

DULCOTEST® Sensors for Bromine

Reliable online measurement of bromine – with DULCOTEST® sensors

LENNTECH
WATER TREATMENT Solutions



ProMinent®

Graduated measuring ranges 0.01 – 10 mg/l

Bromine compounds are an increasingly popular alternative to chlorine compounds in water disinfection in spite of the higher costs of the reagents.

Bromine has a number of advantages over chlorine compounds when it comes to disinfection:

- Greater disinfectant effect at higher pH values
- Lower volatility at higher temperatures
- Less tendency to corrosion
- Bromine compounds that have finished reacting (combined bromine) produce less odour and irritation of the mucous membranes

Our product line of DULCOTEST® bromine sensors provides three types of sensor for your measurement tasks.

Sensor types CBR1-mA and BCR 1-mA are resistant to contaminated water and are designed for the treatment of cooling water. Type CBR1 is specifically designed for free bromine from inorganic bromination processes, e.g. sodium bromide + sodium-calcium hypochlorite, or the use of BrCl.

Sensor type BCR-mA is optimised for the measurement of organic bromination agents (e.g. BCDMH).

Sensor type BRE3-CAN is available for the treatment of swimming pool water with BCDMH

Your benefits

- Precise, real-time amperometric measurement for efficient process control (short response time)
- Suitable for wide range of water qualities (contamination, pH, salinity, temperature)
- Amperometric measuring means no clouding or discolouration
- Stable zero point means no drift
- Integrated temperature compensation eliminates faults caused by influence of temperature
- Diaphragm-covered electrodes for reduced dependence on flow, substances in water and film-forming media

Field of application

- Water disinfection in cooling towers
- Water disinfection in swimming pools and hot tubs
- Disinfection of seawater

Technical Data

Sensor for Total Available Bromine BCR 1-mA (Replaces Earlier Type BRE 1)

Sensor for the disinfectant BCDMH and other oxidative-acting bromine-organic disinfectants and total chlorine even in contaminated water and/or for high pH values of up to 9.5. For use on controllers with mA input

Your benefits

- Measured variable: total available bromine from BCDMH (1-bromo-3-chloro-5,5-dimethylhydantoin)
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water, N-bromamide sulfonate
- Resistance to blocking is achieved by the use of an electrolyte with an antimicrobial effect (less blocking by biofilms) and by a large-pored diaphragm (less blocking by solid particles/dirt)
- Use with high pH values by optimisation of the electrolyte diaphragm system

Measured variable	Total available bromine from BCDMH (1-bromo-3-chloro-5,5-dimethylhydantoin) and N-bromamido-sulphonate, total chlorine
Reference method	DPD4
pH range	5.0 ... 9.5
Temperature	5 ... 45 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGM, DLG III)
Supply voltage	16...24 V DC (two wire)
Output signal	4...20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Non-selective, cross-sensitive towards many oxidation agents
Disinfection process	BCDMH (1-bromo-3-chloro-5,5-dimethyl-hydantoin), N-bromamide sulfonate
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Cooling water, process water, waste water, swimming pool water, water with higher pH values (stable pH).
Resistance to	Dirt films, biofilms, surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
BCR 1-mA-0.5 ppm	0.01...0.5 mg/l	1041697
BCR 1-mA-2 ppm	0.02...2.0 mg/l	1040115
BCR 1-mA-10 ppm	0.10...10.0 mg/l	1041698

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Sensor for Total Available Bromine BRE 3-CAN-P

Sensor for free and combined bromine, also for use with slightly contaminated water. For use on controllers with CAN-bus connection

Your benefits

- Measured variable: total available bromine from BCDMH and other oxidative-acting bromine organic disinfectants
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Use with high pH values by optimisation of the electrolyte diaphragm system
- Operation on the CAN-bus with all the associated benefits

