

# Technical Information

## Memosens CCS50D

Digital sensor with Memosens technology for determining chlorine dioxide

Memosens CCS50D offers high-precision measurement with long-term stability to guarantee optimum process monitoring



### Application

- Drinking water – to guarantee reliable disinfection
- Cooling water – to prevent the growth of biofilms and pathogens
- Food – to guarantee food safety
- Auxiliary equipment or utility services - to ensure the absence/presence of chlorine dioxide

### Your benefits

- The right choice of sensor for every application: from trace measurements to chlorine dioxide concentrations of 200 mg/l
- The fast response time ( $t_{90} < 15$  s) ensures an accurate view of the process and allows the operator to react immediately to counteract changes
- Flexible installation: Can be fitted in flow cell CCA151, CCA250 and immersion assemblies
- Easy to combine with other relevant liquid analysis parameters (Liquiline)

### Other advantages of Memosens technology

- Maximum process safety
- Data security thanks to digital data transmission
- Very easy to use as sensor data saved in the sensor
- Recording of sensor load data in the sensor enables predictive maintenance

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## Function and system design

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### Measuring principle

Chlorine dioxide levels are determined in accordance with the amperometric measuring principle.

The chlorine dioxide ( $\text{ClO}_2$ ) in the medium diffuses through the sensor membrane and is reduced to chloride ions ( $\text{Cl}^-$ ) at the gold cathode. At the silver anode, silver is oxidized to silver chloride. Electron donation at the gold cathode and electron acceptance at the silver anode cause a current to flow which is in proportion to the concentration of chlorine dioxide in the medium. This process takes place in a wide pH and temperature range.

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

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### Mode of operation

The sensor consists of:

- Membrane cap (measuring chamber with membrane)
- Sensor shaft with large-surface anode and plastic, embedded cathode

The electrodes are in an electrolyte which is separated from the medium by a membrane. The membrane prevents the electrolyte from leaking and protects against contaminant penetration.

Calibration takes place by means of a colorimetric comparison measurement based on the DPD method for chlorine dioxide. The calibration value determined is entered in the transmitter.

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### Cross-sensitivity

The ions listed were checked with the specified concentrations. A summary effect has not been studied. No cross-sensitivities were observed up to the concentration levels indicated.

