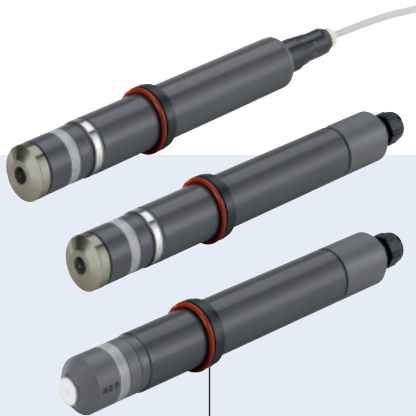


Chlorine Sensor



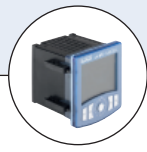
- Trace Sensor with three electrodes for a measuring at low concentrations
- Chlorine Sensor with three electrodes and greatly reduced pH dependency
- Chlorine Sensor with two electrodes

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

The 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 offer a range of three models:

- the Cl-trace sensor (Item no. 565164) with three electrodes, is suitable for the measuring of chlorine at very low concentrations. The membrane of this sensor is less affected by biofouling. It is available with a voltage output on a four-pin fixed connector (connector with cable has to be ordered separately).
- the chlorine sensor (Item no. 566052) with three electrodes, has a sensor having a greatly reduced pH-dependency. This model delivers a current output on a two-pin terminal through a cable gland 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 (Item no. 566051) with two electrodes, delivers a current output on a two-pin terminal through a cable gland. It is designed to be used using in a swimming pool, drinking or process water having similar qualities as drinking 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	
Compatibility	with probe holder Type 8200 version analytical measuring chamber (see corresponding data sheet)
Fluid temperature	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.
Fluid pressure	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
Fluid flow rate	approx. 30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (Ensure constant flow rate)
Temperature compensation	automatic (integrated temperature sensor)
Fluidic connection	see corresponding data sheet Type 8200 "Analytical measurement chamber"
Maintenance¹⁾	Control of the measuring signal Change of the membrane cap Change of the electrolyte
	Regularly, min. once a week Once a year Every 3 - 6 months
Environment	
Ambient temperature	Depend on the sensor model, but same temperature as the fluid (see next page)
Operation	<ul style="list-style-type: none"> ▪ Probe: +5 to +40°C (41 to 104°F) (frost protected, dry and without electrolyte) ▪ Membrane cap: used membrane caps can not be stored ▪ Electrolyte: +5 to +25°C (41 to 77°F) (1 year in original bottle protected from sunlight)
Storage	
Relative humidity	< 90%, without condensation
Max. height above sea level	max. 2000 m

