

## Chlorine sensor



Type 8232 can be combined with...



**Type 8200**

Analytical measurement chamber



**Type 8619**

Panel-mounted multiCELL transmitter/controller



**Type 8619**

Wall-mounted multiCELL transmitter/controller

- Chlorine sensor “Trace” with three electrodes for measuring at low concentrations
- Chlorine sensor with three electrodes and greatly reduced pH dependency
- Chlorine sensor with two electrodes for standard applications at constant pH

The Type 8232 from Bürkert is an electrochemical sensor designed for the measurement of the free chlorine concentration generated from inorganic sources (chlorine gas, sodium hypochlorite,...).

The Type 8232 offers a range of three models:

- the chlorine sensor “Trace” (zero-chlorine) with three electrodes, is suitable for the measuring of chlorine at very low concentrations. The membrane of this sensor is less affected by biofouling. The sensor works in water without chlorine up to four weeks. It is available with a voltage output on a four-pin fixed connector.
- the chlorine sensor with three electrodes, has a sensor having a greatly reduced pH-dependency. This model delivers a current output on a M12 connector and is designed to be used in a swimming pool, drinking or sea water. The fluid must contain a minimum chlorine concentration ( $\geq 0.1$  ppm).
- the chlorine sensor with two electrodes, delivers a current output on a M12 connector. It is designed to be used in swimming pool, drinking or process water. The fluid to be measured must not contain any surfactants or abrasive particles and its pH value must be at a constant level. The fluid must contain a minimum chlorine concentration ( $\geq 0.1$  ppm).

General data	
<b>Compatibility</b>	with probe holder Type 8200 version analytical measuring chamber (see corresponding data sheet)
<b>Fluid temperature</b>	Temperature range depends on the used sensor. Refer to the corresponding instruction manual or technical data on next page. If the temperature ranges given for the holder and the used sensor are different, use the most restrictive range.
<b>Fluid pressure</b>	Pressure range depends on the used sensor. Refer to the corresponding instruction manual or technical data on next page. If the pressure ranges given for the holder and the used sensor are different, use the most restrictive range. Pressure drops are not allowed; the membrane could be damaged
<b>Fluid flow rate</b>	15...30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (Ensure constant flow rate)
<b>Temperature compensation</b>	automatic (integrated temperature sensor)
<b>Fluidic connection</b>	see corresponding data sheet “Analytical measurement chamber” Type 8200
Environment	
<b>Ambient temperature</b> Operation Storage	Depend on the sensor model, but same temperature as the fluid (see next page) <ul style="list-style-type: none"> <li>▪ Probe: <math>+5...+40^{\circ}\text{C}</math> (<math>+41...+104^{\circ}\text{F}</math>) (frost protected, dry and without electrolyte)</li> <li>▪ Membrane cap: used membrane caps cannot be stored</li> <li>▪ Electrolyte: <math>+5...+35^{\circ}\text{C}</math> (<math>+41...+95^{\circ}\text{F}</math>) (1 year in original bottle protected from sunlight)</li> </ul>
<b>Relative humidity</b>	< 90%, without condensation
<b>Height above sea level</b>	max. 2000 m

