

Technical Information

OCS140 and OCS141

Sensors for free chlorine

Amperometric, membrane-covered sensors for installation in the OCA250 assembly



Application

Oxidising agents such as chlorine or anorganic chlorine compounds are used for disinfection of water. Their 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 OCS140 and OCS141 chlorine sensors are applied for measurement of free active chlorine in the following fields:

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

Your benefits

- Minimum flow rate for installation in the OCA250 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 sensors, is not necessary.
- Measured values are not affected by conductivity fluctuation.
- The OCS140 sensor is ready for measurement after a polarisation time of approx. 30 ... 60 minutes. The OCS141 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 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 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 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

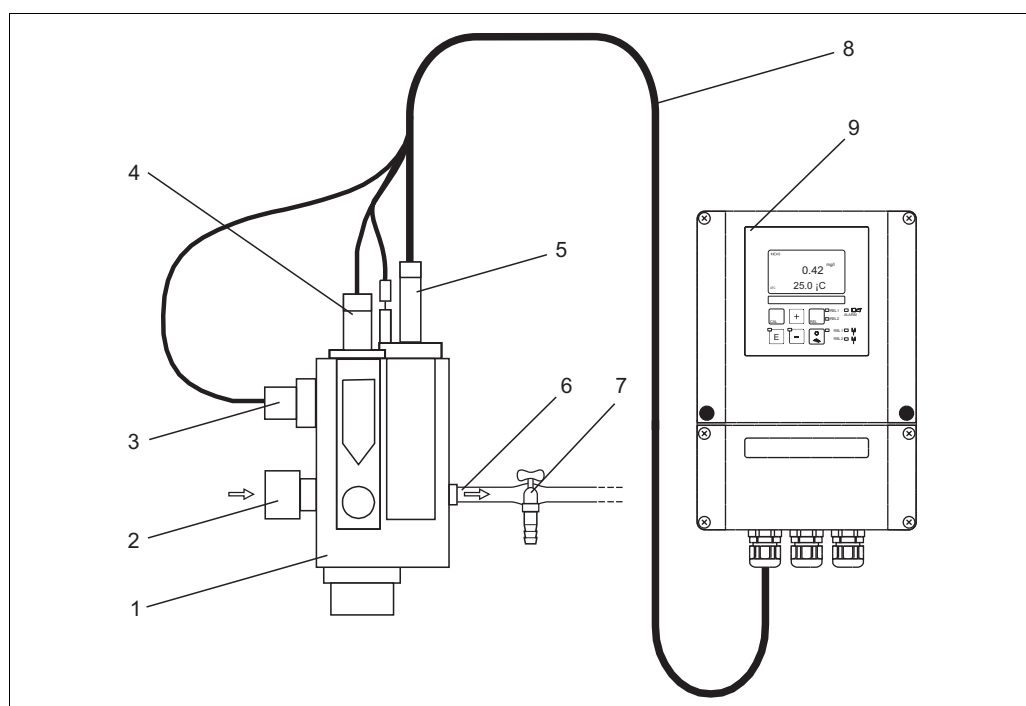
The membrane-capped OCS140 / OCS141 sensors consist of a cathode serving as the working electrode and an anode acting as the counter electrode. These electrodes are immersed in an electrolyte. Electrodes and electrolyte are separated from the medium by a membrane. The membrane prevents the loss of electrolyte and the penetration of contaminants. The OCS140 and OCS141 sensors are used for measurement of free chlorine.

To calibrate the measuring system, determine the content of free chlorine 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 sensor
- OCM223/253 transmitter
- Special measuring cable
- Flow assembly
- Reference measuring instrument for determination of free chlorine according to the DPD method



Measuring system in the flow mode (example)

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|---|--|---|-----------------------|
| 1 | OCA250 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 sensor | | |

Input

Measured variable	Free chlorine:	hypochlorous acid (HOCl)
Measuring range	OCS140 (for industrial water, pool water):	0.05 ... 20 mg Cl ₂ /l (25 °C / 77 °F, pH 7.2)
	OCS141 (for drinking water applications):	0.01 ... 5 mg Cl ₂ /l (25 °C / 77 °F, pH 7.2)
Depolarisation current	OCS140:	approx. 25 nA per mg Cl ₂ /l (25 °C / 77 °F, pH 7.2)
	OCS141:	approx. 80 nA per mg Cl ₂ /l (25 °C / 77 °F, pH 7.2)

Performance characteristics

Response time	T ₉₀ < 2 min T ₉₉ < 5 min in applications involving mainly active chlorination
Polarisation time	OCS140: First polarisation: 60 min Repolarisation: 30 min OCS141: First polarisation: 90 min Repolarisation: 45 min
Drift	< 1.5 % per month
Electrolyte service life	typically 12 months

Installation

Installation instructions	<p>The flow assembly OCA250 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).</p> <p>When installing the sensor, note the following:</p> <ul style="list-style-type: none"> • 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. <p>For further installation instructions, see the operating instructions of the flow assembly.</p>
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Environment