¹⁾ depending on water quality; values are recommended for drinking water

Technical data, *continued*

Sensor	Trace Sensor - Item no. 565 164	Chlorine sensor - Item no. 566 052	Chlorine sensor - Item no. 566 051
Materials	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
Chlorine sensor	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
Membrane cap	M48.2 with intern holder (G-holder)	M48.2 with intern holder (G-holder)	M20
Chlorine measurement			
Measuring range	0.005... 2 ppm	0.01... 20 ppm	0.01... 20 ppm
Sensor resolution	0.001 ppm	0.01 ppm	0.01 ppm
Polarization time	approx. 24 hours after initial operation; approx. 6 hours after maintenance operation	After first start-up and maintenance operations approx. 2 hours	After first start-up and maintenance operations approx. 1 hour
Response time (t ₉₀)	120 s	120 s	30 s
Zero point adjustment	not necessary	not necessary	not necessary
Slope calibration	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	With the 8619 multiCELL*, by the analytical determination DPD-1 method (Reference value)	With the 8619 multiCELL*, by the analytical determination DPD-1 method (Reference value)
Interferences	- ClO ₂ , O ₃ influence the signal strongly - high concentrations of bound chlorine may influence the sensor - reducing agents can influence the measuring value	- ClO ₂ , O ₃ influence the signal strongly - high concentrations of bound chlorine may influence the sensor - reducing agents can influence the measuring value	- ClO ₂ , O ₃ , reducing agents can influence the measuring value. - Electrolytically generated chlorine with a cell without membrane can produce trouble
Fluid	- 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
Chlorination agents	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) ₂ , chlorine gas, electrolytically generated chlorine	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) ₂ , chlorine gas, electrolytically generated chlorine	Inorganic chlorine compounds : NaOCl (sodium hypochlorite), Ca(OCl) ₂ , chlorine gas, chlorine electrolysis with membrane cell (unsuitable: chlorine electrolysis without membrane cell)
Fluid pH range	pH 6.5... pH 9	pH 4... pH 9	pH 6... pH 8 (attention to the dissociation equilibrium HOCl)
Max. fluid pressure	0.5 bar (no pressure drops) (7.25 PSI)	0.5 bar (no pressure drops) (7.25 PSI)	1 bar (no pressure drops) (14.5 PSI)
Fluid temperature	5 to +40°C (41 to 104°F)	5 to +45°C (41 to 113°F)	5 to +45°C (41 to 113°F)
Reference electrolyte	ECN1 gel	ECS2.1 gel	ECL1
Temperature sensor	Yes	Yes	Yes
Electrical connector	4-pin fixed connector	2-pin terminal (2 x 1 mm ²) via a cable gland	2-pin terminal (2 x 1 mm ²) via a cable gland
Recommended cable	Connector with 4 x 0.14 mm ² wire, not shielded (has to be ordered separately, see accessories ordering chart on page 6)	Diameter 4 mm, 2 x 0.25 mm ² wire, not shielded	Diameter 4 mm, 2 x 0.25 mm ² wire, not shielded

