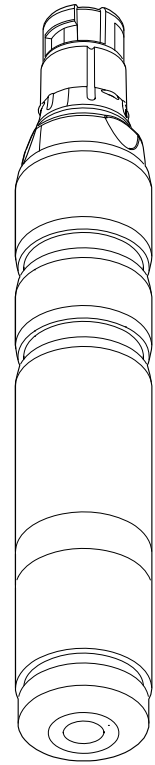
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Operating Instructions
Memosens CCS58D

Digital sensor with Memosens technology for determining ozone



Endress+Hauser
People for Process Automation

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1 About this document

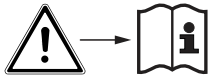
1.1 Warnings

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

Symbol	Meaning
	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

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

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.
- Measuring point faults may be repaired only 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

Drinking water and process water must be disinfected through the addition of appropriate disinfectants such as inorganic chlorine compounds, for example. The dosing quantity of the disinfectant must be adapted to continuously fluctuating operating conditions. If the concentrations in the water are too low, this could jeopardize the effectiveness of the disinfection. On the other hand, concentrations which are too high can lead to signs of corrosion and have an adverse effect on taste, as well as generating unnecessary costs.

The Memosens CCS58D sensor was specifically developed for this application and is designed for continuous measurement of ozone in water. In conjunction with measuring and control equipment, it allows optimal control of disinfection.

The sensor is not suitable for checking the absence of ozone or for measuring ozone in the gas phase.

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.

2.2.1 Hazardous environment in accordance with cCSAus NI Cl. I, Div. 2 [1)]

- It is essential to observe and comply with the control drawing and the specified application conditions in the appendix of these Operating Instructions.

2.3 Workplace safety

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

- Installation guidelines
- Local standards and regulations

1) Only if connected to CM44x(R)-CD*

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable international standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

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.

2.4.1 Special instructions

- ▶ Do not operate the sensor under process conditions (e.g. negative pressure) in which components of the electrolyte can enter the process through the membrane.

Use of the sensor for its intended purpose in liquids with a conductivity of at least 10 nS/cm can be classified as safe in terms of the application.

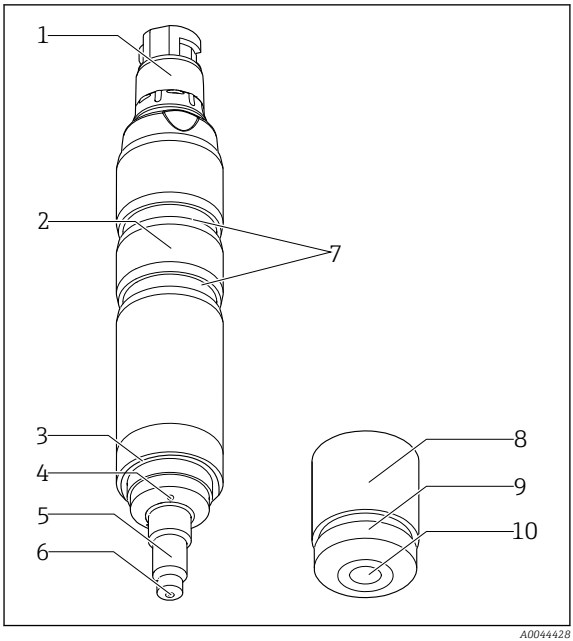
2.5 Product safety

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 Product description

3.1 Product design

The sensor consists of the following functional units:
- Membrane cap (measuring chamber with membrane)
  - Separates the inner amperometric system from the medium
  - With robust membrane that is unaffected by surfactants
  - With special support grid between working electrode and membrane for a defined and consistent electrolyte film and thus a relatively constant indication even at varying pressures and flows
- Sensor shaft with
  - Large counter electrode
  - Working electrode embedded in plastic
  - Embedded temperature sensor



1 *Memosens plug-in head*
2 *Sensor shaft*
3 *O-ring*
4 *Pressure compensation opening*
5 *Large silver/silver halide counter electrode*
6 *Gold working electrode*
7 *Grooves for installation adapter*
8 *Membrane cap*
9 *Membrane holder*
10 *Sensor membrane*

1 Sensor structure

3.1.1 Measuring principle

Ozone levels are determined in accordance with the amperometric measuring principle.

The ozone (O_3) contained in the medium diffuses through the sensor membrane and is reduced to hydroxide ions (OH^-)at the working electrode. At the counter electrode, silver is oxidized to silver bromide. Electron donation at the working electrode and electron acceptance

at the counter electrode causes a current to flow which is proportional to the concentration of ozone in the medium. This process does not depend on the pH value over a wide range.

The transmitter uses the current signal to calculate the measured variable for concentration in mg/l (ppm).

3.1.2 Effects on the measured signal

pH value

pH dependency

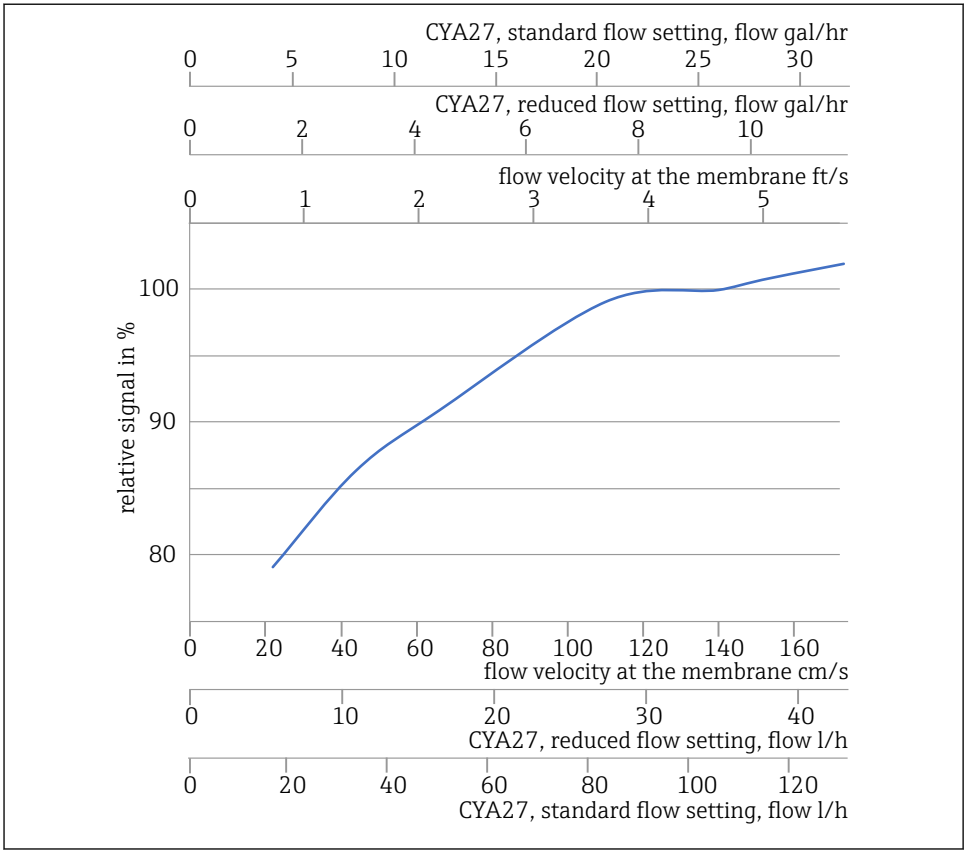
pH value	Effect
< 4	Chlorine is produced if chloride (Cl^-) is present in the medium at the same time. This would also be measured with a photometric reference test. It is not measured by the sensor.
4 to 9	The pH value does not affect measurement of the ozone concentration in the medium.
> 9	Ozone is unstable and decomposes.

Flow

The minimum flow velocity at the membrane-covered measuring cell is 29 cm/s (1.0 ft/s).

- When using the Flowfit CYA27 flow assembly, the minimum flow velocity corresponds to a volume flow of 7 l/h (1.8 gal/h)or 30 l/h (7.9 gal/h), depending on the version of the Flowfit CYA27. If possible, the Memosens CCS58D sensor should be installed in the first module after the inlet module.
- When using the Flowfit CCA151 flow assembly, the minimum flow velocity corresponds to a volume flow of 7 l/h (1.8 gal/h).
- When using the CCA250 flow assembly, the minimum flow velocity corresponds to a volume flow of 45 l/h (11.9 gal/h). The upper edge of the float is then located above the red bar mark.

The factory calibration applies for maximum flow in the assembly. If a lower flow rate is used, a calibration is recommended due to the flow dependency.



2 Correlation between slope of electrode and flow velocity at the membrane/volume flow in assembly

For abrasive media, it is recommended not to exceed the minimum flow. If suspended solids are present, which may form deposits, the maximum flow rate is recommended.

Temperature

Changes in the temperature of the medium affect the measured value:
- Increases in temperature result in a higher measured value (approx. 3 % per K)
- Decreases in temperature result in a lower measured value (approx. 3 % per K)

When used with the Liquiline, the sensor enables automatic temperature compensation (ATC). Recalibration in the case of temperature changes is not necessary.

1. If automatic temperature compensation is disabled at the transmitter, the temperature must be maintained at a constant level following calibration.
2. Otherwise, recalibrate the sensor.

In the event of normal and slow changes in temperature (0.3 K / minute), the internal temperature sensor is sufficient. In the event of very rapid temperature fluctuations with high amplitude (2 K / minute), an external temperature sensor is necessary to ensure maximum accuracy.

For detailed information on the use of external temperature sensors, see the Operating Instructions for the transmitter.

Cross-sensitivities [2)]

There are no cross-sensitivities for: free chlorine, free bromine, total chlorine, total bromine, hydrogen peroxide, peracetic acid.

There is minimum cross-sensitivity to chlorine dioxide.

All photometric tests demonstrate a cross-sensitivity to oxidizing substances and can therefore falsify the reference value.

Surfactants do not affect the measuring performance.

2) The listed substances have been tested with different concentrations. An additive effect has not been investigated.

4 Incoming acceptance and product identification

4.1 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.

4.2 Product identification

4.2.1 Nameplate

The nameplate provides you with the following information on your device:
- Manufacturer identification
- Extended order code
- Serial number
- Safety information and warnings

► Compare the information on the nameplate with the order.

4.2.2 Product page

www.endress.com/ccs58d

4.2.3 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.

4.2.4 Manufacturer address

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

4.2.5 Scope of delivery

The scope of delivery comprises:
- Disinfection sensor (membrane-covered, Ø25 mm) with protection cap
- Bottle with electrolyte (100 ml (3.38 fl oz))
- Emery paper
- Operating Instructions
- Manufacturer inspection certificate

4.2.6 Certificates and approvals

CE mark

Declaration of Conformity

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.

