



Level



Pressure



Flow



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Liquid
Analysis

Registration

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Solutions

Technical Information

Chloromax CCS142D

Digital sensor with Memosens technology for determining free chlorine
Membrane-covered amperometric sensor for process and drinking water applications



Application

Oxidants such as chlorine or inorganic chlorine compounds are used to disinfect water. They must be dosed immediately, depending on the operating conditions. If the concentrations are too low, this could jeopardize the disinfection process. On the other hand, concentrations which are too high can cause corrosion, skin irritation and affect the taste of the water. The CCS142D chlorine sensor is used to measure free chlorine in the following areas:

- Drinking water
- Process water
- Industrial water treatment

Your benefits

- Sensor with digital signal processing:
 - Not sensitive to electromagnetic interference thanks to digital communication with the transmitter
 - Calibration data saved in the sensor, making it possible to calibrate at any transmitter or location and install subsequently at the measuring point
- Ultimate measuring reliability:
 - Measurement practically independent of the flow at flow velocities above 15 cm/s (~0.5 ft/s)
 - Long calibration and maintenance intervals
 - No change in measured value in the event of fluctuations in conductivity
- Membrane-covered sensor, therefore:
 - Easy membrane replacement thanks to prefabricated membrane head
 - Minimum maintenance
- Zero-point calibration not required. No complex installation of an activated carbon filter, as found with open chlorine sensors

Function and system design

Measuring principle

The concentration of free chlorine is determined according to the amperometric measuring principle. The hypochlorous acid (HOCl) 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 oxidized 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 free chlorine concentration in the medium under constant conditions. The concentration of hypochlorous acid in the medium depends on the pH value. This dependence can be compensated by measuring the pH value in the flow assembly.

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

Function

The membrane-covered sensor CCS142D consists of a cathode (working electrode) and an anode (counterelectrode) in an electrolyte which is separated from the medium by a membrane. The membrane prevents the electrolyte from leaking and protects against contaminant penetration.

The measuring system is calibrated by determining the free chlorine based on the DPD method (photometric method). The calibration value determined is entered in the transmitter.

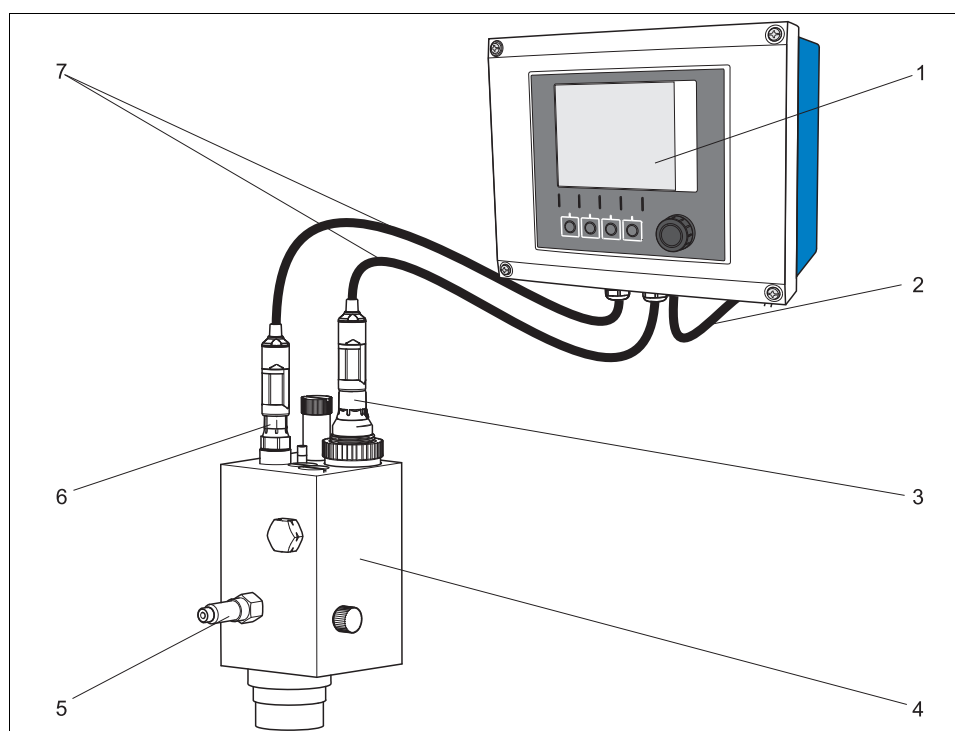
Measuring system

A complete measuring system consists of:

