

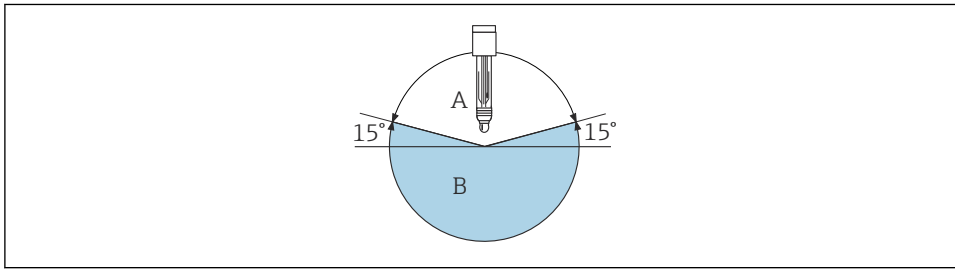
4.1 Mounting requirements

For detailed installation instructions for the assembly: refer to the Operating Instructions of the assembly used.

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. Screw in the sensor and tighten by hand with a torque of 3 Nm (2.21 lbf ft) (specifications only apply if installing in Endress+Hauser assemblies).

4.1.1 Orientation

- Do not install the sensors upside-down.
- The angle of inclination from the horizontal must be at least 15°.



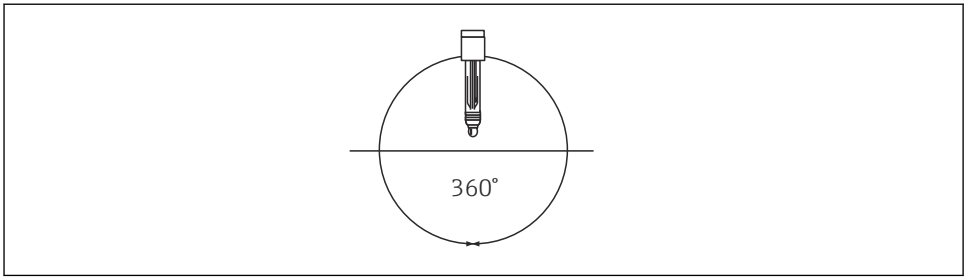
1 Installation angle at least 15° from the horizontal

A Permitted orientation
B Incorrect orientation

Orientation of sensors for upside-down installation:

- The sensors are suitable for upside-down installation according to the "Reference system" order code [1].
- Install the sensors at any angle.

1) Upside-down installation is also possible for ORP and reference half-cells with a solid gel.



2 *Any installation angle*

⚠ CAUTION

Glass sensor with pressurized reference

Possibility of sudden rupture and injury from glass splinters!

- ▶ When handling these sensors, always wear protective goggles and appropriate protective gloves.

⚠ 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.

4.2 Post-mounting 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

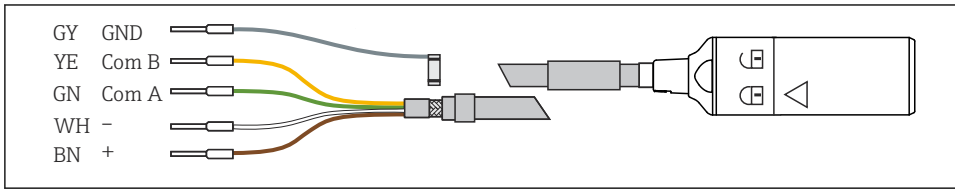
WARNING

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



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3 Measuring cable CYK10 or CYK20

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

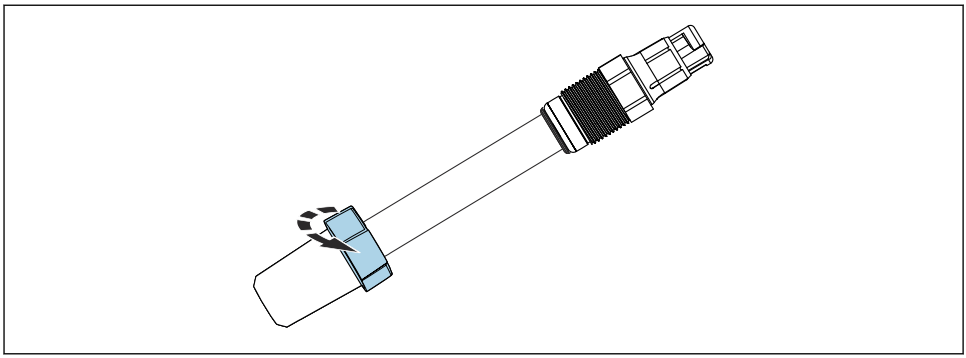
For further information on cable CYK10, see BA00118C

6 Commissioning

6.1 Preliminaries

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

1. Turn the top part of the wetting cap.



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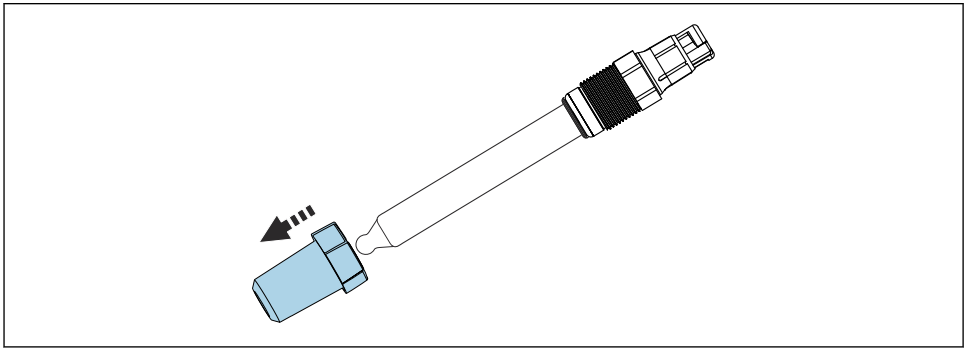
4 *Releasing the wetting cap*