Measured variable	Total available bromine
Reference method	For DBDMH, free bromine: DPD1. For BCDMH: DPD4
pH dependence	If the pH changes from pH 7 to pH 8, the sensor sensitivity is reduced a) in the case of DBDMH and free bromine by approx. 10% b) in the case of BCDMH by approx. 25%
Temperature	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Supply voltage	Via CAN interface (11 – 30 V)
Output signal	Uncalibrated, temperature-compensated, electrically isolated
Selectivity	Non-selective, cross-sensitive towards many oxidation agents
Disinfection process	DBDMH (1,3-dibromo-5,5-dimethyl-hydantoin), BCDMH (1-bromo-3-chloro-5,5-dimethyl-hydantoin), free bromine (HOBr, OBr)
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN®
Typical applications	swimming pools/whirlpools.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
BRE 3-CAN-10 ppm	0.02...10.0 mg/l	1083573

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Sensor for Free and Combined Bromine CBR 1-mA (Replaces Earlier Type BRE 2)

Sensor for free chlorine and bromine in contaminated water, also suitable for high pH values of up to 9.5. For use with controllers with 4-20 mA input

Your benefits

- Measured variable: free chlorine as well as free and combined bromine (bromamines)
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt and biofilms by electrolyte with antimicrobial effect and large-pore diaphragm
- Use at high pH value of up to 9.5 by optimisation of the electrolyte diaphragm system

Measured variable	free chlorine, free bromine, combined bromine, DBDMH (1,3-dibrom-5,5-dimethyl-hydantoin)
Reference method	DPD1
pH-range	5 ... 9.5
Temperature	1 ... 40 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGM, DLG II)
Supply voltage	16...24 V DC (2-wire)
Output signal	4...20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, bromide + hypochlorite, DBDMH
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Cooling water, process water, waste water, water with higher pH values (stable pH), contaminated swimming pool water. Contaminated swimming pool water. In swimming pools to determine the combined chlorine from the difference: Total chlorine minus free chlorine. Raw water for drinking water treatment.
Resistance to	Salts, acids, alkalis, surfactants, dirt films
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CBR 1-mA-0,5 ppm	0.01...0.5 mg/l*	1038016
CBR 1-mA-2 ppm	0.02...2.0 mg/l*	1038015
CBR 1-mA-5 ppm	0.05...5.0 mg/l*	1052138
CBR 1-mA-10 ppm	0.10...10.0 mg/l*	1038014

* Measuring range based on chlorine. When measuring bromine, the lower and upper limit of the measuring range are increased by the factor 2.25, therefore for example CBR 1-mA-0.5ppm: 0.02 ...1.1 ppm.

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Sensor for Free and Combined Bromine CBR 1-CAN-P

Sensor for free chlorine and bromine in contaminated water, also suitable for high pH values of up to 9.5. For use on controllers with CAN-bus connection.

Your benefits

- Measured variable: free chlorine as well as free and combined bromine (bromamines)
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt and biofilms by electrolyte with antimicrobial effect and large-pore diaphragm
- Use at high pH value of up to 9.5 by optimisation of the electrolyte diaphragm system

Measured variable	free chlorine, free bromine, combined bromine, DBDMH (1,3-dibrom-5,5-dimethyl-hydantoin)
Reference method	DPD1
pH range	5 ... 9.5
Temperature	1 ... 40 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGM, DLG II)
Supply voltage	11...30 V DC (via CAN interface)
Output signal	digital (CANopen), uncalibrated, temperature-compensated, galvanically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, bromide + hypochlorite, DBDMH
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN® 3, DULCOMARIN® II only with hardware after 06.02.2014 from software version 3035 or later
Typical applications	Cooling water, process water, waste water, water with higher pH values (stable pH). Contaminated swimming pool water. In swimming pools to determine the combined chlorine from the difference: Total chlorine minus free chlorine. Raw water for drinking water treatment.
Resistance to	Dirt films, biofilms, surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CBR 1-CAN-P-10ppm	0.01...10.0 mg/l	1083135



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