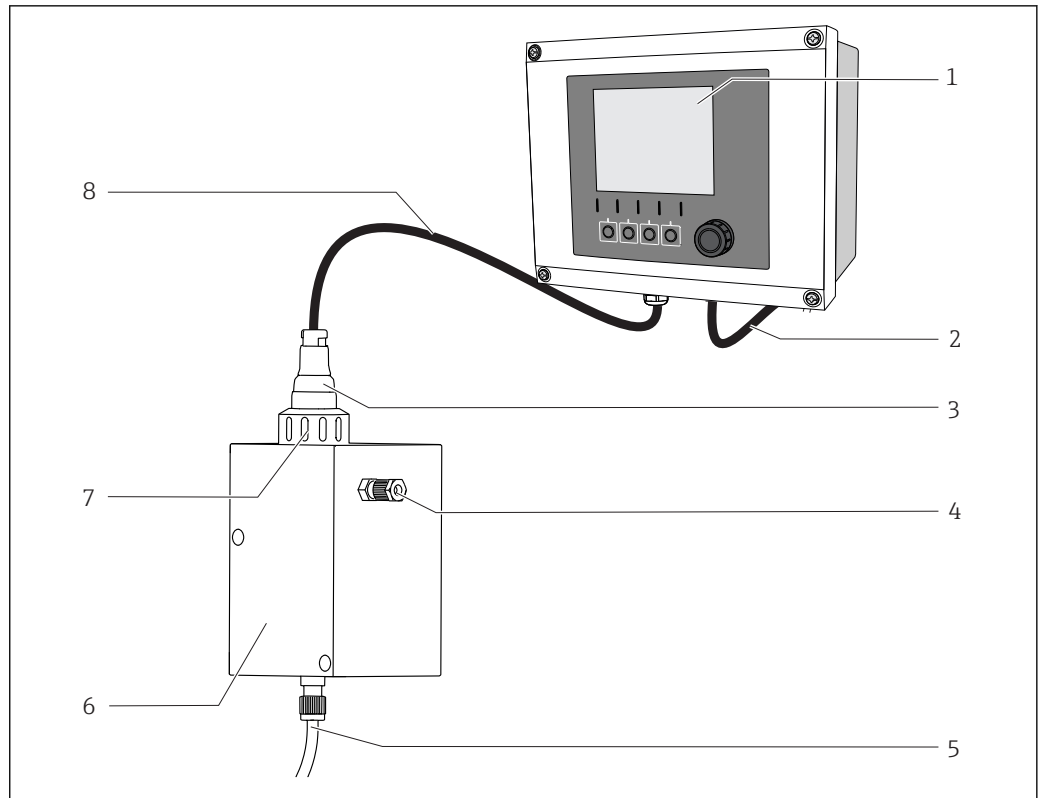
Free chlorine  
Free bromine  
Ozone

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### Measuring system

A complete measuring system comprises:

- Disinfection sensor CCS50D (membrane-covered,  $\varnothing 25$  mm) with corresponding installation adapter
- Flowfit CCA151 flow assembly
- Measuring cable CYK10
- Transmitter, e.g. Liquiline CM44x or CM44xR
- Optional: extension cable CYK11
- Optional: flow assembly Flowfit CCA250 (if a pH/ORP sensor is to be installed)
- Optional: immersion assembly CYA112



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1 Example of a measuring system

- 1 Transmitter Liquiline CM44x
- 2 Power cable for transmitter
- 3 Disinfection sensor CCS50D (membrane-covered, Ø25 mm)
- 4 Outlet from Flowfit CCA151 flow assembly
- 5 Inlet to Flowfit CCA151 flow assembly
- 6 Flowfit CCA151 flow assembly
- 7 Coupling nut for installing a disinfection sensor in the Flowfit CCA151 flow assembly.
- 8 Measuring cable CYK10

## Dependability

## Reliability

### Memosens

Memosens makes your measuring point safer and more reliable:

- Non-contact, digital signal transmission enables optimum galvanic isolation
- Completely watertight
- Sensor can be calibrated in a lab, thus increasing the availability of the measuring point in the process
- Predictive maintenance thanks to recording of sensor data, e.g.:
  - Total hours of operation
  - Hours of operation with very high or very low measured values
  - Hours of operation at high temperatures
  - Number of steam sterilizations
  - Sensor condition

## Maintainability

### Easy handling

Sensors with Memosens technology have integrated electronics that store calibration data and other information (such as total hours of operation and operating hours under extreme measuring conditions). Once the sensor has been connected, the sensor data are transferred automatically to the transmitter and used to calculate the current measured value. As the calibration data are stored

in the sensor, the sensor can be calibrated and adjusted independently of the measuring point. The result:

- Easy calibration in the measuring lab under optimum external conditions increases the quality of the calibration.
- Pre-calibrated sensors can be replaced quickly and easily, resulting in a dramatic increase in the availability of the measuring point .
- Maintenance intervals can be defined based on all stored sensor load and calibration data and predictive maintenance is possible.
- The sensor history can be documented on external data carriers and in evaluation programs. Thus, the current application of the sensors can be made to depend on their previous history.

**Safety**

**Data security thanks to digital data transmission**

Memosens technology digitizes the measured values in the sensor and transmits the data to the transmitter using a non-contact connection that is free from potential interference. The result:

- Automatic error message if sensor fails or connection between sensor and transmitter is interrupted
- Immediate error detection increases measuring point availability