Ex approvals [3)]

cCSAus NI Cl. I, Div. 2
This product complies with the requirements defined in:
- UL 61010-1
- ANSI/ISA 12.12.01
- FM 3600
- FM 3611
- CSA C22.2 NO. 61010-1-12
- CSA C22.2 NO. 213-16
- Control drawing: 401204

3) Only if connected to CM44x(R)-CD*

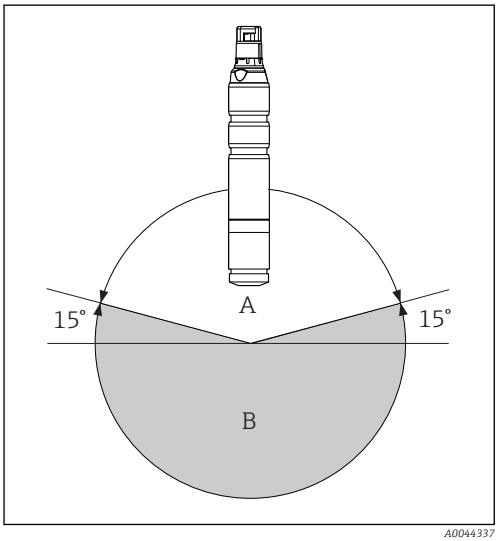
5 Installation

5.1 Installation conditions

5.1.1 Orientation

Do not install upside-down!

- ▶ Install the sensor in an assembly, support or appropriate process connection at an angle of at least 15 ° to the horizontal.
- ▶ Other angles of inclination are not permitted.
- ▶ Follow the instructions for installing the sensor in the Operating Instructions of the assembly used.



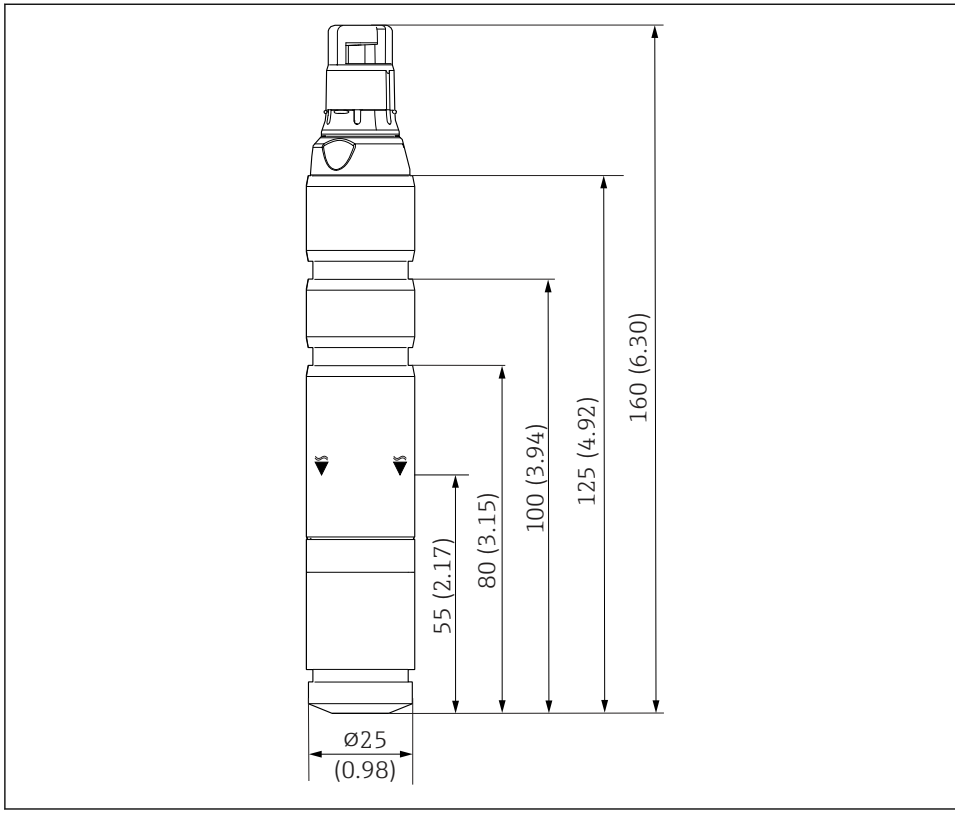
A *Permitted orientation*
B *Incorrect orientation*

3 Orientation

5.1.2 Immersion depth

At least 55 mm (2.17 in). This corresponds to the mark (▼) on the sensor.

5.1.3 Dimensions

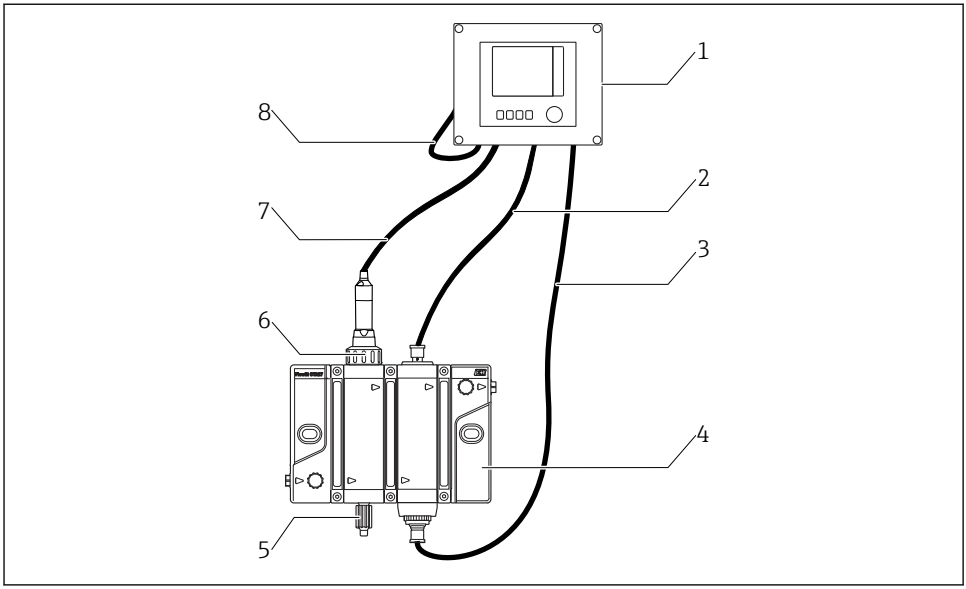


4 *Dimensions in mm (in)*

5.2 Mounting the sensor

5.2.1 Measuring system

A complete measuring system comprises:
- Disinfection sensor Memosens CCS58D (membrane-covered, Ø25 mm) with corresponding installation adapter
- Flow assembly e.g. Flowfit CYA27
- Measuring cable CYK10, CYK20
- Transmitter, e.g. Liquiline CM44x with firmware 01.08.00 or higher or CM44xR with firmware 01.08.00 or higher
- Optional: extension cable CYK11
- Optional: proximity switch



5 Example of a measuring system

1 Transmitter Liquiline CM44x or CM44xR
2 Power supply cable for inductive switch
3 Power supply cable for status lighting on assembly
4 Flow assembly, e.g. Flowfit CYA27
5 Sampling valve
6 Disinfection sensor Memosens CCS58D (membrane-covered, Ø25 mm)
7 Measuring cable CYK10
8 Power supply cable Liquiline CM44x or CM44xR

5.2.2 Preparing the sensor

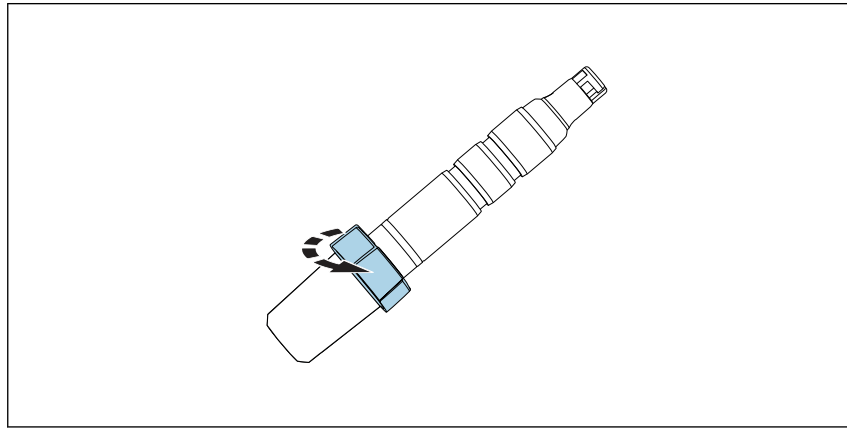
Removing protection cap from sensor

NOTICE

Negative pressure causes damage to the sensor's membrane cap

▶ If the protection cap is attached, carefully remove it from sensor.

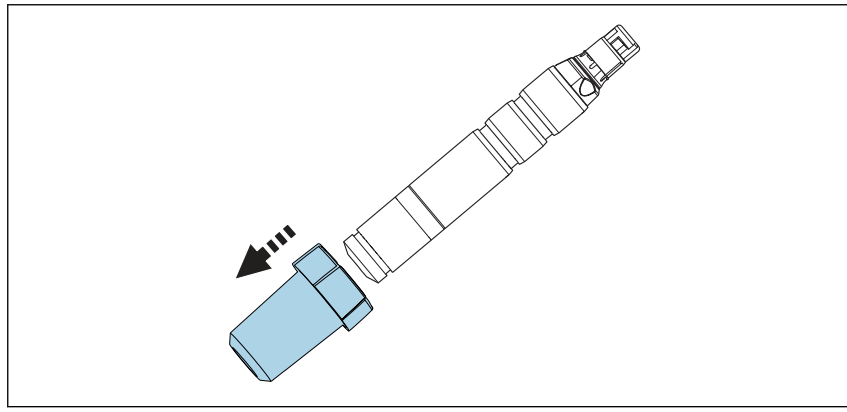
1. When supplied to the customer and when in storage, the sensor is fitted with a protection cap: First release just the top part of the protection cap by turning it.



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6 Releasing top part of protection cap by turning

2. Carefully remove protection cap from sensor.



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7 Carefully remove protection cap

Filling the membrane cap with electrolyte

Please note the information on the safety data sheet to ensure safe use of the electrolyte.

NOTICE

Damage to membrane and electrodes, air bubbles

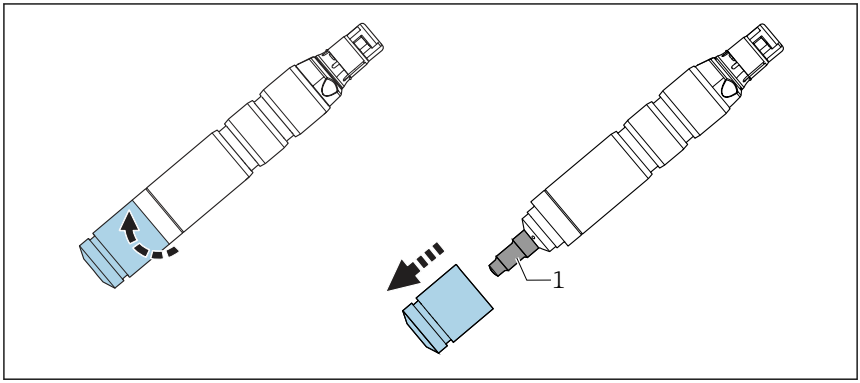
Possibility of measured errors to complete failure of the measuring point

- Avoid damage to membrane and electrodes.
- The electrolyte is chemically neutral and is not hazardous to health. Nonetheless, do not swallow it and avoid contact with eyes.
- Keep the electrolyte bottle closed after use. Do not transfer electrolyte to other vessels.
- Observe the use-by date on the label.
- Avoid air bubbles when pouring electrolyte into membrane cap.
- The membrane cap can be reused several times if only the electrolyte is being replaced. However, repeated installation puts considerable strain on the membrane.

