bürkert
FLUID CONTROL SYSTEMS

Chlorine Sensor

- Free chlorine sensor “Trace” with three electrodes for measuring at low concentration
- Free chlorine sensor with three electrodes and greatly reduced pH dependency
- Free chlorine sensor with two electrodes for standard applications at constant pH
- Total chlorine sensor with 3 electrodes and greatly reduced pH dependency

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

Type 8619 ▸
multiCELL - Multi-channel and multi-function transmitter/controller

Type 8200 ▸
Armatures for analytical probes

Type description

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

Type 8232 offer a range of four models:

- the “Trace” chlorine sensor (zero-chlorine) with three electrodes is suitable for the measuring of free chlorine at very low concentrations. The membrane of this sensor is protected against 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 free chlorine sensor with three electrodes is a sensor with 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 (≥ 0.1 ppm).
- the free chlorine sensor with two electrodes delivers a current output on a M12 connector. It is designed to be used using in a 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 (≥ 0.1 ppm).
- the total chlorine sensor with three electrodes is a sensor with 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, brine.
  It measures total chlorine = free chlorine + bound chlorine.

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Visit product website ▸

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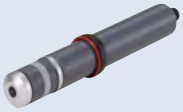
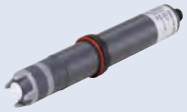
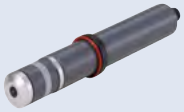
1. General Technical Data

Note:
The 8232 chlorine sensor is available in four models.

Product properties				
Sensor model	**Free chlorine sensor "Trace" (zero-chlorine)** 	**Free chlorine sensor with 3 electrodes** 	**Free chlorine sensor with 2 electrodes** 	**Total chlorine sensor with 3 electrodes** 
Material				
Membrane	Microporous hydrophilic	Microporous hydrophilic	Semi permeable hydrophobic	Microporous hydrophilic
Others	PVC-U, stainless steel 1.4571, PEEK Detailed information can be found in chapter "Free chlorine sensor "Trace" (zero-chlorine) with membrane cap M48.2" on page 7.	PVC-U, stainless steel 1.4571, PEEK Detailed information can be found in chapter "Free chlorine sensor with 3 electrodes with membrane cap M48.4" on page 7.	PVC-U, PEEK, ABS Detailed information can be found in chapter "Free chlorine sensor with 2 electrodes with membrane cap M20.2" on page 8.	PVC-U, stainless steel 1.4571, PEEK Detailed information can be found in chapter "Total chlorine sensor with 3 electrodes with membrane cap M48.4" on page 8.
Dimensions	Detailed information can be found in chapter "3. Dimensions" on page 9.			
Weight	Approx. 125 g			
Compatibility	With probe holder Type 8200 version analytical measuring chamber Detailed information can be found in the data sheet of the armatures for analytical probe, see **data sheet Type 8200** ▶.			
Measured variable	Free chlorine	Free chlorine, reduced pH dependency	Free chlorine, pH-dependent	Total chlorine (= free chlorine + bound chlorine), reduced pH dependency
Application	For monitoring absence of chlorine in reverse osmosis systems[1,] (zero-chlorine)	For monitoring free chlorine at fluctuating pH in eg. drinking water	For monitoring free chlorine at constant pH in eg. swimming pool	For monitoring total chlorine at fluctuating pH in eg. swimming pool, drinking water, sea water, brine (15 % NaCl)
Measuring principle	Membrane covered, amperometric potentiostatic 3-electrode system with electronic inside (completely galvanically isolated, digital internal data processing)	Membrane covered - amperometric potentiostatic 3 electrodes system with electronic inside	Membrane covered - amperometric 2 electrodes system with electronic inside	Membrane covered - amperometric potentiostatic 3 electrodes system with electronic inside
Electrolyte	EMST1 gel	ECS2.1 gel	ECL1	ECP1.4 gel
Measuring range	0.005…2 ppm	0.05…20 ppm	0.05…20 ppm	• 0.05…5 ppm • 0.05…20 ppm
Zero point adjustment	Not necessary	Not necessary	Not necessary	Not necessary
Cross sensitivities/ Interferences	• ClO_2, O_3 influence the signal strongly. • High concentrations of bound chlorine can increase the measured value. • Corrosion inhibitors, Stabilisers for water hardness can lead to measuring errors. • Reducing agents can lead to a loss in slope.	• ClO_2 (factor 0.75), O_3 (factor 0.8) influence the signal. • High concentrations of bound chlorine can increase the measured value. • Corrosion inhibitors, Stabilisers for water hardness can lead to measuring errors.	• ClO_2 (factor 9), O_3 influence the signal. • Electrolytically generated chlorine with a cell without membrane can disturb measurement.	• ClO_2 (factor 1) • O_3 (factor 1.3) • Corrosion inhibitors, Stabilisers for water hardness can lead to measuring errors.
Temperature compensation	Automatic (integrated temperature sensor) Sudden temperature changes must be avoided.			