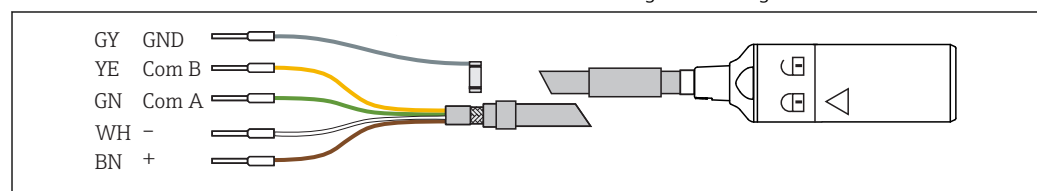
## Input

<b>Measured values</b>	Chlorine dioxide (ClO <sub>2</sub> ) Temperature	[mg/l, µg/l, ppm, ppb] [°C, °F]
<b>Measuring range</b>	CCS50D-**11AD: CCS50D-**11BF: CCS50D-**11CJ:	0 to 5 mg/l ClO <sub>2</sub> 0 to 20 mg/l ClO <sub>2</sub> 0 to 200 mg/l ClO <sub>2</sub>
<b>Signal current</b>	CCS50D-**11AD: CCS50D-**11BF: CCS50D-**11CJ:	135 to 250 nA per 1mg/l ClO <sub>2</sub> 35 to 65 nA per 1 mg/l ClO <sub>2</sub> 4 to 8 nA per 1 mg/l ClO <sub>2</sub>

## Power supply

**Electrical connection**

The electrical connection to the transmitter is established using measuring cable CYK10.



2 Measuring cable CYK10

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

## Performance characteristics

<b>Reference operating conditions</b>	Temperature	20 °C (68 °F)		
	pH value	6 ... 7		
	Flow	40 to 60 cm/s		
	ClO <sub>2</sub> -free base medium	deionized water, conductivity 10 µS/cm		
<b>Response time</b>	T <sub>90</sub> < 15 s (after completing polarization)			
<b>Measured value resolution of sensor</b>	CCS50D-**11AD	0.03 µg/l (ppb) ClO <sub>2</sub>		
	CCS50D-**11BF	0.13 µg/l (ppb) ClO <sub>2</sub>		
	CCS50D-**11CJ	1.1 µg/l (ppb) ClO <sub>2</sub>		
<b>Measured error</b> <sup>1)</sup>	±2 % or ±5 µg/l (ppb) of value measured (depending on which value is higher)			
		CCS50D**11AD	CCS50D**11BF	CCS50D**11CJ
	LOD (limit of detection)	0.0007 mg/l (ppm)	0.0013 mg/l (ppm)	0.0083 mg/l (ppm)
	LOQ (limit of quantitation)	0.002 mg/l (ppm)	0.004 mg/l (ppm)	0.025 mg/l (ppm)
<b>Repeatability</b>	CCS50D**11AD:	0.002 mg/l (ppm)		
	CCS50D**11BF:	0.007 mg/l (ppm)		
	CCS50D**11CJ:	0.025 mg/l (ppm)		
<b>Nominal slope</b>	CCS50D-**11AD	195 nA per 1mg/l ClO <sub>2</sub>		
	CCS50D-**11BF	50 nA per 1 mg/l ClO <sub>2</sub>		
	CCS50D-**11CJ	6 nA per 1 mg/l ClO <sub>2</sub>		
<b>Long-term drift</b>	< 1 % per month (mean value, determined while operating at varying concentrations and under reference conditions)			
<b>Polarization time</b>	Initial commissioning:	60 min		
	Recommissioning:	30 min		
<b>Operating time of the electrolyte</b>	at maximum concentration and 55 °C: 60 days			
	at maximum concentration and 20 °C: 200 days			
	at 50 % of measuring range and 20 °C: 1 year			