* 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*

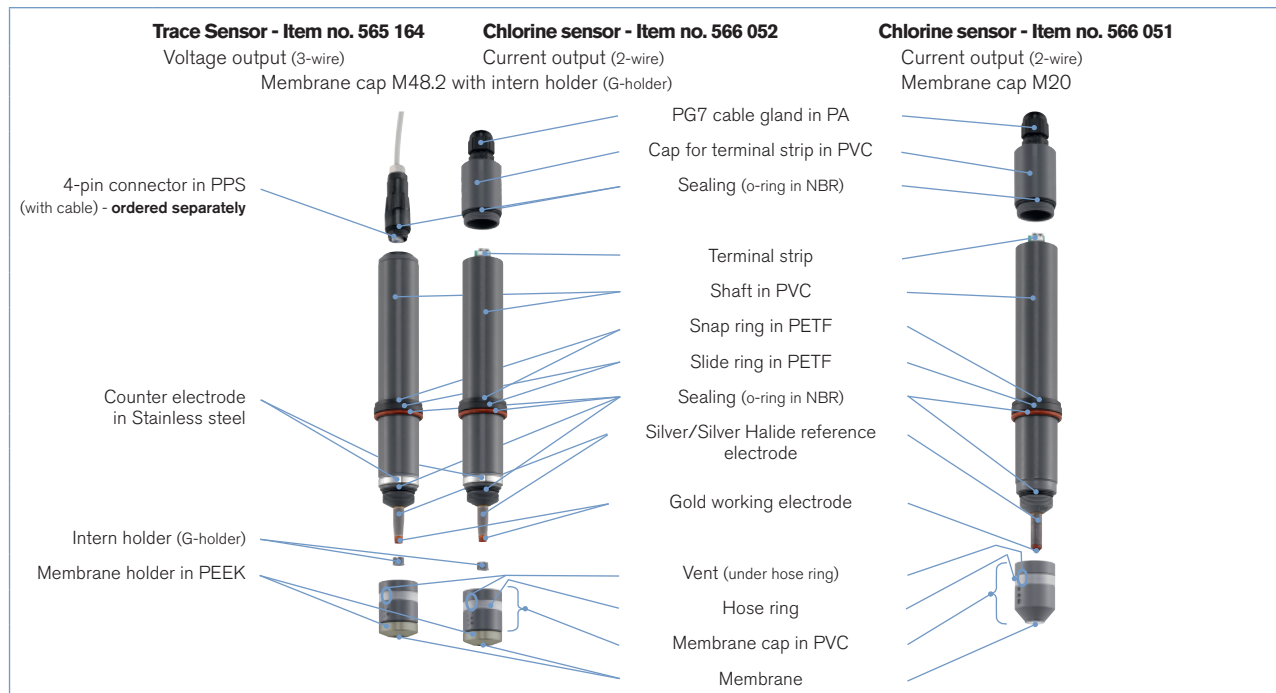
Electrical data			
Sensor	Trace Sensor - Item no. 565 164	Chlorine sensor - Item no. 566 052	Chlorine sensor - Item no. 566 051
Operating voltage	22.5 - 26 V DC, filtered and regulated (otherwise the probe may be damaged)	12 - 30 V DC, filtered and regulated (through the 8619 multiCELL Controller)	12 - 30 V DC, filtered and regulated (through the 8619 multiCELL Controller)
Current consumption	20 mA approx	4 mA approx. (max. current by overloading: 30 mA)	4 mA approx. (max. current by overloading: 30 mA)
Output (only for connection to 8619 multiCELL)	Voltage: <ul style="list-style-type: none"> Analog 0 - 2 V (max. 2.5 V) galvanically insulated 	Current: <ul style="list-style-type: none"> 4... 20 mA (uncalibrated - 16 mA/measuring range in ppm=nominal slope in mA/ppm) not galvanically insulated* Max. loop impedance: 50 Ω at 12 V DC, 900 Ω at 30 V DC 	Current: <ul style="list-style-type: none"> 4... 20 mA (uncalibrated - 16 mA/measuring range in ppm=nominal slope in mA/ppm) not galvanically insulated* Max. loop impedance: 50 Ω at 12 V DC, 900 Ω at 30 V DC

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

Standards, directives and approvals

EMC Approvals	EN 61326-1 CE
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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 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 on contact with the electrolyte 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.

Installation of the sensor



The requirements for maintaining and monitoring a constant flow rate of the analysed water, necessitate the use of an adapted 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 and personal injury and damage to the equipment resulting from that use in another measurement chamber 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.

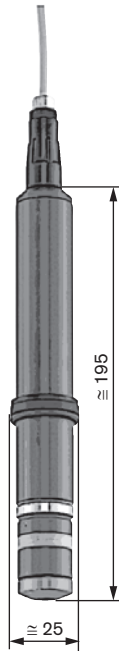
Gas bubbles at the membrane obstruct the inflow of the substance, which leads to incorrect measuring signals.

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

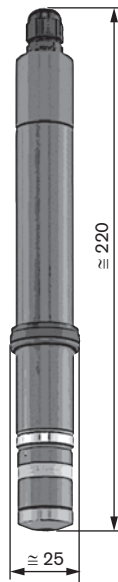
Do not install the sensor in the main pipe. Measure only in bypass with use of the analytical measuring chamber Type 8200.

Dimensions [mm]