2. Carefully remove the wetting cap from the sensor.



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5 *Removing the wetting cap*

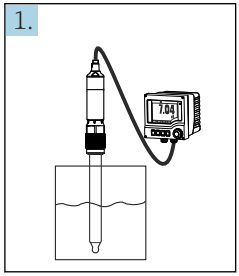
6.1.1 Calibration and adjustment

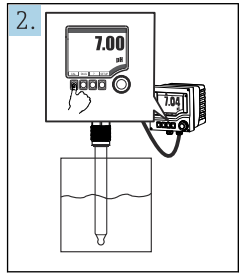
The frequency at which a sensor calibration or sensor inspection is performed depends on the operating conditions, e.g. fouling and chemical load.

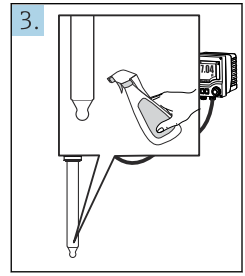
New pH or ORP sensors with Memosens technology do not need to be calibrated. Calibration is only required if very strict accuracy requirements must be met, or if the sensor has been in storage for longer than 3 months.

- Two-point calibration is required for pH sensors. Use quality buffers from Endress+Hauser, e.g. CPY20, for this purpose.
- Single-point calibration is required for ORP sensors. Use a buffer solution with 220 mV or 468 mV from Endress+Hauser for this purpose, e.g. CPY3.

Calibrating and adjusting ORP sensors:







1. Immerse the sensor into a defined buffer solution (e.g. pH 7 or 220 mV).

2. Perform the calibration at the transmitter:

(a) In the case of pH sensors and manual temperature compensation, set the measurement temperature.

(b) Enter the pH value or mV value of the buffer solution.

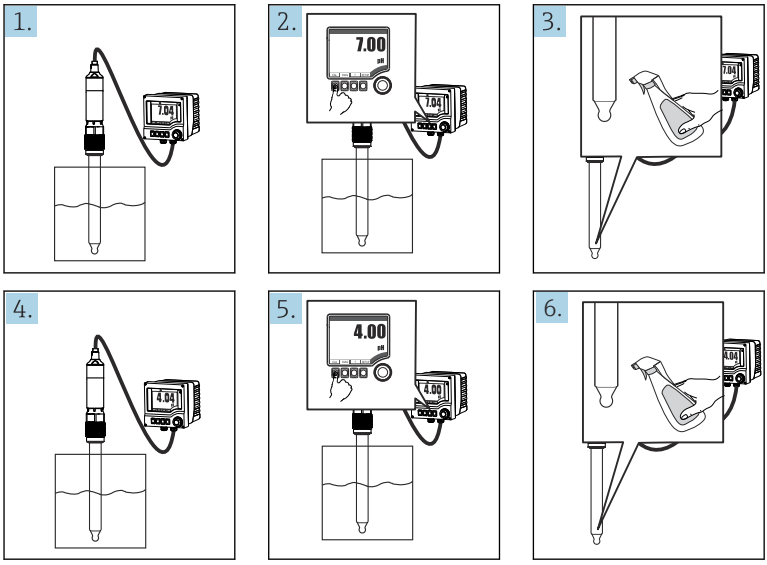
(c) Start the calibration.

(d) The value is accepted once it has stabilized.

3. Rinse the sensor with distilled water. Do not dry the sensor!

The use of automatic temperature compensation (ATC) is recommended for calibration and measurement.

Calibrating and adjusting pH sensors:



1. Immerse the sensor into a defined buffer solution (e.g. pH 7 or 220 mV).

2. Perform the calibration at the transmitter:

(a) In the case of pH sensors and manual temperature compensation, set the measurement temperature.

(b) Enter the pH value or mV value of the buffer solution.

(c) Start the 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 sensor into the second buffer solution (e.g. pH 4).

5. Perform the calibration at the transmitter:

(a) Enter the pH value of the second buffer solution.

(b) Start the calibration.

(c) The value is accepted once it has stabilized.

6. Rinse the sensor with distilled water.

The use of automatic temperature compensation (ATC) is recommended for calibration and measurement.

The transmitter calculates the zero point and slope and displays the values. The sensor is adjusted once the values are accepted.

7 Maintenance

7.1 Maintenance tasks

7.1.1 Cleaning the sensor

- First rinse the sensor with clear water.

WARNING

Mineral acids and 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.

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.

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

1. Oily and greasy films:
   Clean with fat solvent, e.g. alcohol, or hot water and agents containing surfactants (alkaline) (e.g. dishwashing detergent).
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 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. Readily soluble biological buildup:
   Rinse with pressurized water.

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

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.

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.

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 Endress+Hauser 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.

www.addresses.endress.com

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