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Maintenance[2.]				
Control of the measuring signal	Min. once a week recommended	Min. once a week recommended	Min. once a week recommended	Min. once a week recommended
Change of the membrane cap	Once a year recommended	Once a year recommended	Once a year recommended	Once a year recommended
Change of the electrolyte	Every 3…6 months recommended	Once a year recommended	Every 3…6 months recommended	Once a year recommended
Product accessories				
Membrane cap	M48.2 with intern holder (G-holder)	M48.4E (M48.4S for sea water on request)	M20.2	M48.4E (M48.4S for sea water or brine on request)
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)	Inorganic chlorine compounds: • NaOCl (sodium hypochlorite) • $Ca(OCl)_2$ • Chlorine gas • Electrolytically generated chlorine
Suitable transmitter	**Type 8619 multiCELL** ▶ Transmitter/Controller[3.] or any transmitter with appropriate input			
Further accessories	• Photometer MD100 • DPD-1 reagent • External calibration device	• Photometer MD100 • DPD-1 reagent	• Photometer MD100 • DPD-1 reagent	• Photometer MD100 • DPD-4 reagent • DPD-1 + DPD-3 reagents
	Detailed information can be found in chapter "9.5. Ordering chart accessories" on page 15.			
Performance data				
Sensor resolution	0.001 ppm	0.01 ppm	0.01 ppm	0.01 ppm
Run-in time	After first start-up and maintenance operations approx. 2 hours	After first start-up and maintenance operations approx. 2 hours	After first start-up and maintenance operations approx. 1 hour	After first start-up and maintenance operations approx. 2 hours
Response time (t90 %)	Approx. 120 s	Approx. 120 s	Approx. 30 s	Approx. 3 min. (brine approx. 5 min.)
Sensor reactivity loss	After max. 4 weeks use in chlorine-free water	After max. 24 hours use in chlorine-free water	After max. 24 hours use in chlorine-free water	After max. 24 hours use in chlorine-free water
Slope	–	Slope of these sensors can vary depending on production or application between 65 % and 150 % of the nominal slope. • Recommendation to determinate the suitable measuring range or the suitable sensor: concentration to be measured x factor 1.5 = measuring range of the sensor • Example: concentration to be measured 1.6 ppm x 1.5 = 2.4 Result: recommended sensor with a measuring range of 5 ppm		
Calibration	• 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 and the DPD-1 method. Detailed information can be found in chapter "9.5. Ordering chart accessories" on page 15	By the analytical determination DPD-1 method (Reference value)	By the analytical determination DPD-1 method (Reference value)	By analytical determination, DPD-4-or (DPD-1 + DPD-3) methods

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Drift	Approx. -3 % per month, in reference conditions (25 °C, pH 7.2 in drinking water)	Approx. -1 % per month, in reference conditions (25 °C, pH 7.2 in drinking water)	Approx. -1 % per month, in reference conditions (25 °C, pH 7.2 in drinking water)	Approx. -1 % per month, in reference conditions (25 °C, pH 7.2 in drinking water)
Electrical data				
Operating voltage	• 9…30 V DC, filtered and regulated (otherwise the probe may be damaged) • The power supply is galvanically isolated inside of the sensor.	• 12…30 V DC, filtered and regulated, R_L: 50…900 Ω (e.g. through the 8619 multiCELL Transmitter/ Controller) • Not galvanically isolated inside of the sensor	• 12…30 V DC, filtered and regulated, R_L: 50…900 Ω (e.g. through the 8619 multiCELL Transmitter/ Controller) • Not galvanically isolated inside of the sensor	• 12…30 V DC, filtered and regulated, R_L: 50…900 Ω (e.g. through the 8619 multiCELL Transmitter/ Controller) • Not galvanically isolated inside of the sensor
Current consumption	Approx. 56…20 mA	Approx. 4 mA (max. current by overloading: 30 mA)	Approx. 4 mA (max. current by overloading: 30 mA)	Approx. 4 mA (max. current by overloading: 30 mA)
Outputs	Voltage (4-wire): • Analog signal • 0…2000 mV (max. 2500 mV) • Galvanically insulated, that means potential-free • Output resistance: 1 kΩ	Current (2-wire): • Analog signal • 4…20 mA (uncalibrated, at pH 7.2 nominal slope 0.8 mA/ppm) • Not galvanically insulated[4.)] • Max. loop impedance (valid with Type 8619 multiCELL[3.)]): 50 Ω at 12 V DC, 900 Ω at 30 V DC	Current (2-wire): • Analog signal • 4…20 mA (uncalibrated, at pH 7.2 nominal slope 0.8 mA/ppm) • Not galvanically insulated[4.)] • Max. loop impedance (valid with Type 8619 multiCELL[3.)]): 50 Ω at 12 V DC, 900 Ω at 30 V DC	Current (2-wire): • Analog signal • 4…20 mA (uncalibrated, at pH 7.2 nominal slope 3.2 mA/ppm for version 0.05…5 ppm or 0.8 mA/ppm for version 0.05…20 ppm) • Not galvanically insulated[4.)] • Max. loop impedance (valid with Type 8619 multiCELL[3.)]): 50 Ω at 12 V DC, 900 Ω at 30 V DC
Medium data				
Fluid	Water with similar characteristics to drinking water	• Drinking water, swimming pool water, sea water • Surfactants are partially tolerated	• Swimming pool water, drinking water, service water, process water • Free of any surfactants • With constant pH value	• Drinking water, swimming pool water, sea water, brine (15 % NaCl) • Surfactants are partially tolerated
Fluid flow rate	15…30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (ensure constant flow rate)	15…30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (ensure constant flow rate) Detailed information can be found in chapter **"Slope versus flow rate" on page 10**.	15…30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (ensure constant flow rate) Detailed information can be found in chapter **"Slope versus flow rate" on page 11**.	15…30 l/h mounted in analytical measurement chamber 8200, the measuring value depends on the flow rate (ensure constant flow rate) Detailed information can be found in chapter **"Slope versus flow rate" on page 12**.
Fluid pH range	pH 6.5…pH 9 Detailed information can be found in chapter **"Slope versus pH" on page 9**.	pH 4…pH 9 Detailed information can be found in chapter **"Slope versus pH" on page 10**.	pH 6…pH 8 (attention to the dissociation equilibrum HOCl, pH has to be constant) Detailed information can be found in chapter **"Slope versus pH" on page 11**.	pH 4…pH 12, reduced dependence on pH value Detailed information can be found in chapter **"Slope versus pH" on page 12**.
Fluid conductivity	–	10 µS/cm…50 mS/cm (sea water)	–	10 µS/cm…200 mS/cm (brine water)
Fluid temperature	0…+40 °C (+32…+104 °F)	0…+45 °C (+32…+113 °F)	0…+45 °C (+32…+113 °F)	0…+45 °C (+32…+113 °F)
	No ice crystals in the measuring water. If the temperature ranges given for the holder and the used sensor are different, use the most restrictive range.			