Filling the membrane cap with electrolyte

The sensor is dry when delivered from the factory. Before using the sensor, fill the membrane cap with electrolyte.

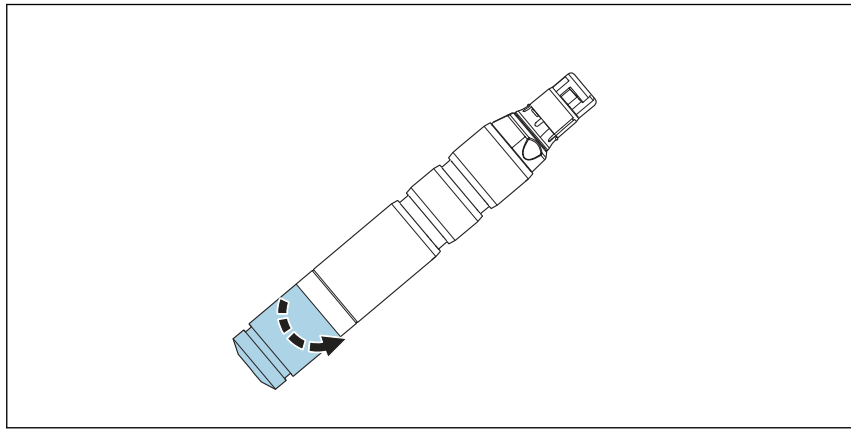
1. Carefully rotate membrane cap and remove.



1 Electrode body

2. Pour approx. 7 ml (0.24 fl oz) of electrolyte into the membrane cap until it is level with the start of the female thread.

3. Slowly screw on the membrane cap as far as the end stop. While tightening, excess electrolyte is forced out at the thread.



A0044613

4. If necessary, pat the sensor and membrane cap dry using a cloth.
5. Reset operating hours counter for electrolyte on transmitter. For detailed information, see the Operating Instructions for the transmitter.

5.2.3 Installing the sensor in the Flowfit CYA27 assembly

The sensor can be installed in the Flowfit CYA27 flow assembly. In addition to the installation of the ozone sensor, this also allows the simultaneous operation of multiple other sensors and flow monitoring.

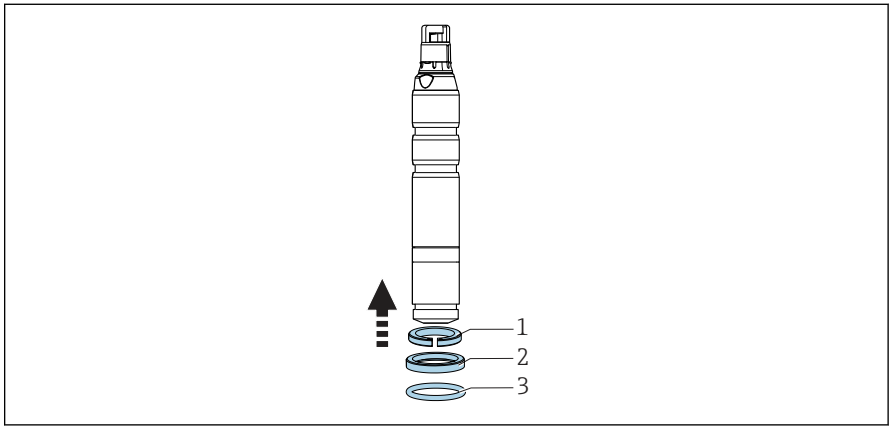
If multiple modules are used, install the Memosens CCS58D sensor in the first module after the inlet module for the best possible flow conditions.

Please note the following during installation:
- Configure the minimum flow rate.
- If the medium is fed back into an overflow basin, pipe or similar, the resulting counterpressure on the sensor must not exceed 1 bar relativ (14.5 psi relativ) (2 bar abs. (29 psi abs.) absolute and must remain constant.
- Avoid negative pressure at the sensor, e.g. due to medium being returned to the suction side of a pump.
- To avoid buildup, heavily contaminated water should also be filtered.

Equipping sensor with adapter

The required adapter (clamping ring, thrust collar and O-ring) can be ordered as a mounted sensor accessory or as a separate accessory → 48.

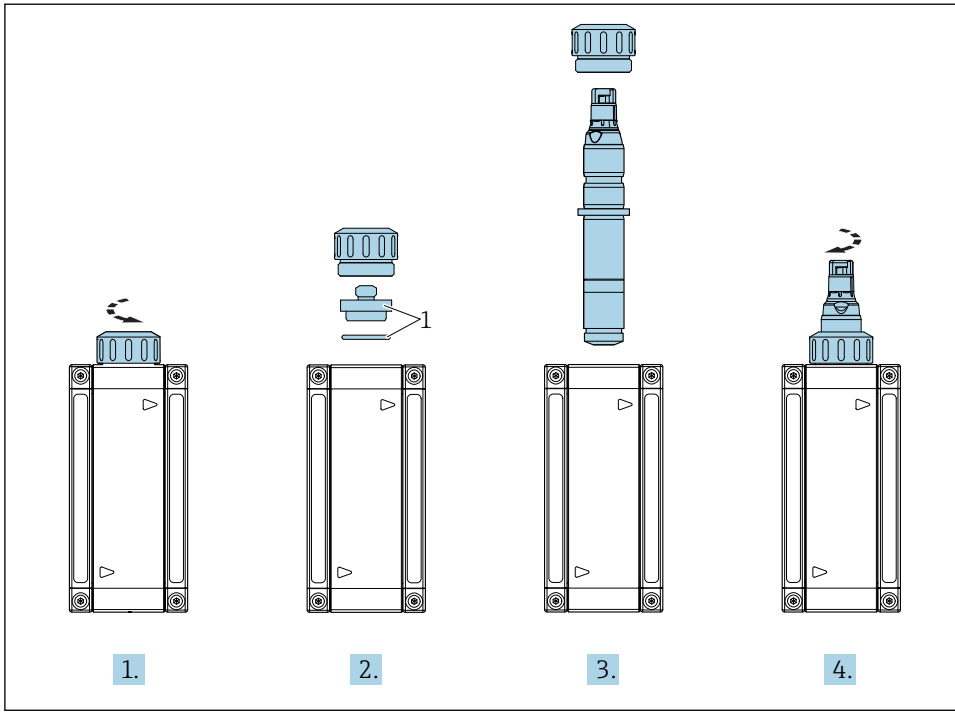
▶ First slide the clamping ring, then the thrust collar, and then the O-ring from the membrane cap towards the sensor head and into the lower groove.



8 Slide clamping ring (1), thrust collar (2) and O-ring (3) upwards from the membrane cap to the sensor shaft and into the lower groove

Installing sensor in assembly

1. The assembly is supplied to the customer with a union nut screwed onto the assembly: unscrew union nut from assembly.
2. The assembly is supplied to the customer with a dummy plug inserted in the assembly: remove dummy plug and O-ring (1) from the assembly.
3. Slide the Memosens CCS58D sensor with the adapter for Flowfit CYA27 into the opening in the assembly.
4. Screw union nut onto assembly on block.



A0044456

1 Dummy plug and O-ring

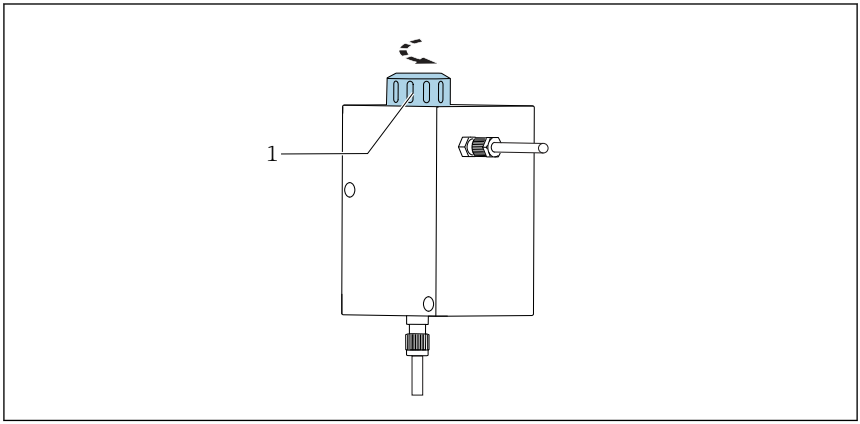
5.2.4 Installing the sensor in assembly CCA151

The disinfection sensor (membrane-covered, Ø25 mm) is designed for installation in the Flowfit CCA151 flow assembly.

Please note the following during installation:
- ▶ The volume flow must be at least 7 l/h (1.8 gal/h).
- ▶ If the medium is fed back into an overflow basin, pipe or similar, the resulting counterpressure on the sensor may not exceed 1 bar relativ (14.5 psi relativ) (2 bar abs. (29 psi abs.)) and must remain constant.
- ▶ Avoid negative pressure at the sensor, e.g. due to medium being returned to the suction side of a pump.
- ▶ To avoid buildup, heavily contaminated water should also be filtered.

Preparing the assembly

1. The assembly is supplied to the customer with a union nut screwed onto the assembly: unscrew union nut from assembly.



9 Flowfit CCA151 flow assembly

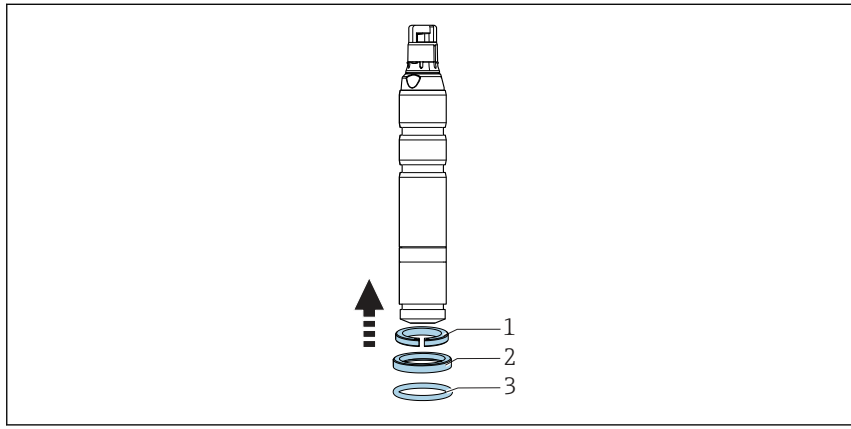
1 Union nut

2. The assembly is supplied to the customer with a dummy plug and O-ring inserted in the assembly: remove the dummy plug and O-ring from the assembly.