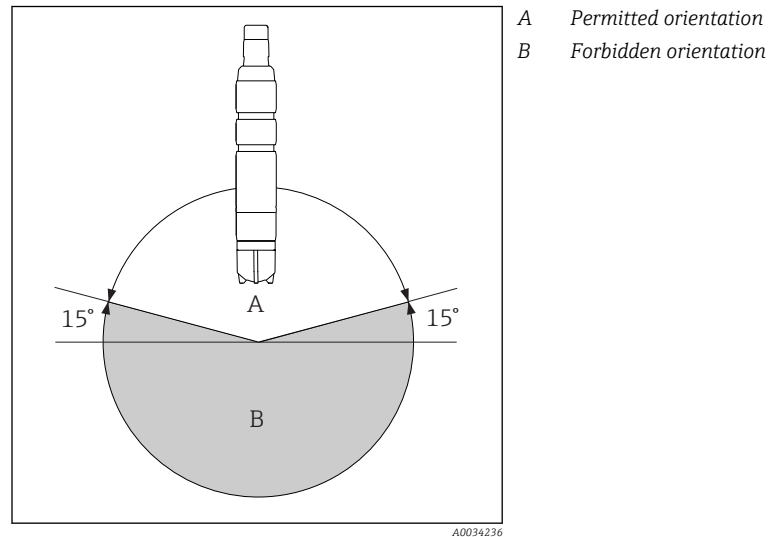
1) Based on ISO 15839. The measured error includes all the uncertainties of the sensor and transmitter (measuring chain). It does not contain all the uncertainties caused by the reference material and adjustments that may have been performed.

## Installation

### 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 for the assembly being used.



### Immersion depth

77 mm (3.03 in)

### Installation instructions

#### Installation in an CCA151 flow assembly

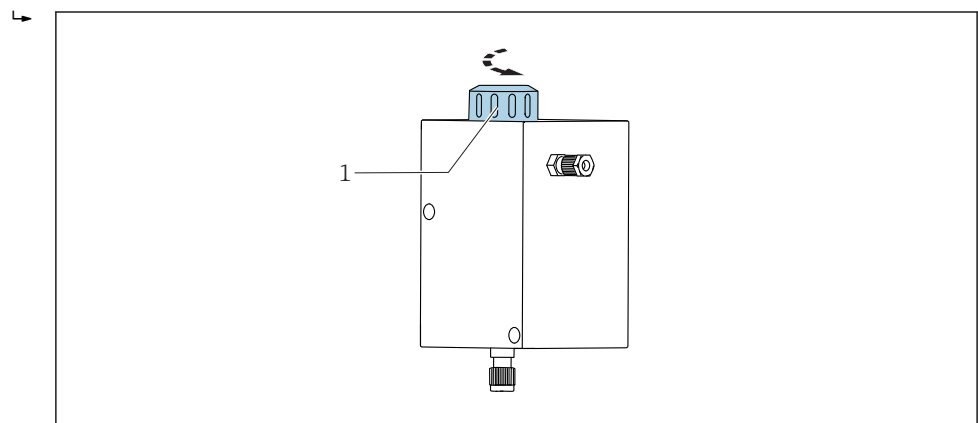
The CCS50D disinfection sensor (membrane-covered, Ø25 mm) is designed for installation in the Flowfit CCA151 flow assembly.

Please note the following during installation:

- ▶ The flow rate must be at least 5 l/h (1.32 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 (14.5 psi) 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.