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Fluid pressure	Max. 0.5 bar (7.26 PSI), operation with or without retaining ring, no pressure drops and/or vibrations	• Max. 3.0 bar (43.53 PSI), operation with retaining ring, no pressure drops and/or vibrations • Max. 0.5 bar (7.26 PSI), operation without retaining ring, no pressure drops and/or vibrations	• Max. 1 bar (14.5 PSI), operation with retaining ring, no pressure drops and/or vibrations • Max. 0.5 bar (7.26 PSI), operation without retaining ring, no pressure drops and/or vibrations	• Max. 3.0 bar (43.53 PSI), operation with retaining ring, no pressure drops and/or vibrations • Max. 0.5 bar (7.26 PSI), operation without retaining ring, no pressure drops and/or vibrations
	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			
Process/Port connection & communication				
Process connection	With probe holder Type 8200, see **data sheet Type 8200** ▶.			
Electrical connection	4 pin fixed hermaphroditic connector	5 pin M12 connector (male)	5 pin M12 connector (male)	5 pin M12 connector (male)
Approvals and certificates				
Directives				
CE directives	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).			
Environment and installation				
Ambient temperature				
Operation	0…+55 °C (+32…+131 °F)			
Storage	• Probe: unlimited time at +5…+40 °C (+41…+104 °F), frost protected, dry and without electrolyte • Membrane cap: – in original packing unlimited time at +5…+40 °C (+41…+104 °F) – used membrane caps cannot be stored • Electrolyte: +5…+35 °C (+41…+95 °F), 1 year or until the specified expiry date in original bottle protected from sunlight			
Transport	+5…+50 °C (+41…+122 °F) (membrane cap, electrolyte, probe)	+5…+55 °C (+41…+131 °F) (membrane cap, electrolyte, probe)	+5…+50 °C (+41…+122 °F) (membrane cap, electrolyte, probe)	+5…+50 °C (+41…+122 °F) (membrane cap, electrolyte, probe)
Relative air humidity	≤90 %, without condensation			
Height above sea level	Max. 2000 m			

1.) Avoids fouling effects on the membrane in water without any chlorine for up to four weeks.

2.) Depends strongly on the water quality; values are recommendations for drinking water quality.

3.) Analogue input board necessary. Software version of input board must be A.03.00 or higher; otherwise contact your local Bürkert support.

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

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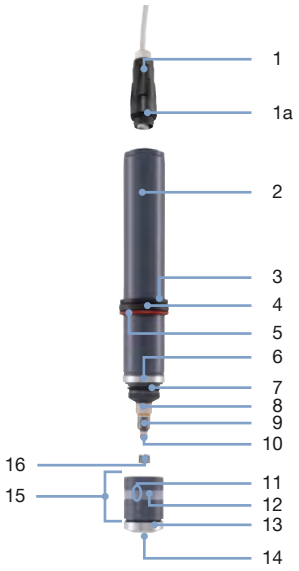
2. Materials

2.1. Material specifications

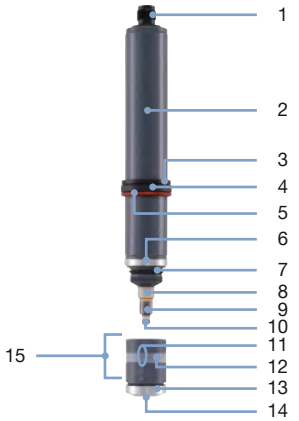
Free chlorine sensor “Trace” (zero-chlorine) with membrane cap M48.2