Equipping sensor with adapter

The required adapter (clamping ring, thrust collar and O-ring) can be ordered as a mounted sensor accessory or as a separate accessory → 48.

1. First slide the clamping ring, then the thrust collar, and then the O-ring from the membrane cap towards the sensor head and into the lower groove.

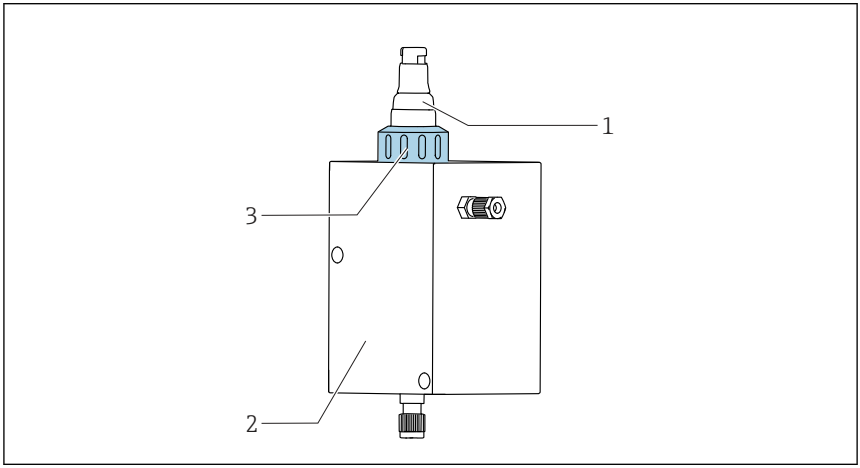


10 Slide clamping ring (1), thrust collar (2) and O-ring (3) upwards from the membrane cap to the sensor shaft and into the lower groove

Installing sensor in assembly

2. Slide sensor with adapter for Flowfit CCA151 into the opening in the assembly.

3. Screw union nut onto assembly on block.



11 *Flowfit CCA151 flow assembly*

1 Disinfection sensor
2 Flowfit CCA151 flow assembly
3 Union nut for securing a disinfection sensor

5.2.5 Installing the sensor in assembly CCA250

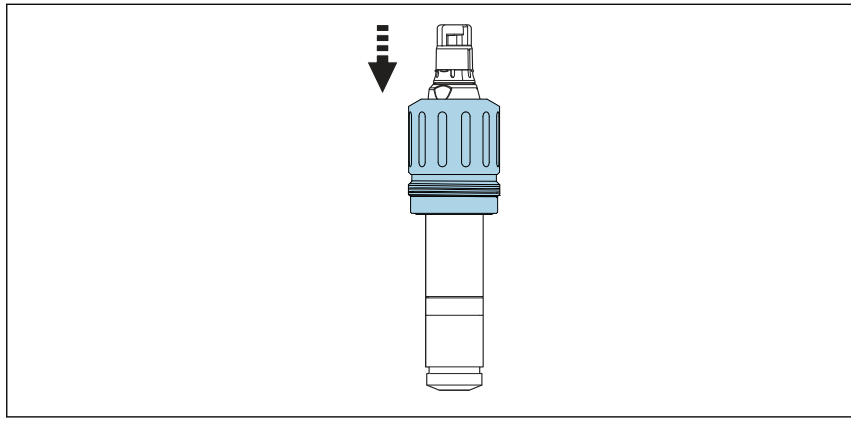
The sensor can be installed in the Flowfit CCA250 flow assembly. In addition to allowing the installation of the ozone sensor, this also allows the simultaneous operation of a pH sensor and an ORP sensor for example. A needle valve controls the volume flow in the range of 30 to 120 l/h (7.9 to 31.7 gal/h).

Please note the following during installation:
- The volume flow must be at least 45 l/h (11.9 gal/h). If the flow drops below this value or stops completely, this can be detected by an inductive proximity switch and used to trigger an alarm with locking of the dosage pumps.
- If the medium is fed back into an overflow basin, pipe or similar, the resulting counterpressure on the sensor may not exceed 1 bar (14.5 psi) (2 bar abs. (29 psi abs.)) and must remain constant.
- Negative pressure at the sensor, e.g. due to medium being returned to the suction side of a pump, must be avoided.

Equipping sensor with adapter

The required adapter can be ordered as a mounted sensor accessory or as a separate accessory → 48.

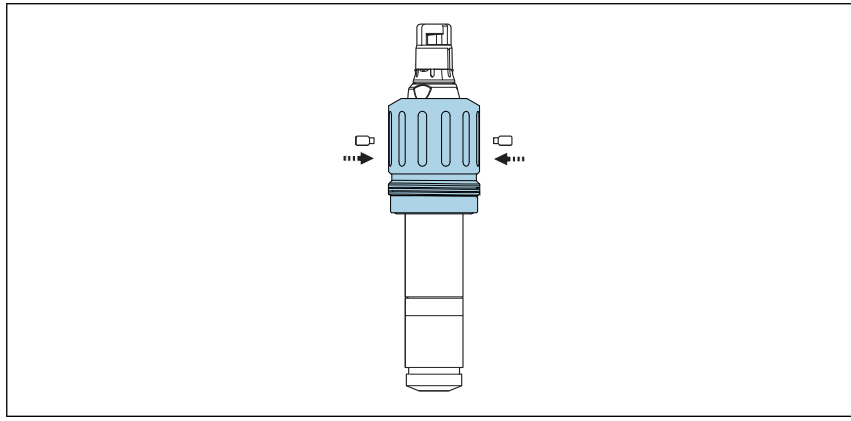
1. Starting from the sensor head, slide the adapter for Flowfit CCA250 onto the sensor as far as the end stop.



A0044462

12 *Slide on adapter for Flowfit CCA250*

2. Fix the adapter with the 2 stud screws supplied and an Allen screw (2 mm).



A0044464

3. Screw the sensor into the assembly.

For detailed information on "Installing the sensor in the Flowfit CCA250 assembly", see the Operating Instructions for the assembly

5.2.6 Installing the sensor in other flow assemblies

When using other flow assemblies, please ensure the following:

- A flow velocity of at least 29 cm/s (1.0 ft/s)must always be ensured at the membrane.

- The flow direction is upwards. Transported air bubbles must be removed so that they do not collect in front of the membrane.
- The flow must be directed to the membrane.
- Observe the minimum immersion depth.

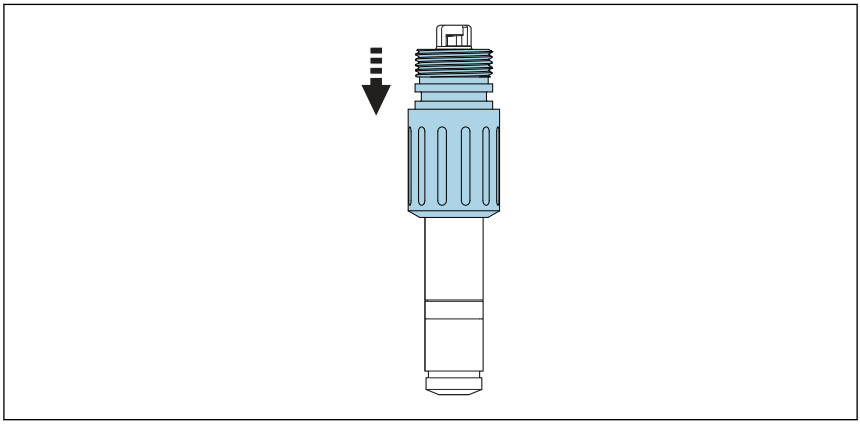
5.2.7 Installing the sensor in immersion assembly CYA112

Alternatively, the sensor can be installed in an immersion assembly with a G1 threaded connection.

Equipping sensor with adapter

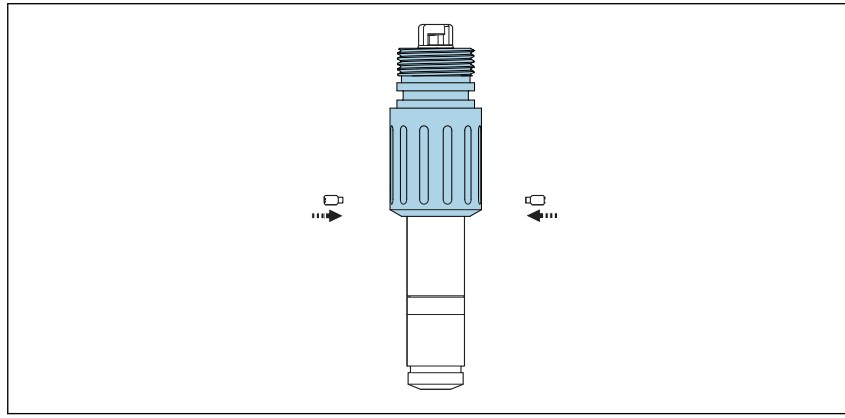
The required adapter can be ordered as a mounted sensor accessory or as a separate accessory → 48.

1. Starting from the sensor head, slide the adapter for Flexdip CYA112 onto the sensor as far as the end stop.



13 Slide on adapter for Flexdip CYA112

2. Fix the adapter with the 2 stud screws supplied and an Allen screw (2 mm).



A0044638

3. Screw the sensor into the assembly. The use of a quick release fastener is recommended.

For detailed information on "Installing sensor in Flexdip CYA112 assembly", see Operating Instructions for assembly

5.3 Post-installation check

1. Is the adapter locked in place and unable to move freely?
2. Is the sensor installed in an assembly and not freely suspended from the cable?
   - Install the sensor in an assembly or directly via the process connection.
3. Is the membrane cap leak-tight?
   - Screw tight or replace.
4. Is the membrane intact and lying flat: Is the membrane bulging slightly (not flat)?
5. Is there electrolyte in the membrane cap?
   - If necessary, refill the membrane cap with electrolyte.

6 Electrical connection

⚠ CAUTION

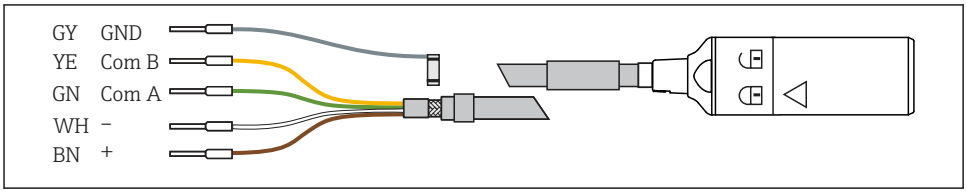
Device is live

Incorrect connection may result in injury!

- 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.

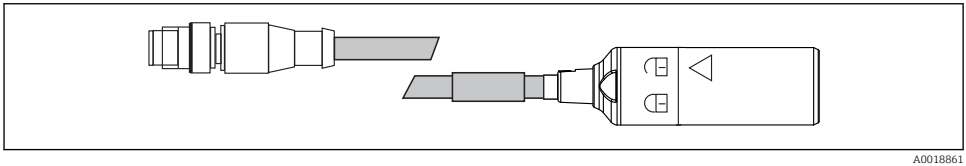
6.1 Connecting the sensor

The electrical connection to the transmitter is performed via Memosens data cable CYK10 or measuring cable CYK20.