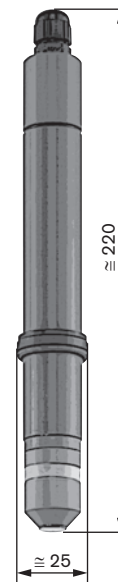
Trace Sensor - Item no. 565 164



Chlorine sensor - Item no. 566 052



Chlorine sensor - Item no. 566 051



Ordering information for complete chlorine measuring system

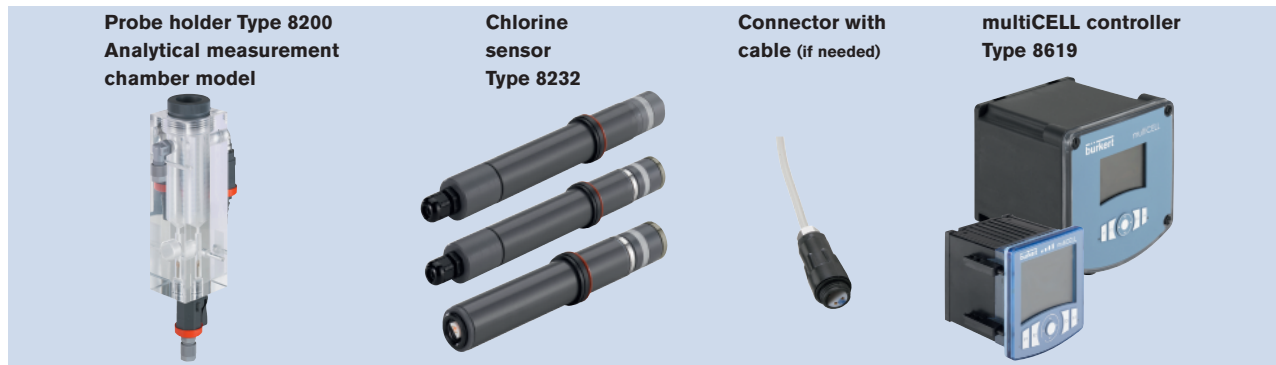
A complete chlorine measuring system consists of a chlorine sensor Type 8232, a connector with cable (if needed, depends on the version of the Type 8232), an analytical measurement chamber Type 8200, an electrolyte (the delivery includes one electrolyte bottle) and the multiCELL controller Type 8619*.

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

- **Item no.** of the analytical measurement chamber **Type 8200** (see 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, if needed (see ordering chart, p. 6)
- **Item no.** of the multiCELL controller **Type 8619** (see separate data sheet) [More info.](#)

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.

→ You have to order the components separately.



* **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	Item no.
Trace sensor	Measures at very low chlorine concentrations	3	0.005... 2 ppm	0 - 2 V (max. 2.5 V)	565 164
Chlorine sensor	Measures the concentration of free chlorine with greatly reduced pH dependency	3	0.01... 20 ppm	4... 20 mA	566 052
Chlorine sensor	Measures the concentration of free chlorine	2	0.01... 20 ppm	4... 20 mA	566 051



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

Feature overview for sensor selection

	Trace sensor Item no. 565 164	Chlorine sensor Item no. 566 052	Chlorine sensor Item no. 566 051
Works in water without chlorine	Yes	No	No
Measures trace concentrations	Yes	No	No
Galvanically isolated	Yes	No	No
Potentiometric measurement	Yes	Yes	No
Greatly reduced pH dependency	Yes ¹⁾	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


¹⁾ Trace sensor has a higher pH dependency compared to Item no. 566 052

Ordering chart for accessories


Description	Item no.
Electrolyte for Trace sensor with 3 electrodes (Item no. 565 164), ECN1 gel, 100 ml	566 060
Electrolyte for chlorine sensor with 3 electrodes (Item no. 566 052), ECS2.1 gel, 100 ml	566 059
Electrolyte for chlorine sensor with 2 electrodes (Item no. 566 051), ECL1, 100 ml	566 058
 Membrane cap for chlorine sensor with 3 electrodes, M48.2 with intern holder (G-holder)	566 057
 Membrane cap for chlorine sensor with 2 electrodes, M20	566 056
External calibration device ¹⁾	565 163
4-pin connector with cable	565 385
Photometer MD100, measuring range 0.01 ...6 ppm	566 393
DPD-1 reagent (100 Tablets)	566 394

1) Only needed if measuring water contains 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- 
Measuring chamber

In case of special application conditions,
please consult for advice.

Subject to alteration.
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