## Technical data (continued)

Sensor	Chlorine sensor "Trace" (zero-chlorine)	Chlorine sensor with 3 electrodes	Chlorine sensor with 2 electrodes
<b>Materials</b>	Microporous hydrophilic membrane, PVC, stainless steel 1.4571 see materials view drawing	Microporous hydrophilic membrane, PVC-U, stainless steel 1.4571 see materials view drawing	Semi permeable hydrophobic membrane, PVC-U see materials view drawing
<b>Chlorine sensor</b>	Membrane covered - amperometric potentiostatic 3 electrodes system with electronic inside	Membrane covered - amperometric potentiostatic 3 electrodes system with electronic inside	Membrane covered - amperometric 2 electrodes system with electronic inside
<b>Membrane cap</b>	M48.2 with intern holder (G-holder)	M48.4E (M48.4S for sea water on request)	M20.2
<b>Maintenance<sup>1)</sup></b> Control of the measuring signal Change of the membrane cap Change of the electrolyte	Once a week recommended  Once a year recommended  Every 3...6 months recommended	Once a week recommended  Once a year recommended  Once a year recommended	Once a week recommended  Once a year recommended  Every 3...6 months recommended
<b>Chlorine measurement</b> Measuring range Sensor resolution Polarization time  Response time (t <sub>90</sub> ) Zero point adjustment Slope calibration   Slope drift	0.005...2 ppm 0.001 ppm After first start-up and maintenance operations approx. 2 hours 120 s not necessary With the 8619 multiCELL*, - generate a stable chlorine concentration in the measuring water, use DPD-1 method - if no chlorine in the measuring water is allowed, use an external calibration equipment (see accessories ordering chart on page 6) and the DPD-1 method -3 %/month	0.01...20 ppm 0.01 ppm After first start-up and maintenance operations approx. 2 hours 120 s not necessary With the 8619 multiCELL*, by the analytical determination DPD-1 method (Reference value) -1 %/month	0.01...20 ppm 0.01 ppm After first start-up and maintenance operations approx. 1 hour 30 s not necessary With the 8619 multiCELL*, by the analytical determination DPD-1 method (Reference value) -1 %/month
<b>Interferences</b>	- ClO <sub>2</sub> , O <sub>3</sub> influence the signal strongly - high concentrations of bound chlorine may influence the sensor - reducing agents can influence the measuring value	- ClO <sub>2</sub> , O <sub>3</sub> influence the signal strongly - high concentrations of bound chlorine may influence the sensor	- ClO <sub>2</sub> , O <sub>3</sub> . - Electrolytically generated chlorine with a cell without membrane can disturb measurement
<b>Fluid</b>	- Water having similar qualities to drinking water	- Swimming pool water, drinking water, sea water - Surfactants are partially tolerated	- Swimming pool water, drinking water, service water, process water - free of any surfactants - with constant pH value
<b>Chlorination agents</b>	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) <sub>2</sub> , chlorine gas, electrolytically generated chlorine	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) <sub>2</sub> , chlorine gas, electrolytically generated chlorine	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) <sub>2</sub> , chlorine gas, chlorine electrolysis with membrane cell (unsuitable: chlorine electrolysis without membrane cell)
<b>Fluid pH range</b>	pH 6.5...pH 9	pH 4...pH 9	pH 6...pH 8 (attention to the dissociation equilibrium HOCl, pH has to be constant)
<b>Max. fluid pressure</b>	0.5 bar (no pressure drops) (7.25 PSI)	3.0 bar (no pressure drops) (7.25 PSI)	1 bar (no pressure drops) (14.5 PSI)
<b>Fluid temperature</b>	0...+40°C (+32...+104°F)	0...+45°C (+32...+113°F)	0...+45°C (+32...+113°F)
<b>Reference electrolyte</b>	EMST1 gel	ECS2.1 gel	ECL1
<b>Temperature sensor</b>	Yes	Yes	Yes
<b>Electrical connector</b>	4-pin fixed hermaphroditic connector	5-pin M12 connector (male)	5-pin M12 connector (male)
<b>Application</b>	Monitoring absence of chlorine in reverse osmosis systems <sup>2)</sup> (zero-chlorine)	Monitoring chlorine at fluctuating pH	Monitoring chlorine at constant pH

<sup>1)</sup> Depends strongly on the water quality; Values are recommendations for drinking water quality

<sup>2)</sup> Avoids fouling effects on the membrane in water without any chlorine for up to four weeks.

\* **NOTE:** Analogue Input Board necessary.

Software version of Input board must be A.03.00 or higher; otherwise contact your local Bürkert support.