14 *Measuring cable CYK10/CYK20*

- To extend the cable, use measuring cable CYK11. The maximum cable length is 100 m (328 ft).



15 *Electrical connection, M12 plug*

6.2 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions and which are necessary for the required, designated use, may be carried out on the device delivered.

- Exercise care when carrying out the work.

Otherwise, the individual types of protection (Ingress Protection (IP), electrical safety, EMC interference immunity) agreed for this product can no longer be guaranteed due, for example to covers being left off or cable (ends) that are loose or insufficiently secured.

6.3 Post-connection check

Device condition and specifications	Notes
Are the sensor, assembly, or cables free from damage on the outside?	Visual inspection
Electrical connection	**Notes**
Are the mounted cables strain-relieved and not twisted?	
Is a sufficient length of the cable cores stripped, and are the cores positioned in the terminal correctly?	Check the fit (by pulling gently)
Are all the screw terminals properly tightened?	Tighten
Are all the cable entries installed, tightened and sealed?	For lateral cable entries, make sure the cables loop downwards to allow water to drip off
Are all cable entries installed downwards or mounted laterally?	

7 Commissioning

7.1 Function check

Prior to commissioning, ensure that:
- The sensor is correctly installed.
- The electrical connection is correct.
- There is sufficient electrolyte in the membrane cap and the transmitter is not displaying a warning about electrolyte depletion.

Please note the information on the safety data sheet to ensure safe use of the electrolyte.

Always keep the sensor moist after commissioning.

⚠ CAUTION

Escaping process medium

Risk of injury from high pressure, high temperatures or chemical hazards
- ▶ Before applying pressure to an assembly with cleaning system, ensure that the system has been connected correctly.
- ▶ Do not install the assembly in the process if you cannot reliably establish the correct connection.

7.2 Sensor polarization

The voltage applied by the transmitter between the working electrode and counter electrode polarizes the surface of the working electrode. Therefore, when commissioning the transmitter with the sensor connected, you must wait until the polarization time has elapsed before starting calibration.

To achieve a stable display value, the sensor requires the following polarization times:

Initial commissioning	120 min
Recommissioning	30 min

7.3 Sensor calibration

Factory calibration

The sensor is supplied with a factory calibration. The data of this calibration are saved on the sensor and are used by the transmitter automatically following connection. If necessary, an additional reference measurement can be performed after commissioning, e.g. in the event of insufficient flow to the sensor. The factory calibration applies for maximum flow in the assembly. If a lower flow rate is used, a calibration is recommended due to the flow dependency.

Reference measurement according to the DPD method

To calibrate the measuring system, carry out a colorimetric comparison measurement in accordance with the DPD method for ozone. Ozone reacts with diethyl-p-phenylendiamine

(DPD) producing a red dye, the intensity of the red color being proportional to the ozone content.
Measure the intensity of the red color using a photometer, e.g. PF-3 (→ 🖹 48). The photometer indicates the ozone content.

Requirements
The sensor reading is stable (no drifts or unsteady values for at least 5 minutes), and the medium is stable. This is normally guaranteed once the following preconditions have been met:
- The polarization time has elapsed.
- The flow is constant and within the correct range.
- The sensor and the medium are at the same temperature.
- The pH value is within the permitted range.
- Optional:
  For zero point adjustment: electrolyte has been replaced (→ 🖹 39)

Zero point adjustment
A zero point adjustment is not required due to the zero point stability of the membrane-covered sensor.

If a zero point adjustment is desired nevertheless, proceed as follows:

▶ Operate the sensor in the assembly or in a clean vessel (e.g. protection cap) for at least 15 min in ozone-free water.

Alternatively, perform the zero point adjustment using the zero point gel COY8 → 🖹 47.

Slope calibration

Always perform a slope calibration in the following cases:
- After replacing the membrane cap
- After replacing electrolyte
- After the membrane cap has been screwed back on
- After a significant change in flow conditions, e.g. a reduction in the flow volume

1. Ensure that the temperature of the medium is constant.
2. Take a representative sample for the DPD measurement. This must be done in close proximity to the sensor. Use the sampling valve of the Flowfit CYA27 if one is provided. For this purpose, allow the first 10 ml (0.34 fl oz) of the medium to run and discard. Then proceed as specified in the DPD manual of the manufacturer.
3. Determine the ozone content using the DPD method.
4. Enter the measured value into the transmitter (see Operating Instructions for transmitter).
5. To ensure greater accuracy, check the calibration several hours or 24 hours later using the DPD method.

8 Diagnostics and troubleshooting

When troubleshooting, the entire measuring point must be taken into account. This comprises:
- Transmitter
- Electrical connections and lines
- Assembly
- Sensor

The possible causes of error in the following table refer primarily to the sensor. Before commencing troubleshooting, ensure that the following operating conditions have been met:
- Measurement in the "temperature-compensated" operating mode (can be configured on the CM44x transmitter) or constant temperature following calibration
- Flow velocity of at least 29 cm/s (1.0 ft/s)

If the value measured by the sensor differs significantly from that of the DPD method, first consider all possible malfunctions of the photometric DPD method (see Operating Instructions for photometer). If necessary, repeat the DPD measurement several times.

Error	Possible cause	Remedy
No display, no sensor current	No supply voltage at the transmitter	► Establish mains connection
	Connection cable between sensor and transmitter interrupted	► Establish cable connection
	There is no electrolyte in the membrane cap	► Fill membrane cap
	No input flow of medium	► Establish flow, clean filter

Error	Possible cause	Remedy
Display value too high	Polarization of the sensor not yet completed	▶ Wait for polarization to be completed
	Membrane defective	▶ Replace membrane cap
	Shunt resistance (e.g. moisture contact) in the sensor shaft	▶ Remove membrane cap, rub working electrode dry ▶ If the transmitter display does not return to zero, there is a shunt present: replace sensor
	Foreign oxidants interfering with sensor	▶ Examine medium, check chemicals
	Flow too high	▶ Check the system ▶ Reduce the flow
	Sensor defective	▶ Send the sensor in to the supplier for inspection/overhaul
Display value too low	Membrane cap not screwed on fully	▶ Fill the membrane cap with fresh electrolyte → 🖹 39 ▶ Screw membrane cap on fully
	Membrane soiled	▶ Clean the membrane → 🖹 36
	Air bubble in front of membrane	▶ Release air bubble
	Air bubble between working electrode and membrane	▶ Remove membrane cap, top up electrolyte ▶ Remove air bubble by tapping on the outside of the membrane cap ▶ Screw on membrane cap
	Input flow of medium too low	▶ Establish correct flow
	Foreign oxidants interfering with DPD reference measurement	▶ Examine medium, check chemicals
	Working electrode is not clean	▶ Perform sensor maintenance → 🖹 36
	Incorrect power supply	▶ Establish correct power supply
	Sensor defective	▶ Send the sensor in to the supplier for inspection/overhaul

Error	Possible cause	Remedy
Display fluctuates considerably	Hole in membrane	▶ Replace membrane cap
Not calibratable/measured value deviates from analytical measurement	Polarization time too short	▶ Wait for polarization time to elapse → 🖹 50
	Membrane torn	▶ Replace membrane cap → 🖹 41
	Membrane cap damaged	▶ Replace membrane cap → 🖹 41
	Interfering substances in water	▶ Check water for interfering substances and take remedial action ▶ Contact the supplier
	Distance between membrane and electrode too large	▶ Screw on the membrane cap fully as far as the end stop
	DPD/titration chemicals passed the expiration date	▶ Use new DPD/titration chemicals ▶ Repeat calibration → 🖹 30
	Buildup on the membrane	▶ Replace membrane cap → 🖹 41
	Gas bubbles on outside of membrane	▶ Increase flow briefly ▶ Check installation and modify it
	No electrolyte in the membrane cap	▶ Fill membrane cap with electrolyte → 🖹 39 ▶ Prepare sensor → 🖹 17
	Concentration of disinfectant higher than measuring range upper limit	▶ Check the system ▶ Rectify the error ▶ Repeat the calibration → 🖹 30
	Sensor defective	▶ Send the sensor in to the supplier for inspection/overhaul
Unstable measured value	Membrane torn	▶ Replace membrane cap → 🖹 41
	Gas bubbles on outside of membrane	▶ Increase flow briefly ▶ Check installation and modify it
	Pressure fluctuations in sample water	▶ Check installation method and modify it
	Reference electrode exhausted and/or dirty [1)]	▶ Send the sensor in to the supplier for inspection/overhaul
	Concentration of disinfectant in sample water too high	▶ Check the system ▶ Rectify the error ▶ Calibrate the sensor → 🖹 30 ▶ Perform sensor maintenance → 🖹 36
No signal	Sensor defective	▶ Send the sensor in to the supplier for inspection/overhaul
Slope too low or too high relative to the nominal slope and the membrane cap is not visibly damaged or dirty		▶ Fill the membrane cap with fresh electrolyte → 🖹 39

Error	Possible cause	Remedy
Slope too low or too high relative to the nominal slope or sensor current is very noisy		▶ Replace membrane cap → 🖹 41
Obvious strong dependence of sensor current on the temperature (temperature compensation not working)	Sensor defective	▶ Send the sensor in to the supplier for inspection/overhaul
Changes visible on working electrode or counter electrode (brown coating no longer present)		▶ Regenerate sensor → 🖹 45

1) The reference electrode has a shiny silver or white color. A brown/gray color is normal.

9 Maintenance

Please note the information on the safety data sheet to ensure safe use of the electrolyte.

Take all the necessary precautions in time to ensure the operational safety and reliability of the entire measuring system.

NOTICE

Effects on process and process control!

- ▶ When carrying out any work on the system, bear in mind any potential impact this could have on the process control system and the process itself.
- ▶ For your own safety, only use genuine accessories. With genuine parts, the function, accuracy and reliability are also ensured after maintenance work.

9.1 Maintenance schedule

Interval	Maintenance work
If deposits are visible on the membrane (biofilm, limescale)	Clean sensor membrane → 🖹 39
If dirt is visible on the surface of the electrode body	Clean electrode body of sensor → 🖹 39

▪ Slope depending on application:
  ▪ After replacing the electrolyte
  ▪ After replacing the membrane cap
▪ Zero point calibration:
  ▪ If operated in concentration range below 0.1 mg/l (ppm)
  ▪ If negative measured values are displayed
	Calibrate sensor → 🖹 30

▪ If the electrolyte counter displays a warning (if counter is active), every 3 to 6 months ▪ If cap is replaced	Fill the membrane cap with fresh electrolyte → 🖹 39
Annually	Replace membrane cap → 🖹 41

9.2 Maintenance tasks

9.2.1 Cleaning the sensor

⚠ CAUTION

Diluted hydrochloric acid

Hydrochloric acid causes irritation if it comes into contact with the skin or eyes.