#### Preparing assembly

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



3 Flowfit CCA151 flow assembly

1 Thread adapter nut

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

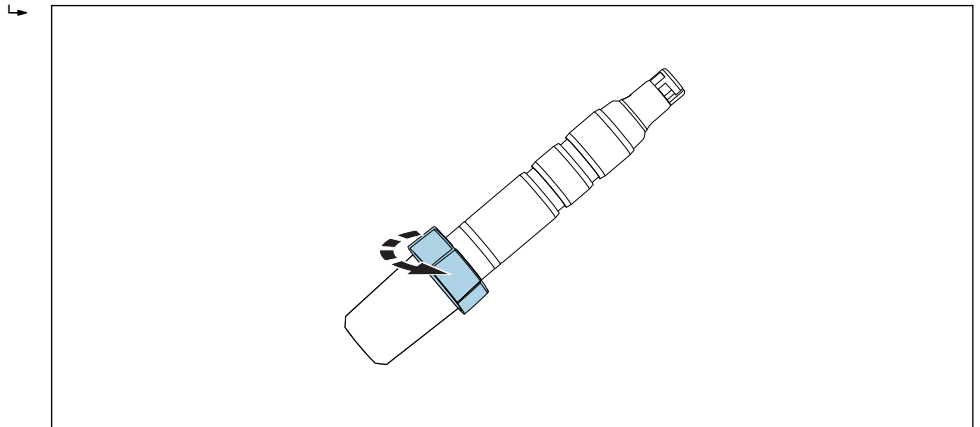
### Removing protection cap from sensor

#### NOTICE

**Negative pressure causes damage to the sensor's membrane cap.**

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

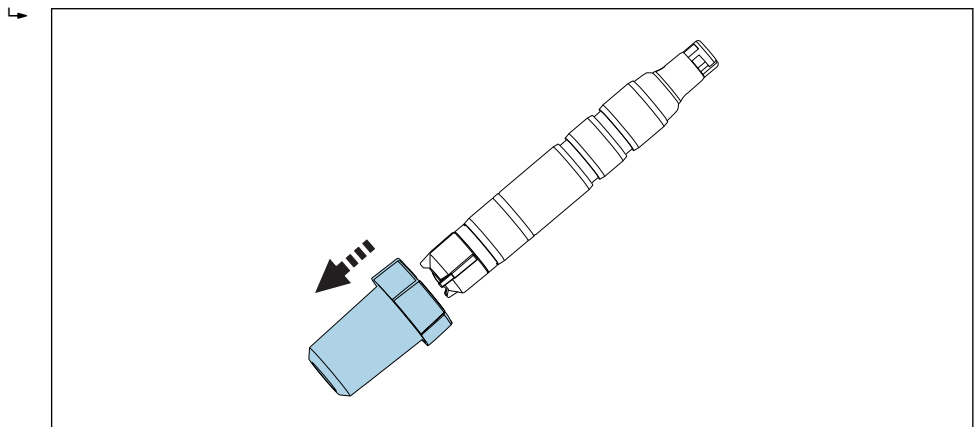
1. When supplied to the customer and when in storage, the sensor is fitted with a protection cap: First release just the top part of the protection cap by turning it.



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4 Releasing top part of protection cap by turning

2. Carefully remove protection cap from sensor.



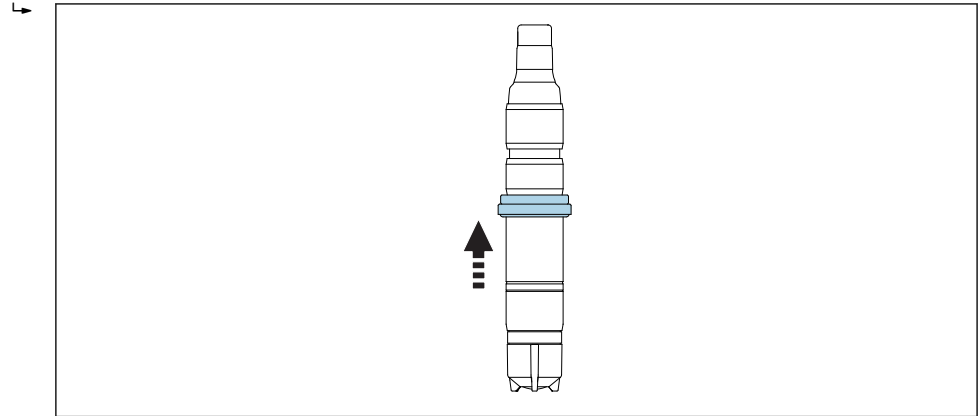
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5 Carefully remove protection cap.

**Fit the adapter to the sensor.**

The required adapter (clamping ring) can be ordered as a sensor accessory or as a separate accessory → 13.