## Technical data (continued)

Electrical data			
Sensor	Chlorine sensor "Trace" (zero-chlorine)	Chlorine sensor with 3 electrodes	Chlorine sensor with 2 electrodes
<b>Operating voltage</b>	9...30 V DC, filtered and regulated (otherwise the probe may be damaged)	12...30 V DC, filtered and regulated (through the 8619 multiCELL Transmitter/ Controller)	12...30 V DC, filtered and regulated (through the 8619 multiCELL Transmitter/ Controller)
<b>Current consumption</b>	20 mA approx.	4 mA approx. (max. current by overloading: 30 mA)	4 mA approx. (max. current by overloading: 30 mA)
<b>Output (only for connection to 8619 multiCELL)</b>	Voltage: <ul style="list-style-type: none"> <li>Analog 0...2000 mV (max. 2500 mV)</li> <li>galvanically insulated</li> </ul>	Current: <ul style="list-style-type: none"> <li>4...20 mA (uncalibrated - 16 mA/measuring range in ppm=nominal slope in mA/ppm)</li> <li>not galvanically insulated*</li> <li>Max. loop impedance: 50 Ω at 12 V DC, 900 Ω at 30 V DC</li> </ul>	Current: <ul style="list-style-type: none"> <li>4...20 mA (uncalibrated - 16 mA/measuring range in ppm=nominal slope in mA/ppm)</li> <li>not galvanically insulated*</li> <li>Max. loop impedance: 50 Ω at 12 V DC, 900 Ω at 30 V DC</li> </ul>

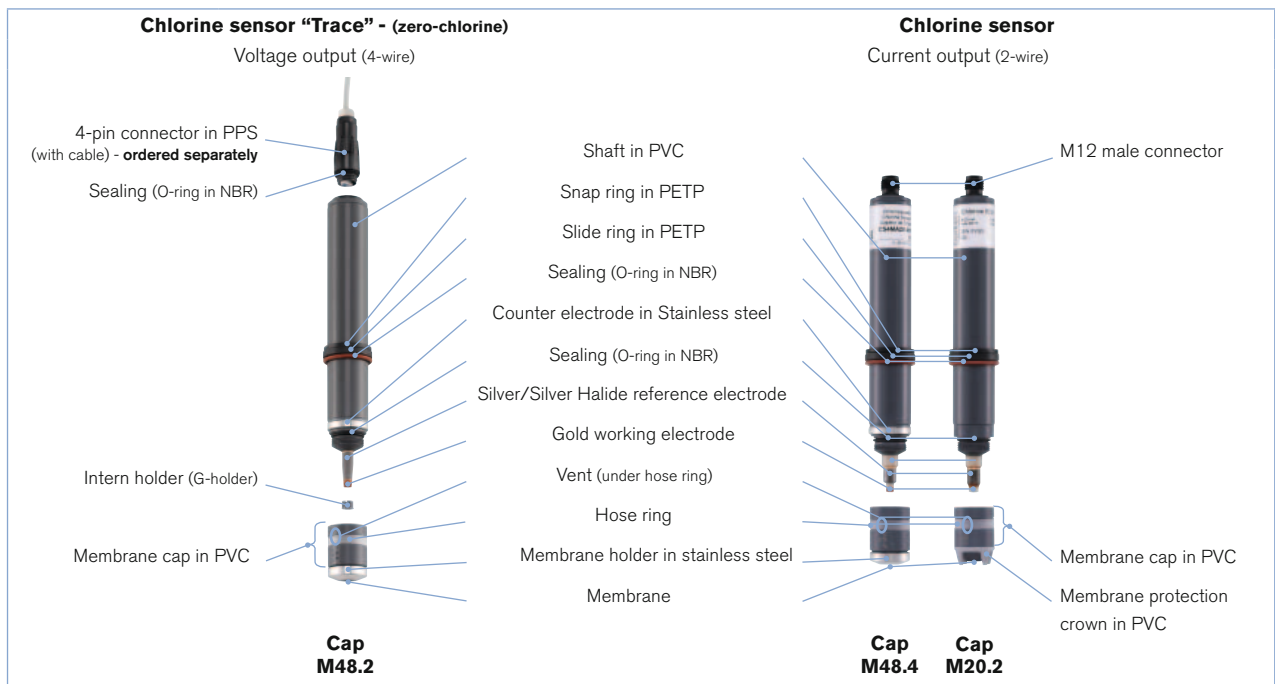
\* A potential-free electrical connection is necessary as the chlorine sensor is not equipped with a galvanic isolation.