- ▶ When using diluted hydrochloric acid, wear protective clothing such as gloves and goggles.
- ▶ Avoid splashes.

NOTICE

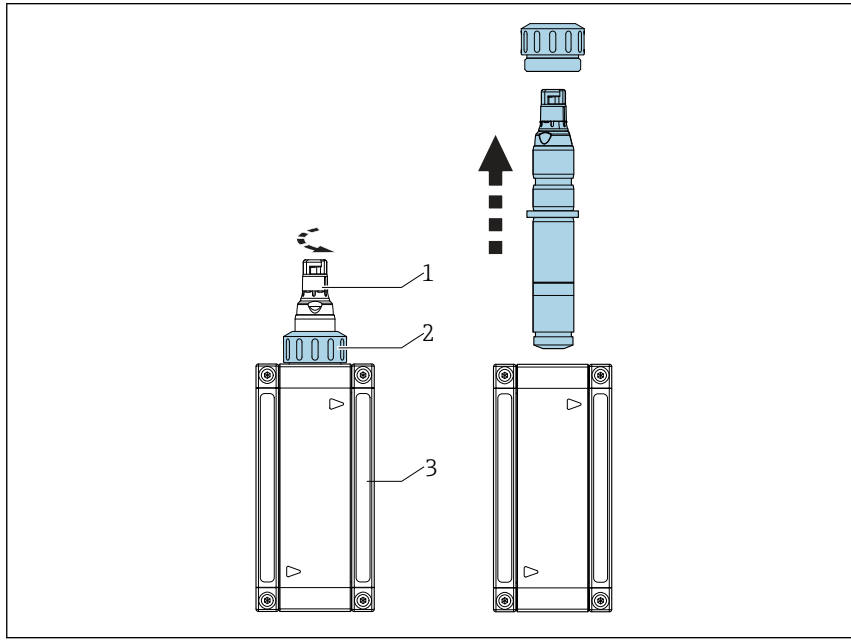
Chemicals that reduce surface tension (e.g. organic solvents such as alcohol that can be mixed with water)

Chemicals that reduce the surface tension cause the sensor membrane to lose its special property and protective function, which results in measured errors.

- ▶ Do not use any chemicals that reduce surface tension.

Removing the sensor from the Flowfit CYA27 assembly

1. Remove the cable.
2. Unscrew the union nut from the assembly.
3. Pull sensor out through opening in assembly.



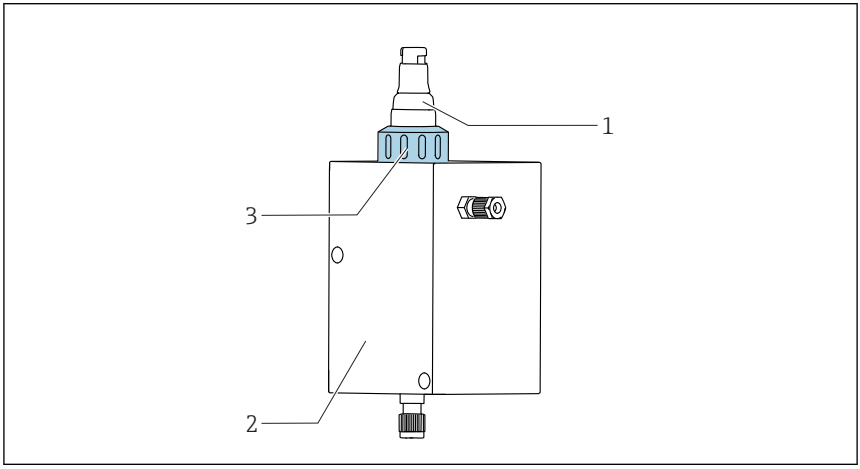
1 Disinfection sensor Memosens CCS58D
2 Union nut for securing a disinfection sensor Memosens CCS58D
3 Flowfit CYA27 flow assembly

For detailed information on "Removing the sensor from the assembly Flowfit CYA27, see the Operating Instructions for the assembly.

Removing the sensor from the assembly CCA151

1. Remove the cable.

2. Unscrew the union nut from the assembly.



1 Disinfection sensor
2 Flow assembly Flowfit CCA151
3 Union nut for securing a disinfection sensor

3. Pull sensor out through opening in assembly.

Removing the sensor from the assembly CCA250

1. Remove the cable.
2. Unscrew the sensor, along with the adapter, from the assembly.
3. Pull sensor out through opening in assembly.

The adapter does not need to be disassembled.

For detailed information on "Removing the sensor from the assembly CCA250", see the Operating Instructions for the assembly.

Removing the sensor from the assembly CYA112

1. Unscrew the sensor, along with the adapter, from the assembly using the quick release fastener.
2. Remove the cable.
3. Unscrew the sensor, along with the adapter, from the assembly.

The adapter does not need to be disassembled.

For detailed information on "Removing the sensor from the assembly CYA112", see the Operating Instructions for the assembly.

Cleaning the sensor membrane

If the membrane is visibly dirty, e.g. biofilm, proceed as follows:

1. Remove the sensor from the flow assembly → 37.
2. Remove the membrane cap → 41.
3. Clean the membrane cap mechanically only using a gentle water jet. Alternatively, clean for several minutes in diluted acids or in specified cleaning agents without any further chemical additives.
4. Then rinse thoroughly with water.
5. Screw the membrane cap back onto the sensor → 41.

Cleaning the electrode body

1. Remove the sensor from the flow assembly → 37.
2. Remove the membrane cap → 41.
3. Wipe gold electrode carefully using a soft sponge.
4. Rinse the electrode body with demineralized water, alcohol or acid.
5. Fill the membrane cap with fresh electrolyte.
6. Screw the membrane cap back onto the sensor → 41.

9.2.2 Filling the membrane cap with fresh electrolyte

Please note the information on the safety data sheet to ensure safe use of the electrolyte.

NOTICE

Damage to membrane and electrodes, air bubbles

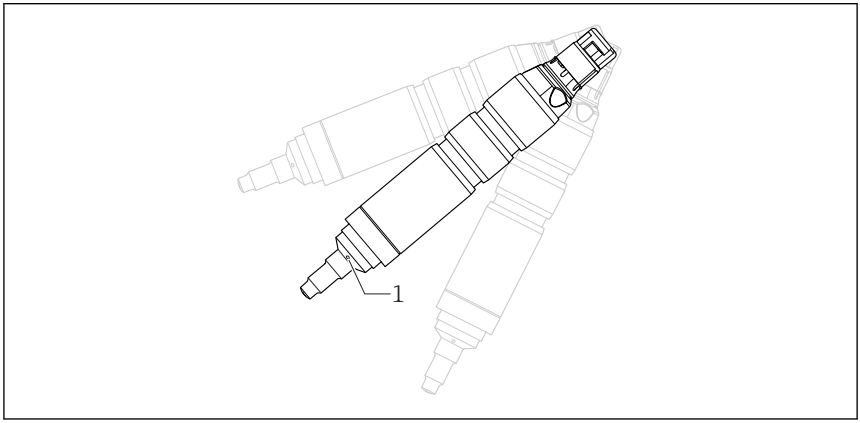
Possibility of measured errors to complete failure of the measuring point

- Avoid damage to membrane and electrodes.
- The electrolyte is chemically neutral and is not hazardous to health. Nonetheless, do not swallow it and avoid contact with eyes.
- Keep the electrolyte bottle closed after use. Do not transfer electrolyte to other vessels.
- Do not store electrolyte for longer than 3 years. Observe the use-by date on the label.
- Avoid air bubbles when pouring electrolyte into membrane cap.

Filling the membrane cap with electrolyte

1. Remove the membrane cap → 16, 42.
2. Drain electrolyte out of the membrane cap.

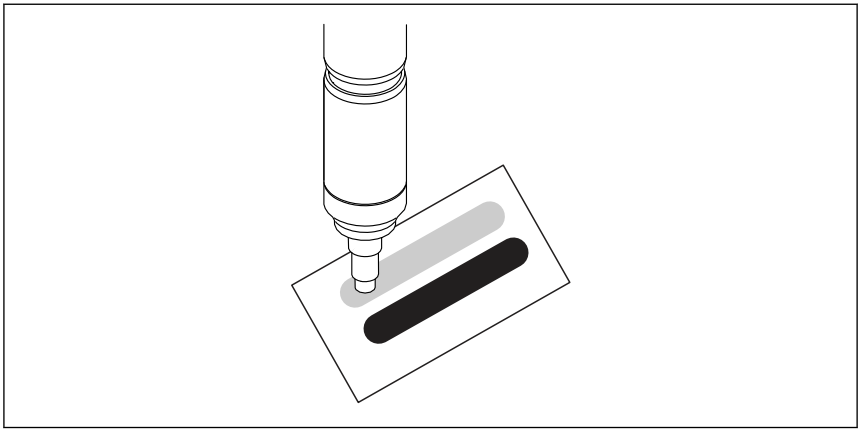
3. Shake the sensor body several times to dry it.



A0044657

1 Pressure compensation opening is emptied

4. Have the emery paper ready.
5. Hold the sensor upright.
6. Hold the emery paper in place and rub the tip of the working electrode over it at least twice, making sure to use a new section of the emery paper each time.



A0044658

7. Pour approx. 7 ml (0.24 fl oz) of electrolyte into the membrane cap until it is level with the start of the female thread.
8. Slowly screw on the membrane cap as far as the end stop → 39. While tightening, excess electrolyte is forced out at the thread.
9. If necessary, pat the sensor and membrane cap dry using a cloth.
10. Reset operating hours counter for electrolyte on transmitter. For detailed information, see the Operating Instructions for the transmitter.

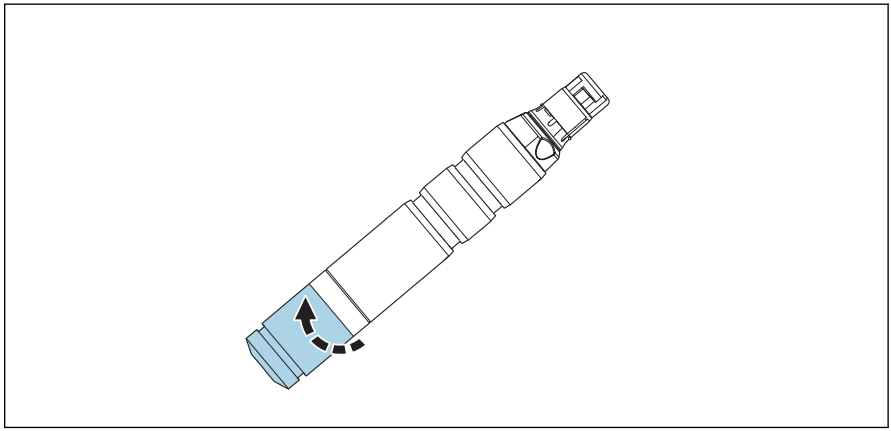
9.2.3 Replacing the membrane cap

1. Remove the sensor from the flow assembly → 📄 37.
2. Remove the membrane cap → 📄 42.
3. Pour fresh electrolyte into the new membrane cap until it is level with the start of the female thread.
4. Check if the sealing ring is mounted in the membrane cap.
5. Screw the new membrane cap onto the sensor shaft → 📄 43.
6. Screw on the membrane cap until the membrane at the working electrode is slightly overstretched (1 mm (0.04 in)).
7. When screwing on the membrane cap, check whether liquid escapes through the membrane. If liquid escapes through the membrane:
   ↳ Use a new membrane cap.
8. Reset operating hours counter for membrane cap on transmitter. For detailed information, see the Operating Instructions for the transmitter.