No.	Element	Material
1	4 pin connector (with cable)[1.)]	PPS
1a	Sealing (O-ring)	NBR
2	Shaft	PVC-U
3	Retaining ring	PETP
4	Slide ring	PETP
5	Sealing (O-ring)	NBR
6	Counter electrode	Stainless steel 1.4571
7	Sealing (O-ring)	NBR
8	Electrode holder	PEEK
9	Reference electrode	Silver/Silver Halide
10	Working electrode	Gold
11	Vent (under hose ring)	Stainless steel 1.4571
12	Hose ring	–
13	Membrane holder	Stainless steel 1.4571, PEEK
14	Membrane	Microporous hydrophilic
15	Membrane cap	PVC-U
16	Intern holder (G-holder)	–

1.) ordered separately

Free chlorine sensor with 3 electrodes with membrane cap M48.4



No.	Element	Material
1	M12 male connector	–
2	Shaft	PVC-U
3	Retaining ring	PETP
4	Slide ring	PETP
5	Sealing (O-ring)	NBR
6	Counter electrode	Stainless steel 1.4571
7	Sealing (O-ring)	NBR
8	Electrode holder	PEEK
9	Reference electrode	Silver/Silver Halide
10	Working electrode	Gold
11	Vent (under hose ring)	–
12	Hose ring	–
13	Membrane holder	Stainless steel 1.4571
14	Membrane	Microporous hydrophilic
15	Membrane cap	PVC-U

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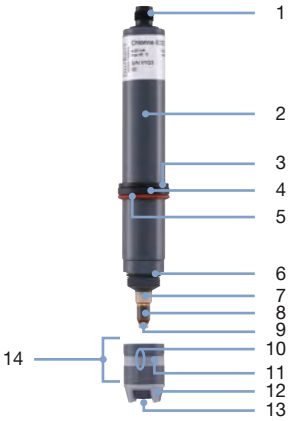
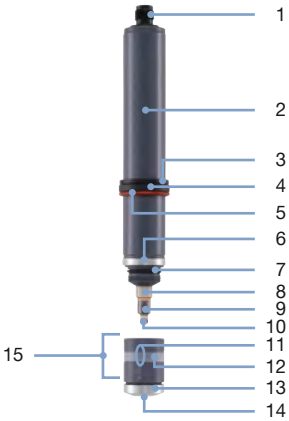
Free chlorine sensor with 2 electrodes with membrane cap M20.2



No.	Element	Material
1	M12 male connector	–
2	Shaft	PVC-U
3	Retaining ring	PETP
4	Slide ring	PETP
5	Sealing (O-ring)	NBR
6	Sealing (O-ring)	NBR
7	Electrode holder	PEEK
8	Reference electrode	Silver/Silver Halide
9	Working electrode	Gold
10	Vent (under hose ring)	–
11	Hose ring	–
12	Membrane protection	ABS
13	Membrane	Semi permeable hydrophobic
14	Membrane cap	PVC-U

Total chlorine sensor with 3 electrodes with membrane cap M48.4



No.	Element	Material
1	M12 male connector	–
2	Shaft	PVC-U
3	Retaining ring	PETP
4	Slide ring	PETP
5	Sealing (O-ring)	NBR
6	Counter electrode	Stainless steel 1.4571
7	Sealing (O-ring)	NBR
8	Electrode holder	PEEK
9	Reference electrode	Silver/Silver Halide
10	Working electrode	Gold
11	Vent (under hose ring)	–
12	Hose ring	–
13	Membrane holder	Stainless steel 1.4571
14	Membrane	Microporous hydrophilic
15	Membrane cap	PVC-U