- A CCS142D chlorine sensor
- An assembly, e.g. Flowfit CCA250
- A Memosens data cable CYK10
- A transmitter, e.g. Liquiline CM44x

Optional:

- RM junction box for cable extension
- When using the assembly CCA250: additional sensor(s), e.g. pH sensor CPS71D



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Measuring system

- 1 Liquiline CM44x transmitter with weather protection cover
- 2 Power supply line for transmitter
- 3 CCS142D chlorine sensor
- 4 Flowfit CCA250 assembly
- 5 Inlet to assembly (outlet on rear, not shown in graphic)
- 6 CPS71D pH sensor
- 7 CYK10 measuring cable

Input

Measured variable	Free chlorine: hypochlorous acid (HOCl)
Measuring range	■ CCS142D-A: 0.05 to 20 mg/l Cl₂ (25 °C (77 °F), pH 7.2) ■ CCS142D-G: 0.01 to 5 mg/l Cl₂ (25 °C (77 °F), pH 7.2)
Depolarization current	■ CCS142D-A: approx. 25 nA per mg/l Cl₂ (25 °C (77 °F), pH 7.2) ■ CCS142D-G: approx. 80 nA per mg/l Cl₂ (25 °C (77 °F), pH 7.2)

Performance characteristics

Response time	T ₉₀ < 2 min in applications involving mainly active chlorination
Reference operating conditions	25 °C (77 °F) pH 7.2
Measured value resolution	■ CCS142D-A: approx. 15 µg/l Cl₂ ■ CCS142D-G: approx. 5 µg/l Cl₂
Maximum measured error	1 % of measured value
Repeatability	■ Sensor: ± 1 % ■ Reference method: depending on version Calibration standards do not have long-term stability.
Nominal slope	■ CCS142D-A: -25 nA per mg/l ■ CCS142D-G: -80 nA per mg/l
Drift	< 1.5 % per month
Polarization time	■ CCS142D-A: Commissioning: 60 min Reoperation: 30 min ■ CCS142D-G: Commissioning: 90 min Reoperation: 45 min
Electrolyte operating time	At average medium concentrations of 1 mg/l Cl ■ CCS142D-A: > 5 years ■ CCS142D-G: > 3 years
Chlorine intrinsic consumption	At average medium concentrations of 1 mg/l Cl and reference conditions ■ CCS142D-A: 25 ng Cl per hour ■ CCS142D-G: 100 ng Cl per hour

Installation

Installation instructions

Flow assembly

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 an ORP sensor can be installed. A needle valve regulates the flow within the range of 30 to 120 l/h (7.9 to 31.7 US.gal/h).

When installing the sensor, note the following:

- The flow must be at least 30 l/h (7.9 US.gal/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.

Immersion assembly

Alternatively, the sensor can be installed in an immersion assembly with threaded connection NPT ¾", e.g. CYA112.

Please note the following when installing the sensor:

- Hold the sensor securely in position and screw the assembly handtight onto the sensor. This prevents the cables from twisting and cable rupture.
- To improve the sealing effect, we recommend you wrap a thin PTFE tape around the thread for assemblies with an NPT ¾" thread.

Additional installation instructions can be found in the Operating Instructions for the assembly.

Environment

Storage temperature

Filled with electrolyte: 5 to 50 °C (41 to 122 °F)
Without electrolyte: -20 to 60 °C (-4 to 140 °F)

Ingress protection

IP 68 (10 m (33 ft) water column at 25 °C (77 °F) during 45 days, 1 mol/l KCl)

Process

Process temperature

0 to 45 °C (32 to 113 °F), non-freezing

Process pressure

Medium in the CCA250 assembly: max. 1 bar (14.5 psi)

pH range

Calibration
CCS142D-A: 4 to 8 pH
CCS142D-G: 4 to 8.2 pH
Measurement: 4 ... 9 pH

Chlorine measurement possible up to pH 9 with limited accuracy.