Removing the membrane cap

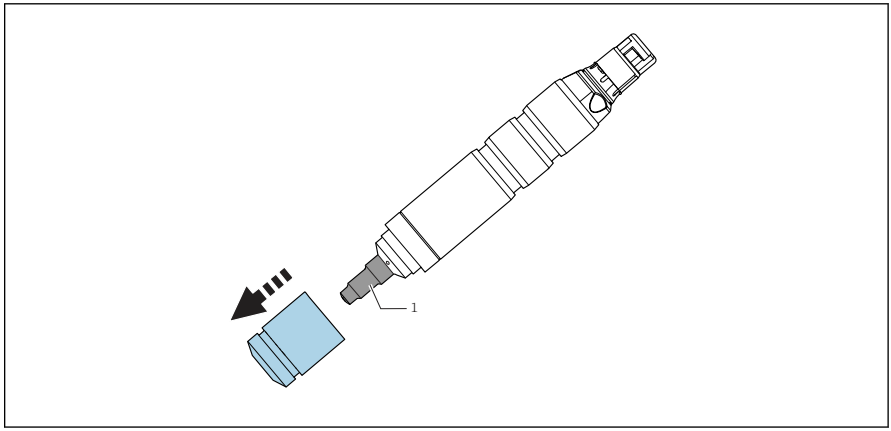
▶ Carefully rotate membrane cap and remove.

↳



A0044579

16 *Carefully rotate membrane cap.*



A0044612

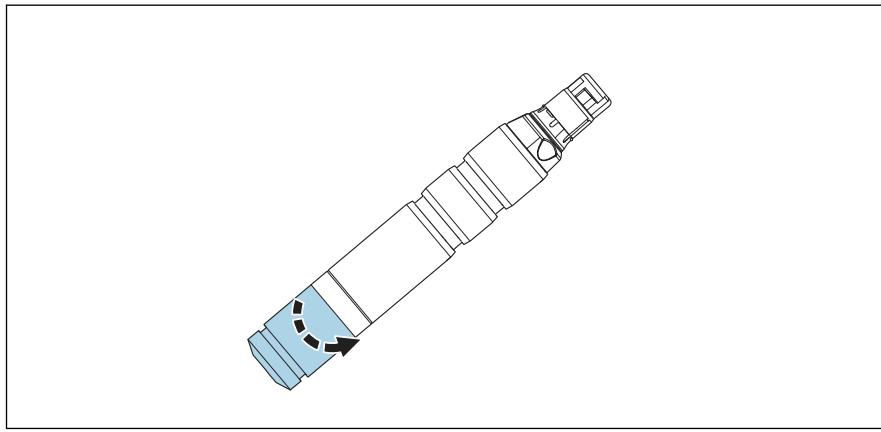
17 *Carefully remove membrane cap.*

1 Electrode body

Screwing the membrane cap onto the sensor

▶ Screw membrane cap onto sensor shaft: hold sensor by the shaft.

↳



18 *Screw on membrane cap*

9.2.4 Storing the sensor

If measurement is suspended for a short period of time and it can be guaranteed that the sensor will be kept moist while in storage:

1. If the assembly is guaranteed not to empty out,
   you may leave the sensor in the flow assembly.
2. If there is a possibility that the assembly may empty out,
   remove the sensor from assembly .
3. To keep the membrane moist after the sensor has been removed, refill the protection cap with electrolyte or clean water.
4. Fit the protection cap on the sensor → 44.

During longterm interruptions to measurement, particularly if dehydration is possible:

1. Remove sensor from assembly.
2. Unscrew the membrane cap.
3. Rinse the electrolyte out of the membrane cap with tap water.
4. Shake the sensor body several times to dry it (→ 40).
5. Rinse the electrode finger with tap water.
6. Allow the membrane cap and sensor body to dry in a dust-free location.
7. Screw the dry membrane cap loosely onto the sensor body for protection.

8. Make sure that the membrane is not resting against the working electrode.

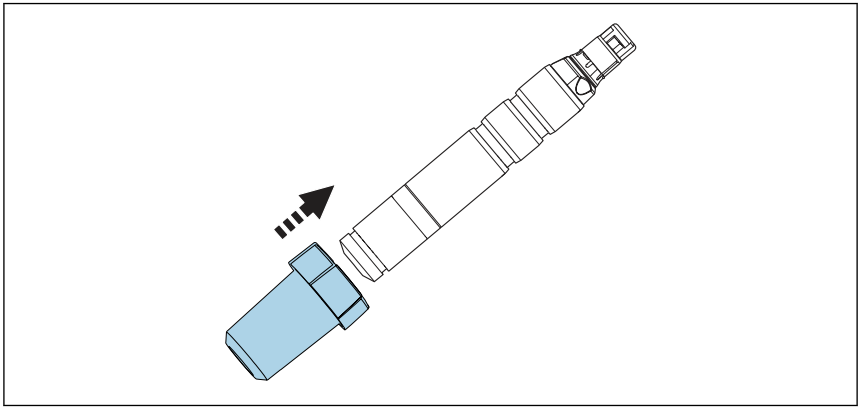
If the membrane cap was in use for at least one day, it is advisable not to reuse it when recommissioning.

Replace the membrane cap → 41

Ensure that no biofouling occurs during longer interruptions to measurement. Remove continuous organic deposits, such as films of bacteria.

Fitting the protection cap on the sensor

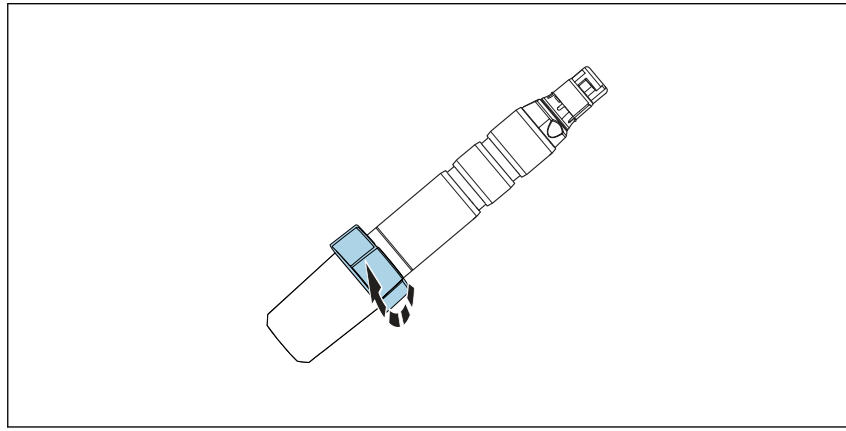
1. To keep the membrane moist after the sensor has been removed, fill the protection cap with some electrolyte.



19 *Carefully slide protection cap onto the membrane cap.*

2. Top part of protection cap is in the open position.
Carefully slide protection cap onto the membrane cap.

3. Secure protection cap by rotating the top part of the protection cap.



A0044578

20 Secure the protection cap by rotating the top part.

9.2.5 Regenerating the sensor

During measurement, the electrolyte in the sensor is gradually exhausted due to chemical reactions. The gray-brown silver halide layer that is applied to the counter electrode at the factory continues to grow during sensor operation. However, this has no effect on the reaction taking place at the working electrode.

A change in the color of the silver halide layer indicates an effect of the reaction that is taking place. Carry out a visual inspection to ensure that the gray-brown color of the counter electrode has not changed. If the color of the counter electrode has changed, e.g. if it is spotted, white or silvery, the sensor must be regenerated.

- Send the sensor to the manufacturer for regeneration.

10 Repair

10.1 Spare parts

For more detailed information on spare parts kits, please refer to the "Spare Part Finding Tool" on the Internet:

www.endress.com/spareparts_consumables

10.2 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.

10.3 Disposal



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.

11 Accessories

The following are the most important accessories available at the time this documentation was issued.

▶ For accessories not listed here, please contact your Service or Sales Center.

11.1 Maintenance kit CCV05

Order according to product structure

- 1 x membrane cap, 1 x electrolyte 100 ml (3.38 fl oz), 1 x emery paper, 2 x O-ring, silicone
- 1 x electrolyte 100 ml (3.38 fl oz)

11.2 Device-specific accessories

Memosens data cable CYK10
- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10

 Technical Information TI00118C

Memosens laboratory cable CYK20
- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk20

Flowfit CYA27
- Modular flow assembly for multiparameter measurements
- Product Configurator on the product page: www.endress.com/cya27

 Technical Information TI01559C

Flowfit CCA151
- Flow assembly for disinfection sensors
- Product Configurator on the product page: www.endress.com/cca151

 Technical Information TI01357C

Flowfit CCA250
- Flow assembly for disinfection and pH/ORP sensors
- Product Configurator on the product page: www.endress.com/cca250

 Technical Information TI00062C

Flexdip CYA112
- Immersion assembly for water and wastewater
- Modular assembly system for sensors in open basins, channels and tanks
- Material: PVC or stainless steel
- Product Configurator on the product page: www.endress.com/cya112

 Technical Information TI00432C

Photometer PF-3
- Compact hand-held photometer for determining the reference measured value
- Color-coded reagent bottles with clear dosing instructions
- Order No.: 71257946

Adapter kit CCS5xD for CYA27 and CCA151
- Clamping ring
- Thrust collar
- O-ring
- Order No. 71372027

Adapter kit CCS5x(D) for CCA250
- Adapter incl. O-rings
- 2 studs for locking in place
- Order No. 71372025

Adapter kit CCS5x(D) for CYA112
- Adapter incl. O-rings
- 2 studs for locking in place
- Order No. 71372026

Complete quick fastener kit for CYA112
- Adapter, inner and outer parts incl. O-rings
- Tool for mounting and disassembly
- Order No. 71093377 or mounted accessory of CYA112

COY8

Zero-point gel for oxygen and disinfection sensors
- Disinfectant-free gel for the verification, zero point calibration and adjustment of oxygen and disinfection measuring points
- Product Configurator on the product page: www.endress.com/coy8



Technical Information TI01244C

12 Technical data

12.1 Input

12.1.1 Measured values

Ozone	[mg/l, µg/l, ppm, ppb]
Temperature	[°C, °F]

12.1.2 Measuring range

0.1 to 2 mg/l (ppm)

The sensor is not suitable for checking the absence of ozone.