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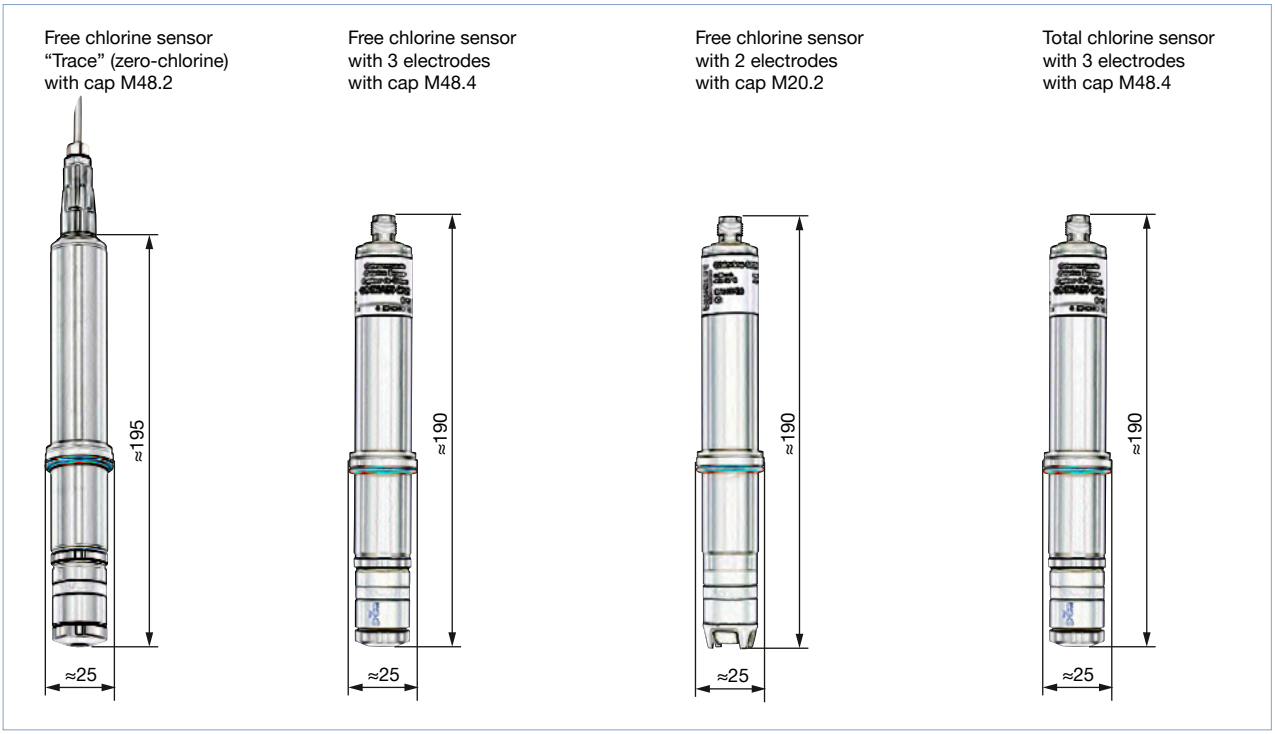
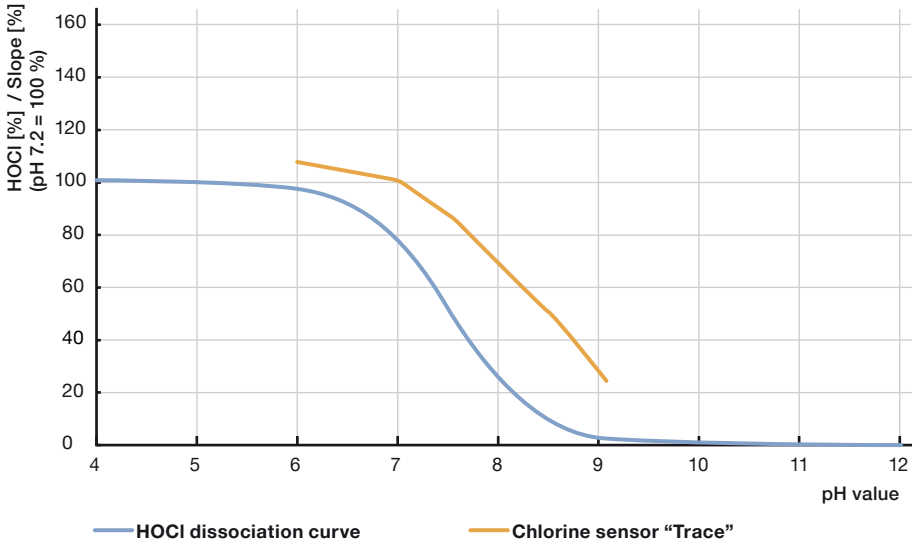
3. Dimensions



4. Performance specifications

4.1. Free chlorine sensor “Trace” (zero-chlorine) with membrane cap M48.2

Slope versus pH



Temperature: 25 °C / Flow rate: 30 l/h

pH regulation:
pH decreaser: H_2SO_4
pH increaser: NaOH

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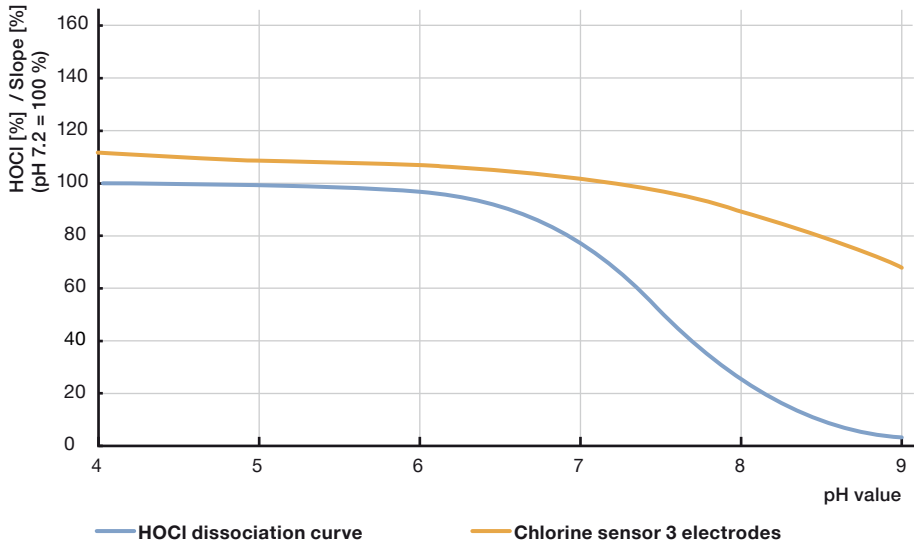
4.2. Free chlorine sensor with 3 electrodes with membrane cap M48.4