### Standards, directives and certifications

#### Standard and directives CE

The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and/or the EU Declaration of conformity (if applicable)

## Materials view drawing



## Principle of operation

The chlorine sensor is a two or three-electrode measuring system (depends on variant) covered with a membrane. The membrane cap filled with a special electrolyte, protects the working and reference electrodes from direct contact with the measuring water. With this measuring method, ionic substances in the water are held back by the membrane, whereas the substance to be determined (disinfectant or chlorine) can pass through the membrane without restriction. The diffusion of the substance through the membrane ensures that the concentrations on both sides of the membrane are equal and causes an electrical signal on the working electrode.

The 2-electrode measuring system consists of a working electrode and a reference electrode, between which a certain voltage (polarization voltage) is applied. The 3-electrode measuring system consists of a working electrode, a reference electrode and a counter electrode.

The measuring signal at the working electrode is proportional to the concentration of the disinfectant or to the chlorine concentration and is amplified by the electronics of the sensor. The measuring signal is independent from the temperature of the measuring water due to an integrated temperature compensation.

The calibration is done with a transmitter/controller (Type 8619 recommended) with a reference value.

## Installation of the sensor



The requirements for maintaining and monitoring a constant flow rate of the analysed water, necessitate the use of an appropriate measuring chamber. Thus the sensor Type 8232 has to be installed in the analytical measuring chamber Type 8200. Otherwise the liability for a proper function of the sensor will be declined.

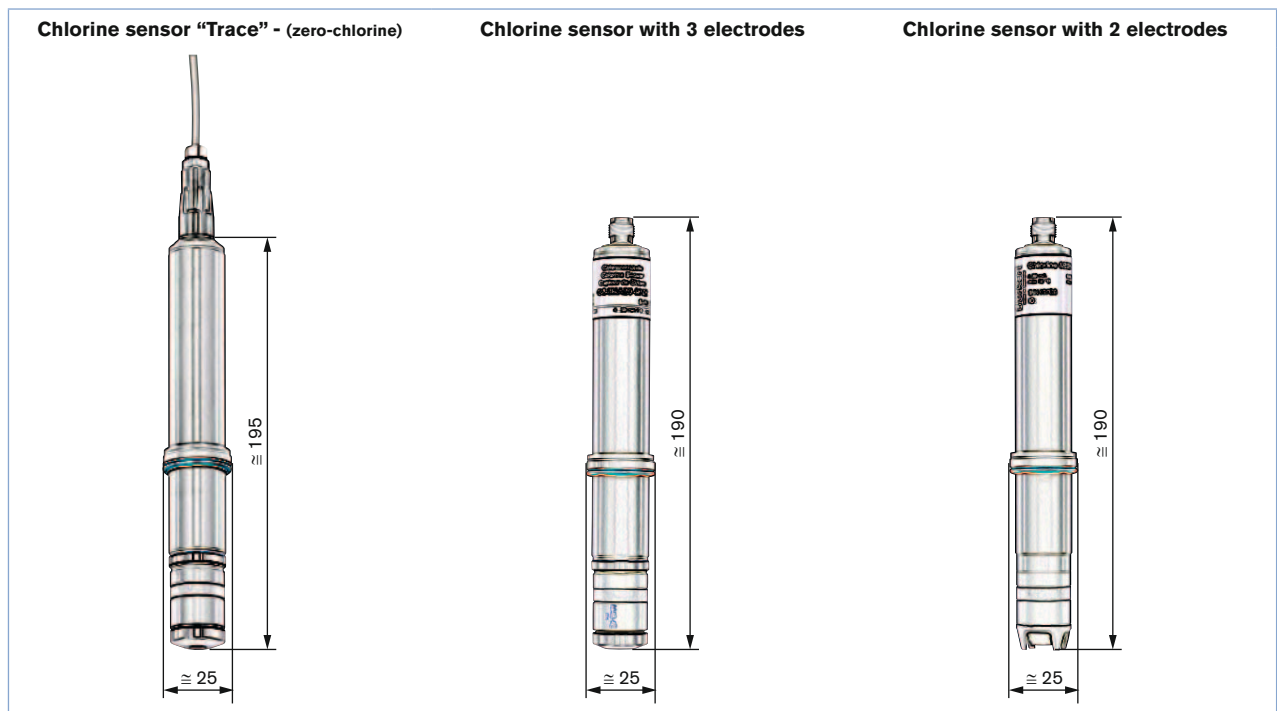
This analytical measurement chamber has to be installed so that the inserted chlorine sensor is in an upright position, and so that the incoming flow rate comes from the bottom up to the membrane.