12.1.3 Signal current

135 to 340 nA per 1 mg/l (ppm) O_3

12.2 Performance characteristics

12.2.1 Reference operating conditions

Temperature	15 °C (59 °F) ±2 °C (±36 °F)
pH value	pH 7.2 ±0.2
Flow	140 cm/s (4.6 ft/s) ±5 (±0.16)
Sample water	Drinking water

12.2.2 Response time

T_{90} < 8 min (440 s) (under reference operating conditions)

12.2.3 Measured value resolution of sensor

At most, the smallest possible measured value resolution under reference conditions is 0.05 % of the measured value above the limit of quantification (LOQ).

12.2.4 Maximum measured error

±2 % and ±5 µg/l (ppb) of value measured (depending on which value is higher)

LOD (limit of detection) [1]	LOQ (limit of quantification)
0.018 mg/l (ppm)	0.061 mg/l (ppm)

1) Based on ISO 15839. The measured error includes all the uncertainties of the sensor and transmitter (electrode system). It does not contain all the uncertainties caused by the reference material and adjustments that may have been performed.

12.2.5 Repeatability

0.055 mg/l (ppm)

12.2.6 Nominal slope

226 nA per 1 mg/l

12.2.7 Long-term drift

1% per month

12.2.8 Polarization time

Initial commissioning	120 min
Recommissioning	30 min

12.2.9 Operating time of the electrolyte

3 to 6 months

12.2.10 Operating time of membrane cap

With electrolyte	Cap replacement once per year
Without electrolyte	Can be stored for unlimited period at 5 to 40 °C (41 to 104 °F)

12.2.11 Ozone intrinsic consumption

The intrinsic consumption of ozone at the sensor is negligible.

12.3 Environment

12.3.1 Ambient temperature

0 to 55 °C (32 to 131 °F)

12.3.2 Storage temperature

Without electrolyte	0 to 55 °C (32 to 131 °F)

12.3.3 Degree of protection

IP68

12.4 Process

12.4.1 Process temperature

0 to 45 °C (32 to 110 °F), non-freezing

12.4.2 Process pressure

1 bar relativ (14.5 psi relativ) (2 bar abs. (29 psi abs.)), no pressure shocks or vibrations

12.4.3 pH range

Calibration	pH 4 to 8
Measurement	pH 4 to 9 [1)]
Material resistance	pH 2 to 11

As of pH values > 9 ozone is unstable and decomposes.

1) At pH 4 and in the presence of chloride ions (Cl^-), free chlorine is produced, which is also measured by the reference test.

12.4.4 Conductivity

0.03 to 40 mS/cm

If the salt content is high, iodine and bromine can occur; this affects the reference value.

The sensor can also be used in media with a very low conductivity, such as demineralized water.

12.4.5 Flow

At least 7 l/h (1.8 gal/h), in the Flowfit CYA27 (5 l version) and Flowfit CCA151 flow assembly

At least 30 l/h (7.9 gal/h), in the Flowfit CYA27 (30 l version) flow assembly

At least 45 l/h (11.9 gal/h), in the Flowfit CCA250 flow assembly

12.4.6 Flow

At least 29 cm/s (1.0 ft/s)

12.5 Mechanical construction

12.5.1 Dimensions

→ 15

12.5.2 Weight

Membrane cap	14.45 g (0.5 oz)
Sensor, total	93.45 g (3.3 oz)

12.5.3 Materials

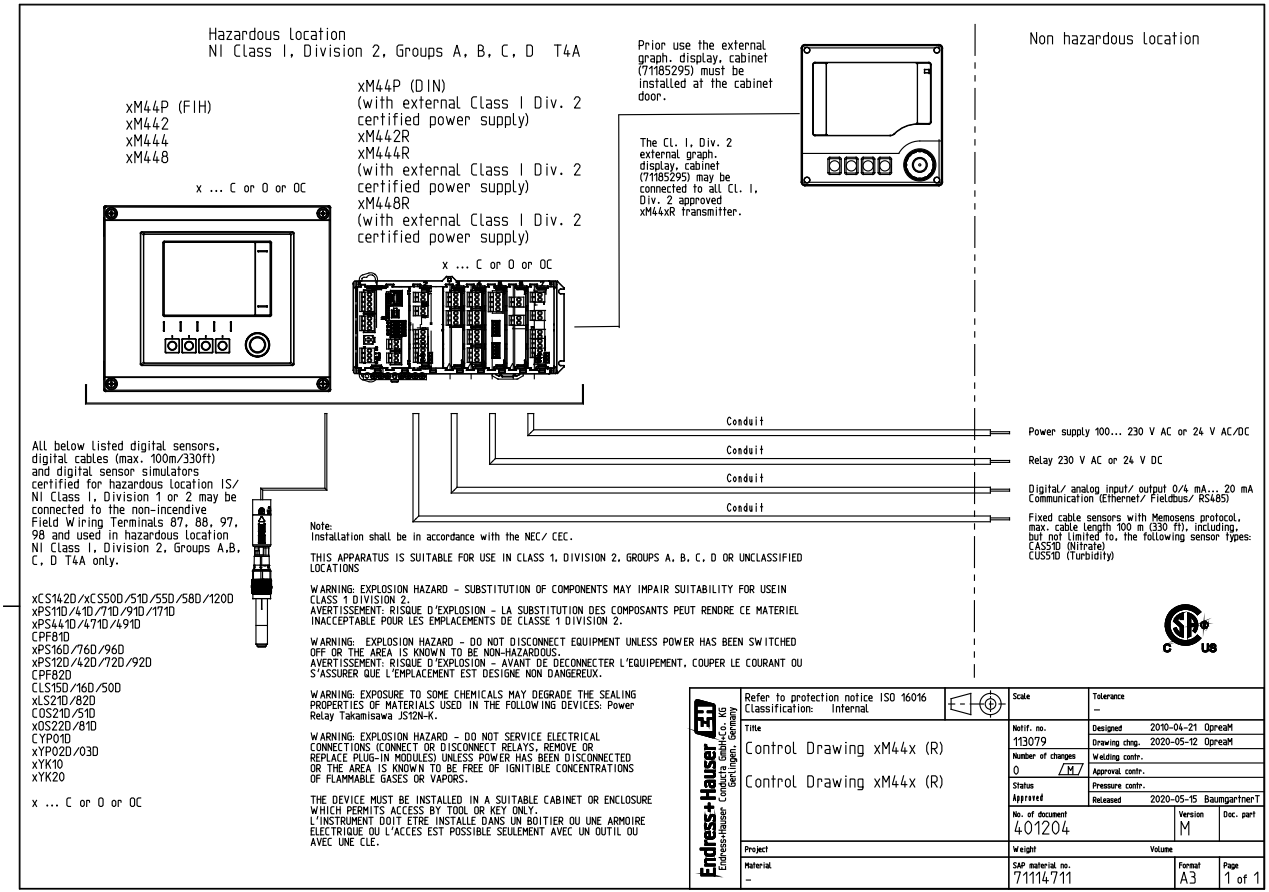
Membrane cap sleeve	PVC
Sensor shaft	PVC
Membrane	Plastic film
Membrane holder	Stainless steel 1.4571
Electrode body	PEEK

12.5.4 Cable specification

max. 100 m (330 ft), incl. Cable extension

13 Installation and operation in hazardous environment Class I Div. 2

Non-sparking device for use in specified hazardous environment in accordance with:
- cCSAus Class I Div. 2
- Gas group A, B, C, D
- Temperature class T6, -5 °C (23 °F) < Ta < 55 °C (131 °F)
- Control drawing: 401204


Hazardous location
NI Class I, Division 2, Groups A, B, C, D T4A
xM44P (FIH)
xM442
xM444
xM448
x ... C or O or OC
xM44P (DIN)
(with external Class I Div. 2
certified power supply)
xM442R
xM444R
(with external Class I Div. 2
certified power supply)
xM448R
(with external Class I Div. 2
certified power supply)
x ... C or O or OC
Prior use the external graph. display, cabinet (71185295) must be installed at the cabinet door.
The Cl. I, Div. 2 external graph. display, cabinet (71185295) may be connected to all Cl. I, Div. 2 approved xM44xR transmitter.
Non hazardous location
Conduit
Conduit
Conduit
Conduit
Power supply 100... 230 V AC or 24 V AC/DC
Relay 230 V AC or 24 V DC
Digital/ analog input/ output 0/4 mA... 20 mA
Communication (Ethernet/ Fieldbus/ RS485)
Fixed cable sensors with Memosens protocol, max. cable length 100 m (330 ft), including, but not limited to, the following sensor types:
CAS51D (Nitrate)
CUS51D (Turbidity)
All below listed digital sensors, digital cables (max. 100m/330ft) and digital sensor simulators certified for hazardous location IS/ NI Class I, Division 1 or 2 may be connected to the non-incendive Field Wiring Terminals 87, 88, 97, 98 and used in hazardous location NI Class I, Division 2, Groups A,B, C, D T4A only.
xCS142D/xCS50D/51D/55D/58D/120D
xPS11D/41D/71D/91D/171D
xPS441D/471D/491D
CPF81D
xPS16D/76D/96D
xPS12D/42D/72D/92D
CPF82D
CLS15D/16D/50D
xLS21D/82D
COS21D/51D
xOS22D/81D
CYP01D
xYP02D/03D
xYK10
xYK20
x ... C or O or OC
Note:
Installation shall be in accordance with the NEC/ CEC.
THIS APPARATUS IS SUITABLE FOR USE IN CLASS 1, DIVISION 2, GROUPS A, B, C, D OR UNCLASSIFIED LOCATIONS
WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USEIN CLASS 1 DIVISION 2.
AVERTISSEMENT: RISQUE D'EXPLOSION - LA SUBSTITUTION DES COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1 DIVISION 2.
WARNING: EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT: RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.
WARNING: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE FOLLOWING DEVICES: Power Relay Takamisawa JS12N-K.
WARNING: EXPLOSION HAZARD - DO NOT SERVICE ELECTRICAL CONNECTIONS (CONNECT OR DISCONNECT RELAYS, REMOVE OR REPLACE PLUG-IN MODULES) UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS KNOWN TO BE FREE OF IGNITIBLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS.
THE DEVICE MUST BE INSTALLED IN A SUITABLE CABINET OR ENCLOSURE WHICH PERMITS ACCESS BY TOOL OR KEY ONLY.
L'INSTRUMENT DOIT ETRE INSTALLE DANS UN BOITIER OU UNE ARMOIRE ELECTRIQUE OU L'ACCES EST POSSIBLE SEULEMENT AVEC UN OUTIL OU AVEC UNE CLE.
Endress+Hauser
Endress+Hauser Conducta GmbH+Co. KG
Gerlingen, Germany
Refer to protection notice ISO 16016
Classification: Internal
Scale
Tolerance
Title
Control Drawing xM44x (R)
Control Drawing xM44x (R)
Notif. no.
113079
Designed 2010-04-21 OpreaM
Drawing chng. 2020-05-12 OpreaM
Number of changes
0 M
Welding contr.
Approval contr.
Status
Approved
Pressure contr.
Released 2020-05-15 BaumgartnerT
No. of document
401204
Version
M
Doc. part
Project
Weight
Volume
Material
-
SAP material no.
71114711
Format
A3
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