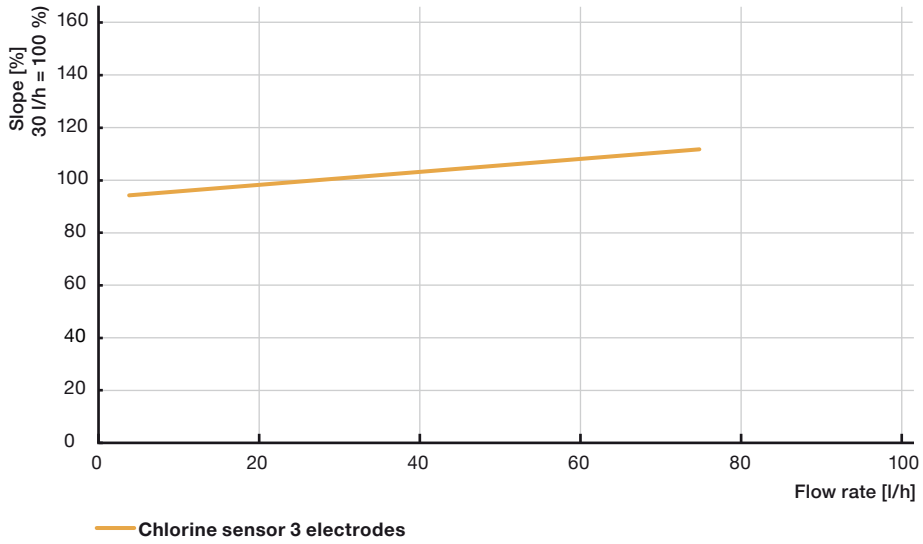
Slope versus pH



Temperature: 25 °C / Flow rate: 30 l/h

pH regulation:
pH decreaser: H_2SO_4
pH increaser: NaOH

Slope versus flow rate



Temperature: 25 °C / pH value: 7.2

This values are only valid for
the measuring chamber Type 8200

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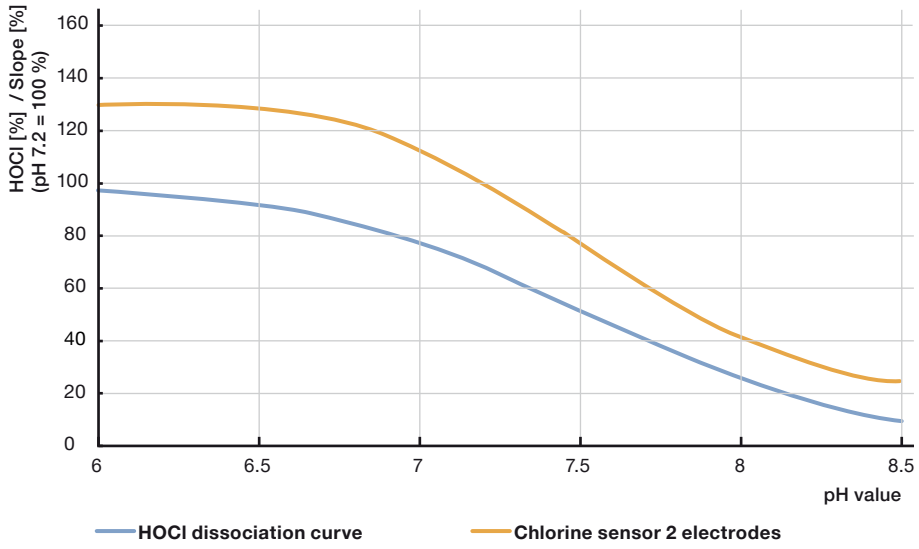
4.3. Free chlorine sensor with 2 electrodes with membrane cap M20.2