1. Slide the adapter for CCA151 (clamping ring) from the membrane cap towards the sensor head and into the lower groove.

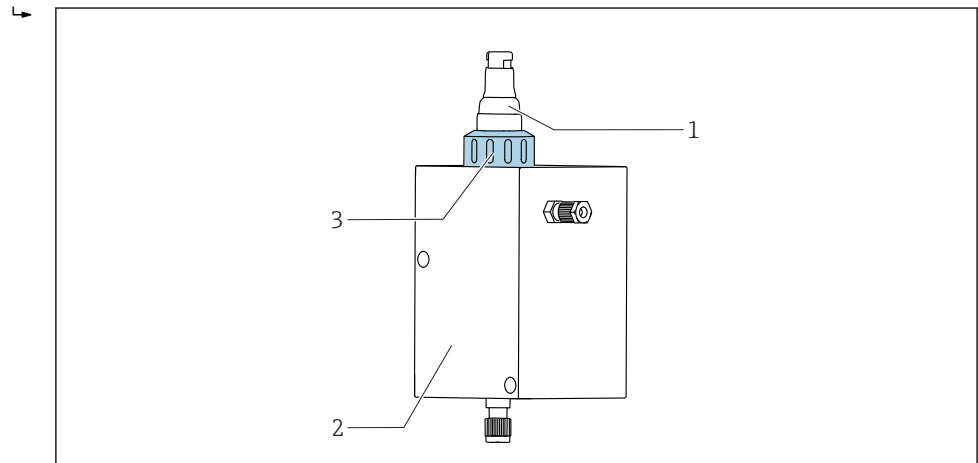


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- 6 Slide the adapter (clamping ring) upwards from the membrane cap to the sensor shaft and into the lower groove.

**Installing sensor in assembly**

2. Slide the sensor with adapter for CCA151 (clamping ring) into the opening in the assembly.
3. Screw coupling nut onto assembly on block.



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- 1 Disinfection sensor CCS50D
- 2 Flowfit CCA151 flow assembly
- 3 Coupling nut for securing a CCS50D disinfection sensor

**Installation in an CCA250 flow assembly**

The sensor can be installed in the Flowfit CCA250 flow assembly. It allows a pH and ORP sensor to be installed, in addition to the chlorine or chlorine dioxide sensor. A needle valve regulates the flow in the range of 30 to 120 l/h (7.9 to 30 gal/h).

Please note the following during installation:

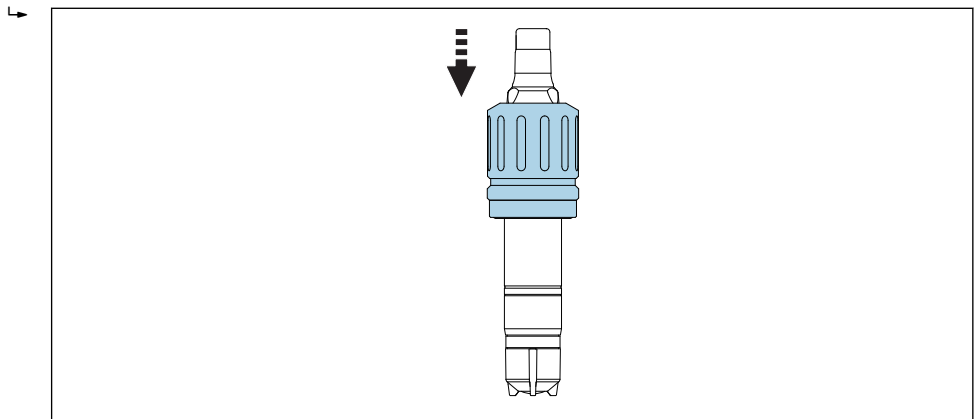
- ▶ The flow rate must be at least 30 l/h (7.92 gal/h). If the flow drops below this value or stops completely, this can be detected by an inductive proximity switch and used to trigger an alarm with locking of the dosage pumps.
- ▶ If the medium is fed back into an overflow basin, pipe or similar, the resulting counterpressure on the sensor may not exceed 1 bar (14.5 psi) and must remain constant.
- ▶ Negative pressure at the sensor e.g. caused by feedback of the medium to the suction side of a pump, must be avoided.



**Fit the adapter to the sensor.**


The required adapter can be ordered as a sensor accessory or as a separate accessory. → 13

1. Slide the adapter for CCA250 from the sensor head into the upper groove on the sensor.



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2. Lock the adapter in place using the two studs provided.

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

**Installation in other flow assemblies**

When using other flow assemblies, please ensure the following:

- ▶ The flow velocity against the membrane is always at least 15 cm/s (0.49 ft/s).
- ▶ The flow direction is upwards so that transported air bubbles are removed and do not collect in front of the membrane.
- ▶ The membrane is struck directly by the flow.