Gas bubbles at the membrane leads to incorrect measuring signals.

For continuous flow monitoring, an inductive flow switch is available optionally, to be mounted in the analytical measurement chamber type 8200.

**Do not install the sensor in the main pipe. Measure only in bypass with use of the analytical measuring chamber Type 8200.**

## Dimensions [mm]



## Ordering information for complete chlorine measuring system

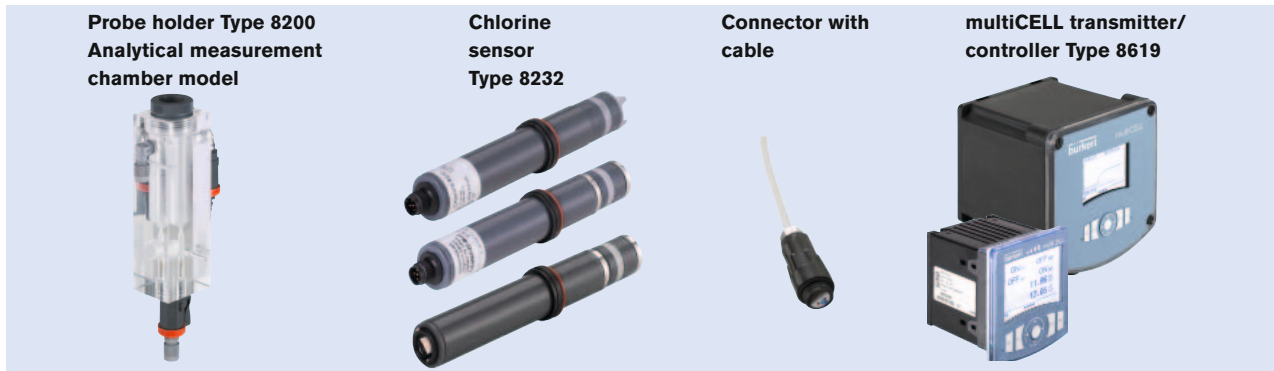
A complete chlorine measuring system consists of a chlorine sensor Type 8232, a connector with cable (depends on the version of the Type 8232), an analytical measurement chamber Type 8200, an electrolyte (the delivery includes one electrolyte bottle) and the multiCELL controller Type 8619\*.

The following information is necessary for the selection of a complete system:

- **Item no.** of the analytical measurement chamber **Type 8200** (see ordering chart for accessories , p. 6 or separate data sheet) [More info.](#)
- **Item no.** of the desired chlorine sensor **Type 8232** (see ordering chart, p. 5)
- **Item no.** of the connector with cable (see ordering chart, p. 6)
- **Item no.** of the multiCELL controller **Type 8619** (see separate data sheet) [More info.](#)

→ You have to order the components separately.