Flow

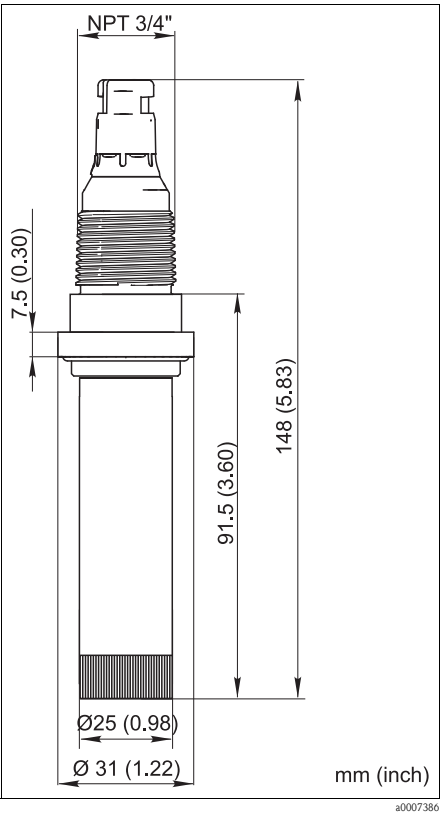
in the CCA250 assembly: min. 30 l/h (8 US.gal./h)

Flow rate

min. 15 cm/s (0.5 ft/s)

Mechanical construction

Dimensions



Dimensions

Weight	approx. 0.1 kg (0.22 lbs)	
Material	Sensor shaft:	PVC
	Membrane:	PTFE
	Membrane cap:	PBT (GF 30), PVDF
	Cathode:	Gold
	Anode:	Silver / silver chloride
Cable length	max. 100 m (330 ft), incl. cable extension	

Ordering information

Product structure

Measuring range				
	A	0.05 to 20 mg/l (0.05 to 20 ppm)		
	G	0.01 to 5 mg/l (0.01 to 5 ppm)		
Approval				
	A	Non-hazardous area		
Sensor head type				
	S	Thread NPT 3/4, Memosens plug-in head		
Cable length				
	8	Standard: without cable		
Accessories				
	0	None		
CCS142D-				Complete order code

Scope of delivery	The scope of delivery comprises: ■ 1 chlorine sensor ■ 1 bottle with electrolyte (50 ml) ■ 1 replacement cartridge with pretensioned membrane ■ 1 Operating Instructions in English
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Accessories

Installation accessories	Flowfit CCA250 ■ Flow assembly for chlorine, chlorine dioxide, pH and ORP sensors ■ Ordering acc. to product structure, see Technical Information TI062C/07/en Wastewater assembly Flexdip CYA112 ■ Modular assembly system for sensors in open basins, channels and tanks ■ Versions in stainless steel or PVC ■ Ordering acc. to product structure (Technical Information TI432C/07/en)
Connection accessories	CYK10 Memosens data cable ■ For digital sensors with Memosens technology ■ Ordering according to product structure, see Technical Information (TI376C/07/en) CYK81 measuring cable ■ Non-terminated measuring cable for extension of sensor cables of e.g. Memosens sensors, CUS31/CUS41 ■ 2 wires, twisted pair with shield and PVC-sheath (2 x 2 x 0.5 mm² + shield) ■ Sold by the meter, order no.: 51502543 Junction box RM ■ For cable extension (e.g. for Memosens sensors) ■ 5 terminals ■ Cable entries: 2 x Pg 13.5 ■ Material: PC ■ Ingress protection: IP 65 ■ Order no.: 51500832
Measuring point identification marking	Memoclip ■ Identification for Memosens sensors ■ 100 plastic clips incl. label sheets ■ order no. 71038228
Calibration	CCM182 ■ Microprocessor-controlled photometer for determining chlorine and pH value ■ Measuring range for chlorine: 0.05 – 6 mg/l ■ Measuring range for pH value: 6.5 – 8.4 ■ Order no.: CCM182-0
Maintenance	CCY14-WP ■ 2 replacement cartridges ready-made for CCS140/141/142D chlorine and CCS240/241 chlorine dioxide sensors ■ Order no. 50005255 CCY14-F ■ Electrolyte for CCS140 / CCS141 / CCS142D chlorine sensors; 50 ml ■ Order no. 50005256 Polishing sheets COY31-PF ■ 10 pieces for cleaning of the gold cathode ■ For oxygen and chlorine sensors ■ Order no. 51506973 Service kit CCS14x ■ For chlorine sensors CCS140/CCS141/CCS142D ■ 2 replacement cartridges, filling electrolyte 50 ml, polishing sheets ■ Order no. 71076921

System solutions

Compact measuring station CCE10/CCE11

- Panel mounted ready for connection for holding one or three transmitters, with flow assembly CCA250-A1
- Ordering acc. to product structure, s. Technical Information TI440C/07/EN

For more Endress+Hauser product please visit: www.ainstru.com

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