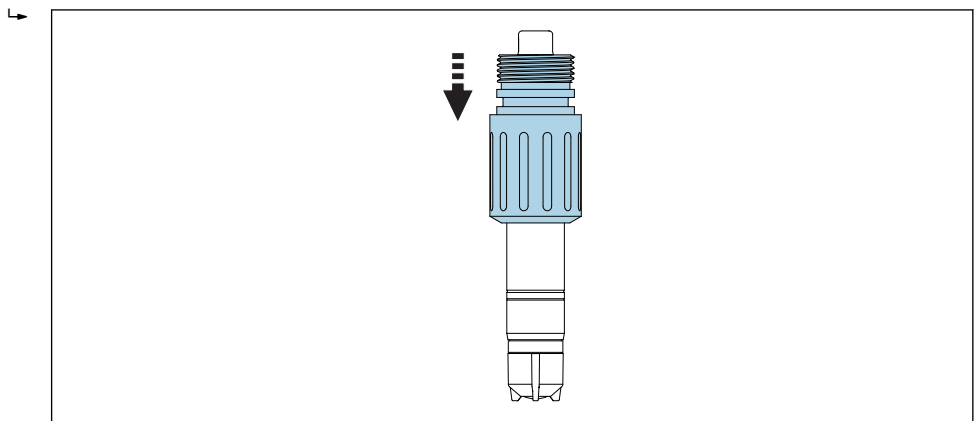
**Installation in CYA112 immersion assembly**

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

**Fit the adapter to the sensor.**


The required adapter can be ordered as a sensor accessory or as a separate accessory. → 13

1. Slide the adapter for CYA112 from the sensor head into the upper groove on the sensor.



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2. Lock the adapter in place using the two studs provided.

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

## Environment

**Ambient temperature** 0 to 60 °C (32 to 140 °F)

**Storage temperature**

	Longterm storage	Storage up to max 48 h
With electrolyte:	+0 to 35 °C (32 to 95 °F) (non-freezing)	35 to 50°C (95 to 122 °F)
Without electrolyte:	-20 to 60 °C (-4 to 140 °F)	

**Degree of protection** IP 68 (1.8 m (5.91 ft) water column over 7 days at 20 °C (68 °F)

## Process

**Process temperature** +0 to 55 °C (32 to 130 °F), non-freezing

**Process pressure** The inlet pressure depends on the specific fitting and installation.  
Free outlet

**pH range** Stability range of ClO<sub>2</sub> 2 to 10<sup>1)</sup>  
Typical range of application pH 4 to 9  
ClO<sub>2</sub> dissipates very quickly from pH values > 9

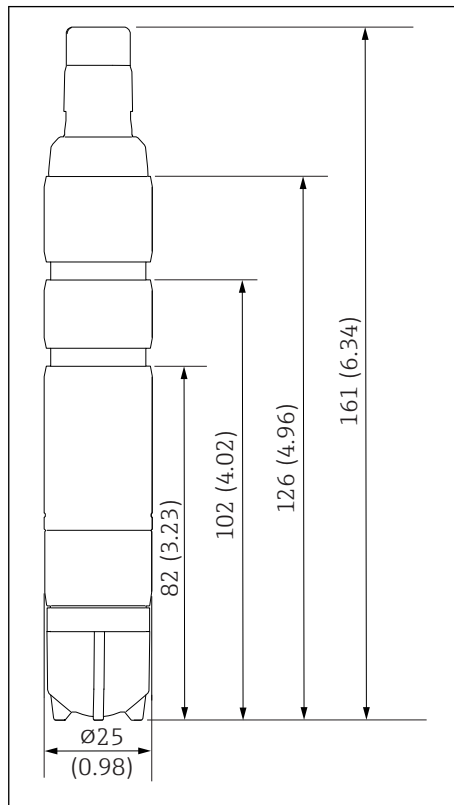
1) In the pH range of 1 to 3.5 and when Cl ions are present, free chlorine occurs and is included in the measurements

**Flow** remains stable for a minimum of 5 l/h (1.32 gal/hr), in the Flowfit CCA151 flow assembly  
remains stable for a minimum of 30 l/h (8 gal/hr), in the Flowfit W CCA250 flow assembly

