



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

CCS240 and CCS241

Sensors for chlorine dioxide

Amperometric, membrane-covered sensors for installation in the CCA250 assembly



Application

Chlorine dioxide is used for disinfection of water. Its dosing must be carefully controlled to suit the application. Too low a concentration makes the degree of disinfection questionable. Too high a concentration can result in corrosion effects, impairment of taste or skin irritation.

The CCS240 and CCS241 sensors are applied for measurement of chlorine dioxide in the following fields:

- Drinking water treatment
- Pool water treatment
- Industrial water treatment

Your benefits

- Minimum flow rate for installation in the CCA250 flow assembly: 30 l/h
- Measurement almost independent of flow rate in the range above 30 l/h
- No zero point calibration necessary. This means complicated installation of an active carbon filter, as in open chlorine dioxide sensors, is not necessary.
- Measured values are not affected by conductivity fluctuation.
- The CCS240 sensor is ready for measurement after a polarisation time of approx. 10 ... 30 minutes. The CCS241 sensor requires 45 ... 90 min.
- Easy membrane replacement thanks to ready-made membrane head
- Recalibration intervals approx. 1 ... 4 months under constant operating conditions
- Back pressure up to 1 bar / 14.5 psi allowed at the outlet

Function and system design

Measuring principle

The concentration of chlorine dioxide is determined according to the amperometric measuring principle. The chlorine dioxide (ClO_2) contained in the medium diffuses through the sensor membrane and is reduced to chloride ions (Cl^-) on the gold cathode. On the silver anode, silver is oxidised to silver chloride. The electron release of the gold cathode and electron acceptance on the silver anode result in a current flow which is proportional to the chlorine dioxide concentration in the medium. This process takes place within a wide pH and temperature range.

The transmitter transforms the current signal into the measuring unit concentration in mg/l.

Function

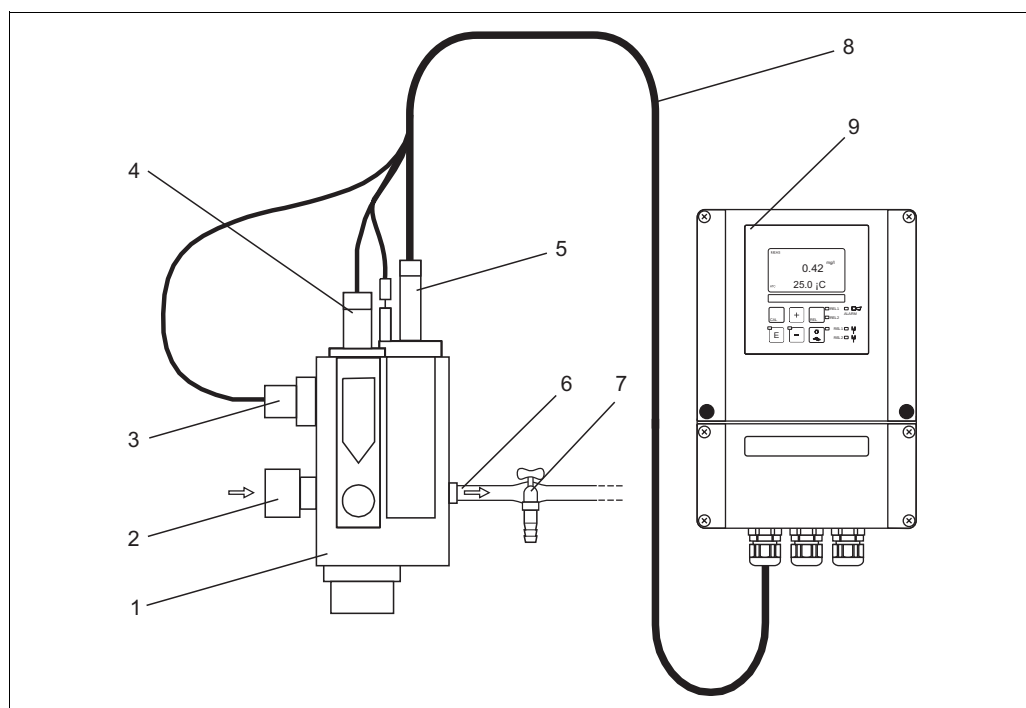
The membrane-capped CCS240 / CCS241 sensors consist of a cathode serving as the working electrode and an anode acting as the counter electrode. These electrodes are immersed in an electrolyte. Electrodes and electrolyte are separated from the medium by a membrane. The membrane prevents the loss of electrolyte and the penetration of contaminants. The CCS240 and CCS241 sensors are used for measurement of chlorine dioxide.

To calibrate the measuring system, determine the content of chlorine dioxide using the DPD method. You need a photometer with the pertaining reagents. The determined value is the calibration value for the transmitter.