When you click on the orange box "More info," you will come to our website for the resp. product where you can download the data sheet.



\* **NOTE:** Analogue Input Board necessary.  
Software version of Input board must be the version A.03.00 or higher; otherwise contact your local Bürkert support.

## Ordering chart for chlorine sensor

Version	Description	Number of electrodes	Measuring range	Output	Electrical connection	Item no.
Chlorine sensor "Trace" (zero-chlorine)	Measures at very low chlorine concentrations	3	0.005...2 ppm	0...2000 mV (max. 2500 mV)	4-pin fixed hermaphroditic connector	565 164
Chlorine sensor with 3 electrodes	Measures the concentration of free chlorine with greatly reduced pH dependency	3	0.01...20 ppm	4...20 mA	5-pin M12 male connector	568 523
Chlorine sensor with 2 electrodes	Measures the concentration of free chlorine	2	0.01...20 ppm	4...20 mA	5-pin M12 male connector	568 524

**Note:** Each sensor is delivered with 100 ml Electrolyte and one membrane cap.

### **i** Further versions on request



**Electrical connection**  
screw terminal








**Additional**  
Measurement parameter (total chlorine, chlorine dioxide, or others)

## Feature overview for sensor selection

	Chlorine sensor "Trace" (zero-chlorine)	Chlorine sensor with 3 electrodes	Chlorine sensor with 2 electrodes
Works in water without chlorine for up to four weeks	Yes	No	No
Galvanically isolated	Yes	No	No
Greatly reduced pH dependency	Yes <sup>1)</sup>	Yes	No
Surfactants are partially tolerated	Yes	Yes	No
Temperature compensation	Yes	Yes	Yes
Zero-Point stability	Yes	Yes	Yes
Membrane covered	Yes	Yes	Yes
Two-wire device	No	Yes	Yes

<sup>1)</sup> Chlorine sensor "Trace" has a higher pH dependency compared to the chlorine sensor with 3 electrodes

## Ordering chart for accessories

Description	Item no.
Analytical measurement chamber Type 8200 with sampling valve	566 054
Flow switch for analytical measurement chamber, PNP, 2 m cable	772 858
Electrolyte for Chlorine sensor "Trace" (zero-chlorine) with 3 electrodes (Item no. 565 164), EMST1 gel, 100 ml	566 060
Electrolyte for chlorine sensor with 3 electrodes (Item no. 568 523), ECS2.1 gel, 100 ml	566 059
Electrolyte for chlorine sensor with 2 electrodes (Item no. 568 524), ECL1, 100 ml	566 058
 Membrane cap for Chlorine sensor "Trace" (zero-chlorine) with 3 electrodes, M48.2 with intern holder (G-holder)	566 057
 Membrane cap for chlorine sensor with 3 electrodes, M48.4E for standard water quality	568 557
 Membrane cap for chlorine sensor with 3 electrodes, M48.4S for sea water quality	568 558
 Membrane cap for chlorine sensor with 2 electrodes, M20.2	566 056
External calibration device <sup>1)</sup>	565 163
4-pin hermaphroditic connector with cable (for Chlorine sensor "Trace" only)	565 385
 5-pin M12 female straight cable plug moulded on cable (2 m, shielded)	438 680
Photometer MD100, measuring range 0.01...6 ppm	566 393
DPD-1 reagent (100 Tablets)	566 394

<sup>1)</sup> Only needed if measuring water containing no chlorines

## Interconnection possibilities with other Bürkert devices

**Type 8619 -**  
multiCELL transmitter/controller  
Multichannel, multifunction device  
can be directly connected to most of  
common flow, pH/ORP, chlorine and  
conductivity sensors

**Type 8232 -**  
Chlorine sensor

**Type 8200-**  
Analytical measuring  
chamber

**More info.**

**More info.**

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