**Minimum flow** remains stable for a minimum of 15 cm/s (0.5 ft/s), e.g. with Flexdip CYA112 immersion assembly

## Mechanical construction

### Dimensions



7 Dimensions in mm (in)

### Weight

Sensor with membrane cap and electrolyte (without protection cap and without adapter): approx. 95 g (3.35 oz)

### Materials

Sensor shaft:	PVC
Membrane:	PVDF
Membrane cap:	PVDF
Protection cap:	<ul style="list-style-type: none"> <li>▪ Vessel: PC Makrolon (polycarbonate)</li> <li>▪ Seal: Kraiburg TPE TM5MED</li> <li>▪ Cover: PC Makrolon (polycarbonate)</li> </ul>
Sealing ring:	FKM

## 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.

#### EAC

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

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## Ordering information

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**Product page**

[www.endress.com/ccs50d](http://www.endress.com/ccs50d)

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**Product Configurator**

On the product page there is a "Configure" button to the right of the product image **Configure**.

1. Click this button.
  - ↳ The Configurator opens in a separate window.
2. Select all the options to configure the device in line with your requirements.
  - ↳ In this way, you receive a valid and complete order code for the device.
3. Export the order code as a PDF or Excel file. To do so, click the appropriate button on the right above the selection window.



For many products you also have the option of downloading CAD or 2D drawings of the selected product version. Click the tab for this **CAD** and select the desired file type using picklists.

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**Scope of delivery**

The delivery comprises:

- Disinfection sensor (membrane-covered, Ø25 mm) with protection cap (ready for use)
- Bottle of electrolyte (50 ml (1.69 fl.oz))
- Replacement membrane cap in protection cap
- Operating Instructions

## 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.

### Device-specific accessories


#### **CYK10 Memosens data cable**

- For digital sensors with Memosens technology
- Product Configurator on the product page: [www.endress.com/cyk10](http://www.endress.com/cyk10)

 Technical Information TI00118C


#### **Memosens data cable CYK11**

- Extension cable for digital sensors with Memosens protocol
- Product Configurator on the product page: [www.endress.com/cyk11](http://www.endress.com/cyk11)

 Technical Information TI00118C

#### **Flowfit CCA151**

- Flow assembly for chlorine sensors
- Product Configurator on the product page: [www.endress.com/cca151](http://www.endress.com/cca151)

 Technical Information TI01357C

#### **Flowfit CCA250**

- Flow assembly for chlorine and pH/ORP sensors
- Product Configurator on the product page: [www.endress.com/cca250](http://www.endress.com/cca250)

 Technical Information TI00062C

#### **FlexdipCYA112**

- 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](http://www.endress.com/cya112)

 Technical Information TI00432C

#### **Photometer PF-3**

- Compact hand-held photometer for determining free available chlorine
- Color-coded reagent bottles with clear dosing instructions
- Order No.: 71257946

#### **Kit adapter CCS5xD for CCA151**

- Clamping ring
- Thrust collar
- O-ring
- Order No. 71372027

#### **Kit adapter CCS5xD for CCA250**

- Adapter incl. O-rings
- 2 studs for locking in place
- Order No. 71372025

#### **Kit adapter CCS5xD for CYA112**

- Adapter incl. O-rings
- 2 studs for locking in place
- Order No. 71372026

#### **COY8**

Zero-point gel for oxygen and chlorine sensors

- Oxygen-free gel for the validation, calibration and adjustment of oxygen measuring cells
- Product Configurator on the product page: [www.endress.com/coy8](http://www.endress.com/coy8)

 Technical Information TI01244C

#### **Maintenance kit, CCS50D**

- For chlorine sensor CCS50D
- 2 replacement membrane caps, electrolyte 50 ml (1.69 fl.oz)
- Order No. 71372022

**Consumables**

**Electrolyte CCS50D, 50ml**

- For chlorine sensor CCS50D
- Electrolyte 50 ml (1.69 fl.oz)
- Order No. 71372023

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[www.addresses.endress.com](http://www.addresses.endress.com)

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