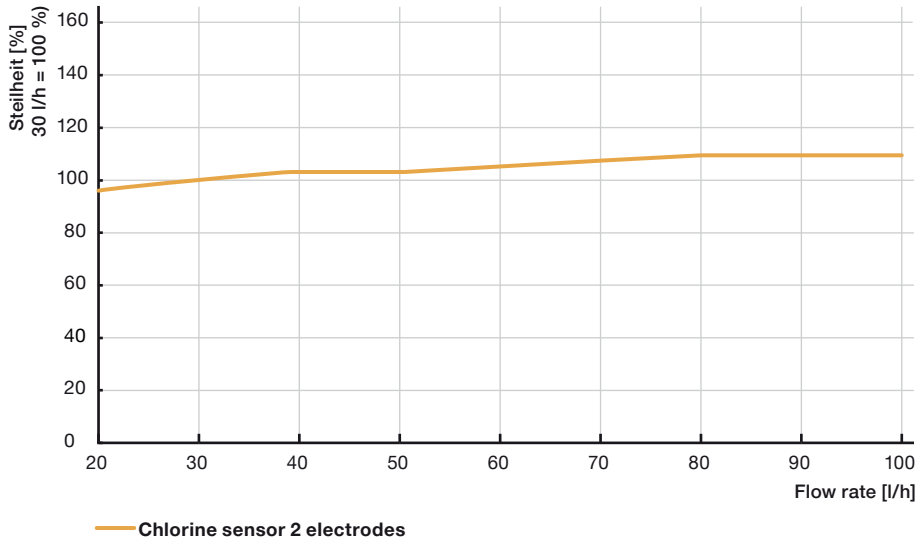
Slope versus pH



Temperature: 25 °C / Flow rate: 30 l/h

pH regulation:
pH decreaser: H_2SO_4
pH increaser: NaOH

Slope versus flow rate



Temperature: 25 °C / pH value: 7.2

This values are only valid for
the measuring chamber Type 8200

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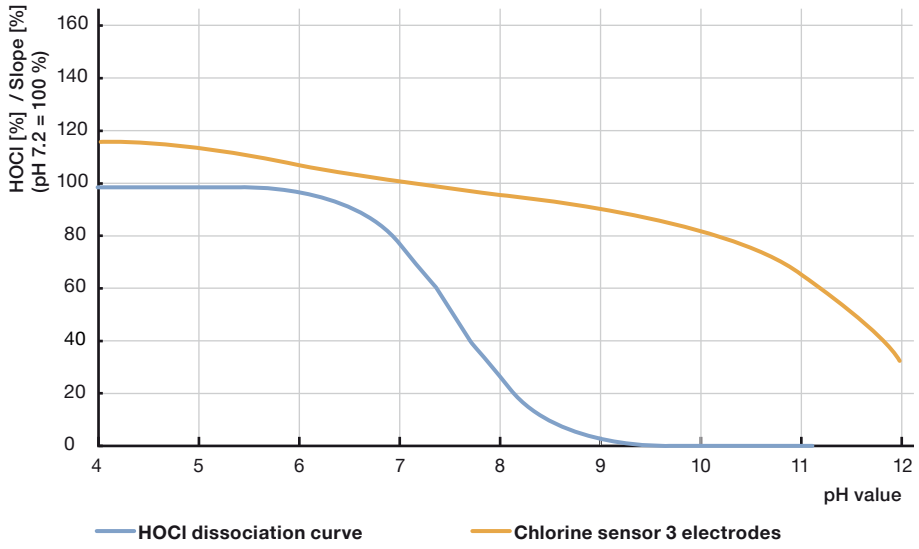
4.4. Total chlorine sensor with 3 electrodes with membrane cap M48.4

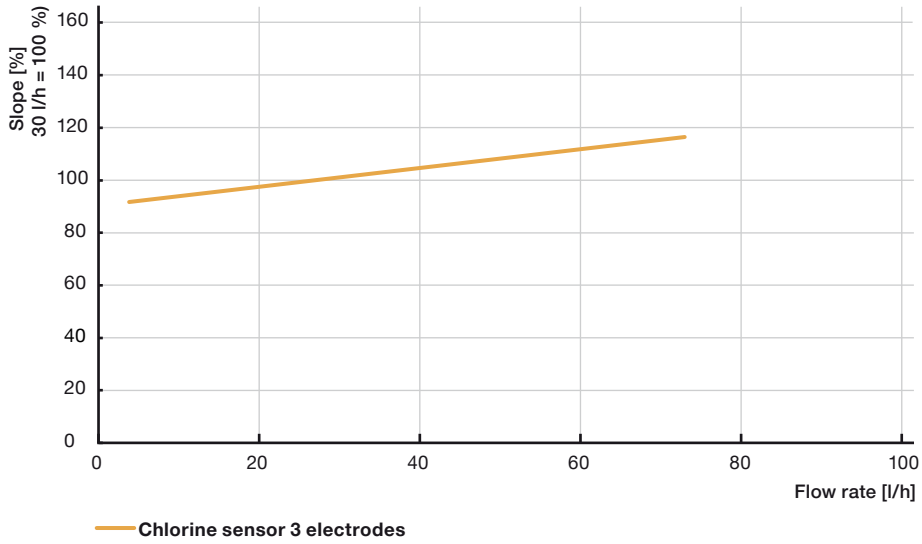
Slope versus pH



Temperature: 25 °C / Flow rate: 30 l/h

pH regulation:
pH decreaser: H_2SO_4
pH increaser: NaOH

Slope versus flow rate



Temperature: 25 °C / pH value: 7.2

This values are only valid for
the measuring chamber Type 8200

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5. Product installation

5.1. Installation notes

Measuring chamber	Description
	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. See **data sheet Type 8200** ▸ for more information. 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**.