Measuring system

A complete measuring system comprises at least:

- Chlorine dioxide sensor
- Liquisys M CCM223/253 transmitter
- Special measuring cable
- Flow assembly
- Reference measuring instrument for determination of chlorine dioxide according to the DPD method



Measuring system in the flow mode (example)

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|---|--|---|-----------------------|
| 1 | CCA250 flow assembly | 6 | Medium outlet |
| 2 | Medium inlet | 7 | Sampling tap |
| 3 | Inductive proximity switch for flow monitoring | 8 | Fixed measuring cable |
| 4 | Mounting place for pH/redox sensors | 9 | Transmitter |
| 5 | Chlorine dioxide sensor | | |

Input

Measured variable	Chlorine dioxide (ClO ₂)
Measuring range	CCS240 (for industrial water, pool water): 0.05 ... 20 mg ClO ₂ /l CCS241 (for drinking water applications): 0.01 ... 5 mg ClO ₂ /l

Performance characteristics

Response time	T ₉₀ < 2 min T ₉₉ < 5 min
Polarisation time	CCS240: First polarisation: 30 min Repolarisation: 10 min CCS241: First polarisation: 90 min Repolarisation: 45 min
Drift	< 1.5 % per month
Electrolyte service life	typically 12 months

Installation

Installation instructions	The flow assembly CCA250 is designed for on-site installation of the sensor. In addition to the chlorine or chlorine dioxide sensor, a pH and redox sensor can be installed. A needle valve regulates the flow within the range of 30 ... 120 l/h (7.92 ... 31.68 US.gal/h). When installing the sensor, note the following: ■ The flow must be at least 30 l/h. If the flow drops below this value or stops completely, this can be detected by an inductive proximity switch and an alarm signal plus locking of the dosage pumps can be triggered. ■ If the medium is fed back into a surge tank, pipeline or the like, ensure that the thus generated back pressure on the sensor does not exceed 1 bar (14.5 psi) and remains constant. ■ Negative pressure at the sensor, e.g. by feedback of medium to the suction side of a pump, must be avoided. For further installation instructions, see the operating instructions of the flow assembly.
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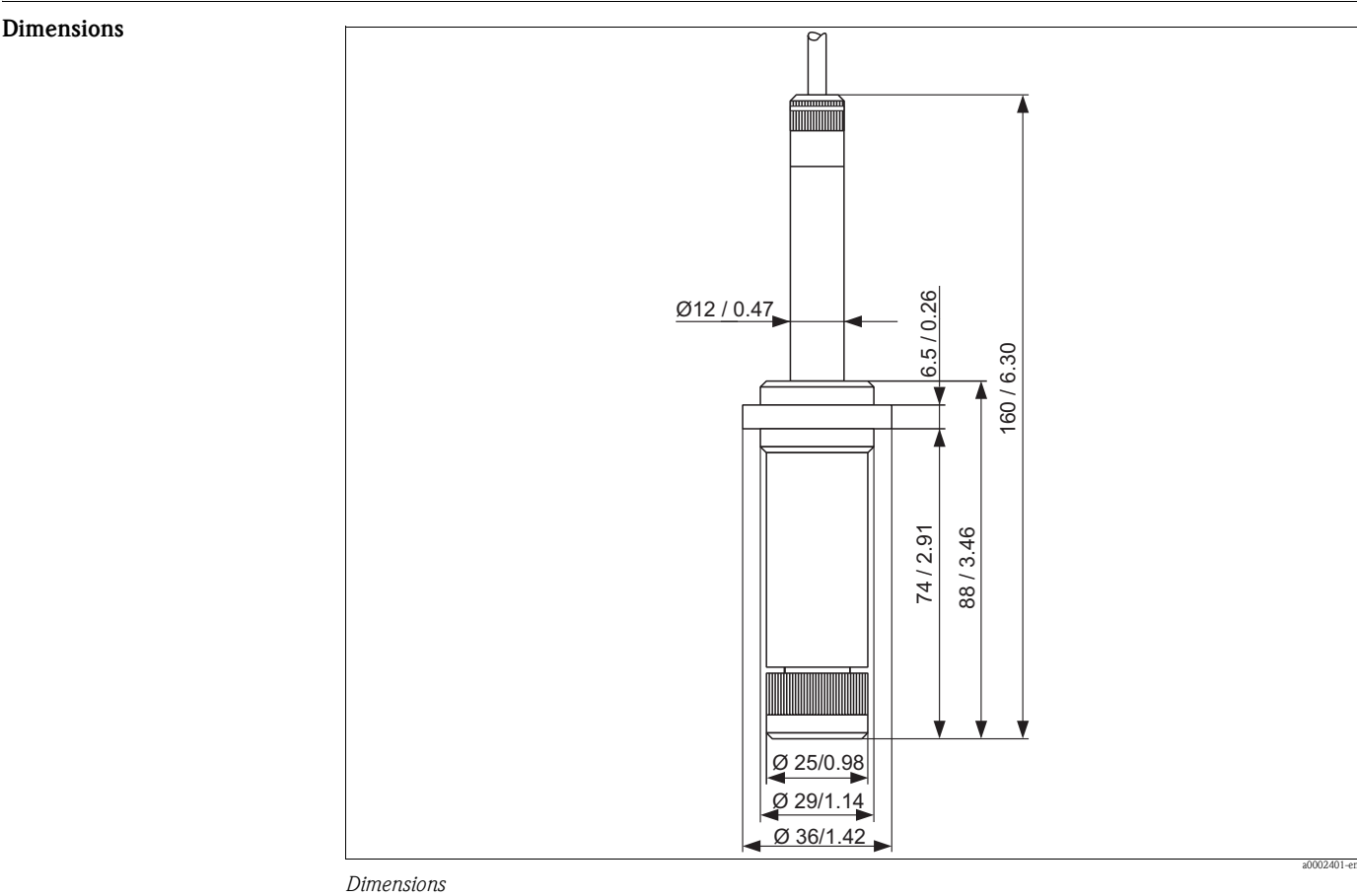
Environment