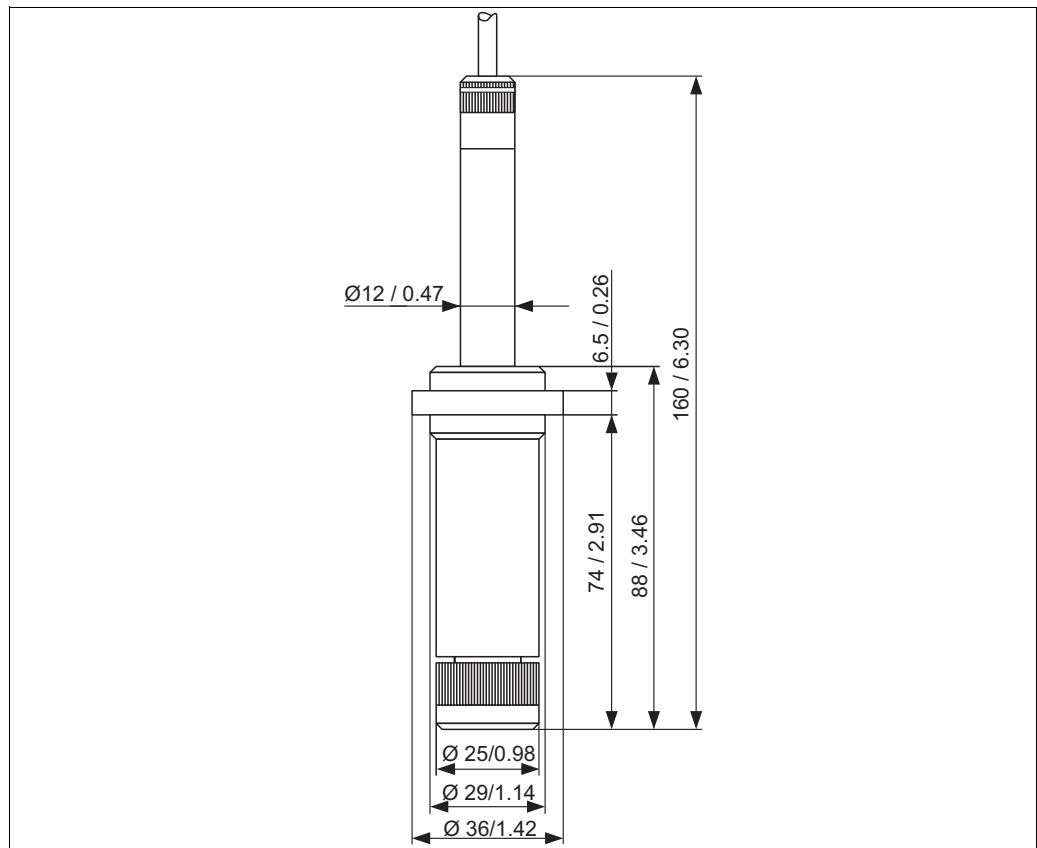
Storage temperature	Filled with electrolyte: 5 ... 50 °C / 41 ... 122 °F
	Without electrolyte: -20 ... 60 °C / -4 ... 140 °F
Ingress protection	IP 68 (up to the mounting collar Ø 36 mm / 1.42")

Process

Temperature range	OCS140: 10 ... 45 °C / 50 ... 113 °F
	OCS141: 2 ... 45 °C / 36 ... 113 °F
pH range	OCS140: 4 ... 8 pH
	OCS141: 4 ... 8.2 pH
Pressure	Medium in the OCA250 assembly: max. 1 bar (14.5 psi)
Flow	in the OCA250 assembly: min. 30 l/h / 7.92 US.gal./h
Flow velocity	min. 15 cm/s / 0.5 ft/s

Mechanical construction

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, 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

OCS140 sensor

Version	
A	without temperature sensor
N	with NTC temperature sensor

Cable length	
01	1 m / 3.3 ft fixed cable
03	3 m / 9.8 ft fixed cable
10	10 m / 32.8 ft fixed cable

OCS140-			complete order code
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OCS141 sensor

Version	
N	with NTC temperature sensor

Cable length	
01	1 m / 3.3 ft fixed cable
03	3 m / 9.8 ft fixed cable
10	10 m / 32.8 ft fixed cable

OCS141-			complete order code
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Scope of delivery

The scope of delivery comprises:

- 1 chlorine 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	<ul style="list-style-type: none">• Flow assembly OCA250 for chlorine, chlorine dioxide, pH and redox
Connection accessories	<ul style="list-style-type: none">• 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• OMK special measuring cable for cable extension between junction box and transmitter, non terminated, sold by the metre
Transmitter	<ul style="list-style-type: none">• OCM223/253 Transmitter for chlorine, field or panel-mounted housing
Maintenance / calibration	<ul style="list-style-type: none">• OCY14-WP 2 replacement cartridges ready-made for OCS140/141/240/241 chlorine and chlorine dioxide sensors