6. Product operation

6.1. Measuring principle

Depending on the version, the 8232 Sensor measures either the free chlorine or the total chlorine content. Total chlorine is the sum of free chlorine (disinfectant chlorine) and bound chlorine (Concentration of chlorine combined with organic and inorganic nitrogen compounds present in the water).

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 must be done on a transmitter/controller with a reference value. The transmitter Type 8619 multiCELL is suited and recommended, but any other suited transmitter can be also used.

See **data sheet Type 8619** ▸ for more information.

7. Product design and assembly

7.1. Product features

Note:
The following table gives an overview of the features for sensor selection.

Feature details	Free chlorine sensor			Total chlorine sensor
	"Trace" (zero-chlorine)	with 3 electrodes	with 2 electrodes	with 3 electrodes
Works in water without chlorine for up to 4 weeks	Yes	No	No	No
Galvanically isolated	Yes	No	No	No
Greatly reduced pH dependency	Yes[1.)]	Yes	No	Yes
Surfactants are partially tolerated	Yes	Yes	No	Yes
Temperature compensation	Yes	Yes	Yes	Yes
Zero-Point stability	Yes	Yes	Yes	Yes
Membrane covered	Yes	Yes	Yes	Yes
Two-wire device	No	Yes	Yes	Yes

1.) Chlorine sensor "Trace" has a higher pH dependency compared to the chlorine sensor with 3 electrodes.

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8. Networking and combination with other Bürkert products

Example:

Type 8232

Type 8200 ▶
Armatures for analytical probes (measuring chamber)

Type 8619 ▶
multiCELL - Multi-channel and multi-function transmitter/ controller

9. Ordering information

9.1. Bürkert eShop – Easy ordering and quick delivery

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9.2. Recommendation regarding product selection

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 (analogue input board necessary. Software version of input board must be the version A.03.00 or higher; otherwise contact your local Bürkert support).

Three or four different components must be ordered in order to select a complete device. The following information is required:

- **Article no.** of the analytical measurement chamber **Type 8200** (see chapter **"11.4. Ordering chart" on page 16** or **data sheet Type 8200** ▶)
- **Article no.** of the desired chlorine sensor **Type 8232** (see chapter **"11.4. Ordering chart" on page 16**)
- **Article no.** of the connector (see chapter **"11.4. Ordering chart" on page 16**)
- **Article no.** of the multiCELL transmitter/controller **Type 8619** (see **data sheet Type 8619** ▶)

9.3. Bürkert product filter

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9.4. Ordering chart

Sensor version		Description	Number of electrodes	Measuring range [ppm]	Output	Electrical connection	Article no.
	"Trace" (zero-chlorine)	Measures at very low chlorine concentrations	3	0.005…2	0…2000 mV (max. 2500 mV)	4 pin fixed hermaphroditic connector	565164
	With 3 electrodes	Measures the concentration of free chlorine with greatly reduced pH dependency	3	0.01…20	4…20 mA	5 pin M12 male connector	568523
	With 2 electrodes	Measures the concentration of free chlorine	2	0.01…20	4…20 mA	5 pin M12 male connector	568524
	With 3 electrodes	Measures the concentration of total chlorine with greatly reduced pH dependency	3	0.05…5	4…20 mA	5 pin M12 male connector	569698
	With 3 electrodes	Measures the concentration of total chlorine with greatly reduced pH dependency	3	0.05…20	4…20 mA	5 pin M12 male connector	573799

Further versions on request

Additional Measurement parameter (chlorine dioxide, or others)	**Electrical connection** Screw terminal

9.5. Ordering chart accessories

Description	Article no.
Analytical measurement chamber Type 8200	569221
Flow switch for analytical measurement chamber, PNP, 2 m cable	772858
Photometer MD100, measuring range 0.01…6 ppm	566393
DPD-1 reagent (100 Tablets)	566394
For free chlorine sensor "Trace" (zero-chlorine) with 3 electrodes (Article no. 565164)	
Electrolyte EMST1 gel, 100 ml	566060
Membrane cap M48.2 with intern holder (G-holder)	566057
4 pin hermaphroditic connector with cable	565385
External calibration device (only needed if measuring water containing no chlorine)	565163
For free chlorine sensor with 3 electrodes (Article no. 568523)	
Electrolyte ECS2.1 gel, 100 ml	566059
Membrane cap M48.4E for standard water quality	568557
Membrane cap M48.4S for sea water quality	568558
5 pin M12 female straight cable plug moulded on cable (2 m, shielded)	438680
For free chlorine sensor with 2 electrodes (Article no. 568524)	
Electrolyte ECL1, 100 ml	566058
Membrane cap M20.2	566056
5 pin M12 female straight cable plug moulded on cable (2 m, shielded)	438680
For total chlorine sensor with 3 electrodes (Article no. 569698 and 573799)	
Electrolyte ECP1.4 gel, 100 ml	569510
Membrane cap M48.4E for standard water quality	568557
Membrane cap M48.4S for sea water quality or brine	568558
5 pin M12 female straight cable plug moulded on cable (2 m, shielded)	438680

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