Storage temperature	Filled with electrolyte:	5 ... 50 °C / 41 ... 122 °F
	Without electrolyte:	-20 ... 60 °C / -4 ... 140 °F
Ingress protection	IP 68 (up to the mounting collar Ø 36 mm / 1.42")	

Process

Temperature range	2 ... 45 °C / 36 ... 113 °F
pH range	in stability range of ClO ₂
Pressure	Medium in the CCA250 assembly: max. 1 bar (14.5 psi)
Flow	in the CCA250 assembly: min. 30 l/h / 7.92 US.gal./h
Flow velocity	min. 15 cm/s / 0.5 ft/s

Mechanical construction



Weight	approx. 0.5 kg / 1.1 lb.	
Material	Sensor shaft:	PVC
	Membrane:	PTFE
	Membrane cap:	PBT (GF 30), PVDF
	Cathode:	Gold
	Anode:	Silver / silver chloride
Cable connection	Fixed cable (3 m / 9.84 ft), four cores, double-screened, low noise	
Cable length	max. 30 m / 98.43 ft (cable extension included)	
Temperature sensor	NTC, 10 kΩ at 25 °C / 77 °F	

Ordering information

CCS240 sensor		Version
	N	with NTC temperature sensor
	CCS240-	complete order code
CCS241 sensor		Version
	N	with NTC temperature sensor
	CCS241-	complete order code

Scope of delivery	The scope of delivery comprises: ■ 1 chlorine dioxide sensor ■ 1 bottle filled with electrolyte (50 ml) plus nozzle ■ 1 membrane cap for protection and storage ■ 1 replacement cartridge with pretensioned membrane ■ Operating Instructions, English
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Accessories

Installation accessories	■ Flow assembly CCA250 for chlorine, chlorine dioxide, pH and redox; Ordering acc. to product structure, see Technical Information (TI 062C/07/en) ■ Compact chlorine system CCE1 Factory-assembled and wired panel for transmitter with flow assembly CCA250-A1; see also Technical Information TI 014C/07/en
Connection accessories	■ Junction box VBC Metallic junction box for cable extension, dimensions (W x D x H): 125 x 80 x 54 mm / 4.92 x 3.15 x 2.13 inches Order no. 50005181 ■ CMK special measuring cable for cable extension between junction box and transmitter, non terminated, sold by the metre Order no. 50005374
Transmitter	■ Liquisys M CCM223/253 Transmitter for chlorine, field or panel-mounted housing, Hart® or PROFIBUS available, Ordering acc. to product structure, see Technical Information (TI 214C/07/en)
Maintenance /calibration	■ Photometer CCM182; microprocessor-controlled photometer for chlorine, pH value, cyanuric acid; Chlorine measuring range: 0.05 - 6 mg/l pH measuring range: 6.5 - 8.4 ■ CCY24-F Electrolyte for CCS240 / CCS241 chlorine dioxide sensors, 50 ml Order no. 50064294 ■ CCY14-WP 2 replacement cartridges ready-made for CCS140/141/240/241 chlorine and chlorine dioxide sensors Order no. 50005255

International Head Quarters

Endress+Hauser
GmbH+Co. KG
Instruments International
Colmarer Str. 6
79576 Weil am Rhein
Deutschland

Tel. +49 76 21 9 75 02
Fax +49 76 21 9 75 34 5
www.endress.com
info@ii.endress.com

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