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

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Function and system design

Measuring principle

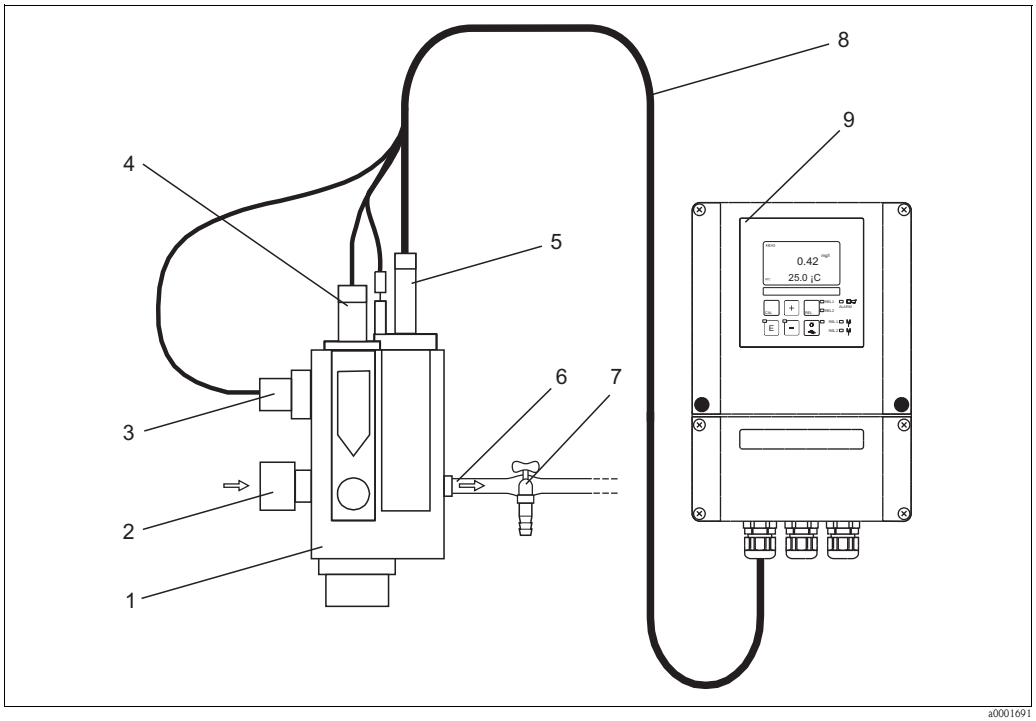
The concentration of chlorine dioxide is determined according to the amperometric measuring principle. The chlorine dioxide (ClO_2) contained in the medium diffuses through the sensor membrane and is reduced to chloride ions (Cl^-) on the gold cathode. On the silve anode, silver is oxidised to silver 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)

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.

Environment

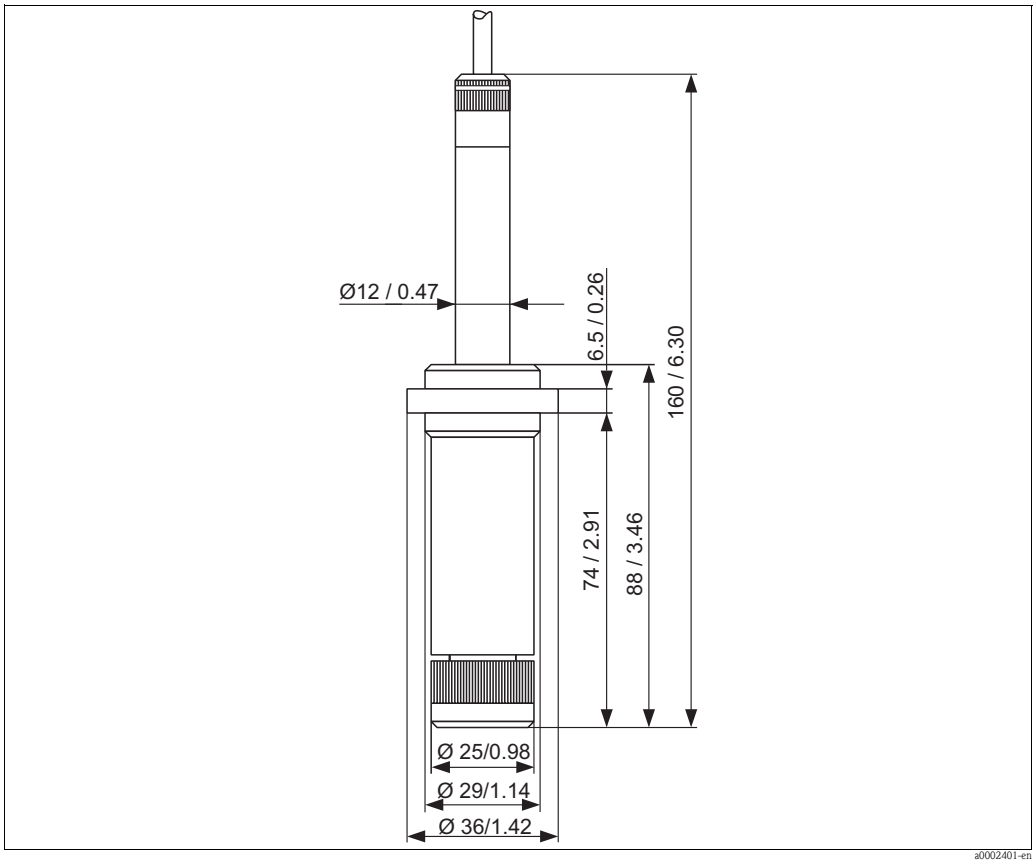
Storage temperature	Filled with electrolyte: 5 ... 50 °C / 41 ... 122 °F Without electrolyte: -20 ... 60 °C / -4 ... 140 °F
Ingress protection	IP 68 (up to the mounting collar Ø 36 mm / 1.42")

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

Dimensions



Dimensions

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

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

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