

6.3 DULCOTEST® Amperometric Sensors

6.3 Amperometric Sensors for Chlorine, Bromine, Chlorine Dioxide, Chlorite, Ozone, Dissolved Oxygen and Peracetic Acid

For optimum functioning of chlorine, bromine, chlorine dioxide and ozone measuring cells please note the following guidelines:

- Use DULCOMETER® measurement and control systems.
- Install only in ProMinent® DGM or DLGA in-line probe housings.
- Defined flow between 30 and 60 l/h.
- Chlorine measurement must only take place when pH is stable (CLE 3).
- Regular calibration with a Photometer (e.g. Type DT 1).

Important:

Amperometric probes are **NOT electrically isolated**.

When installing in external appliances (e.g. PLC), you should electrically isolate the supply voltage and the analogue input signal.

- Summary of features:
- High zero point stability
- Compact design
- Integrated temperature correction
- Simple to install
- Simple to maintain
- Short warm up period time
- Measurement signal virtually unaffected by flow

Chlorine dissolved in water is present in different forms:

Free (active) chlorine: Cl₂, HOCl (hypochlorous acid), OCl⁻ (hypochlorite) recommended sensors: CLE (analysis: DPD 1).

Combined chlorine: mono, di, trichloramine (analysis: DPD 4 - DPD 1).

Organic combined chlorine: Of isocyanuric acid / isocyanurate bound chlorine (total available chlorine) and the resulting free (effective) chlorine; recommended sensor: CGE (analysis: DPD 1).

Total chlorine: Sum of free and combined chlorine; recommended sensor: CTE (analysis: DPD 4).

Applications: Chlorine measurement in drinking, swimming pool, process, industrial water and water of similar quality e.g. seawater/brine with up to 15 % chloride content.

We recommend the CGE, CTE chlorine sensors for measuring chlorine if pH value is high (8...9.5).

Guidelines for device usage:

The measuring cells type CLE cannot be used in the presence of iso-cyanuric acid/chlorine stabilisers!

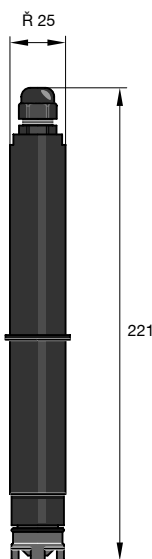
The sensors with the suffix -mA are used with the measurement and control devices D1C, D2C and DULCOMARIN®. The sensors with the suffix -4P are used with the earlier WS controllers and for metering pumps with integrated chlorine controllers. DMT-type sensors are used for the DMT transducer. CAN-type sensors are used with the DULCOMARIN® II swimming pool controller.

Note

CLE sensors: The CLE type sensors cannot be used in liquids containing isocyanuric acid/chlorine stabilisers.

6.3 DULCOTEST® Sensors for Chlorine

6.3.1 DULCOTEST® Sensors for free chlorine - CLE 3-mA and CLE 3.1-mA



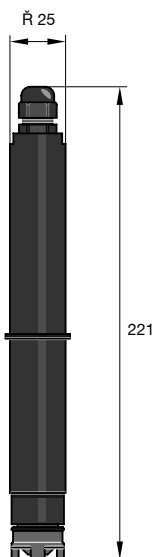
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Measurement of free chlorine

CLE 3-mA

| | |
|----------------------------------|---|
| Measured variable: | Free chlorine (hypochlorous acid HOCl) |
| Analysis: | DPD 1 |
| Measurement range: | 0.01... 50 mg/l |
| pH range: | 5.5...8.0 (up to pH 8.5 for pH correction in the D1C) |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 1 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | 16...24 VDC (two-wire technology) |
| Output signal: | 4...20 mA † measurement range (un-calibrated) |
| | Warning: no electrical isolation! |
| Typical applications: | CLE 3-mA-0.5 ppm, potable water CLE 3-mA-2.0/10 ppm, swimming pool, potable, industrial, process water (surfactant free) |
| Measurement and control devices: | D1C, D2C, DULCOMARIN® (2/10 ppm only) |
| In-line probe housing: | DGM, DLGA |

| | |
|--|----------|
| CLE 3-mA-0.5 ppm set, with 100 ml electrolyte *** not stocked*** | 792927. |
| CLE 3-mA-2 ppm set, with 100 ml electrolyte *** not stocked*** | 792920. |
| CLE 3-mA-5 ppm set, with 100 ml electrolyte | 1033392. |
| CLE 3-mA-10 ppm set, with 100 ml electrolyte | 792919. |
| CLE 3-mA-20 ppm set, with 100 ml electrolyte | 1002964. |
| CLE 3-mA-50 ppm set, with 100 ml electrolyte | 1020531. |
| CLE 3-mA-100 ppm set, with 100 ml electrolyte | 1022786. |



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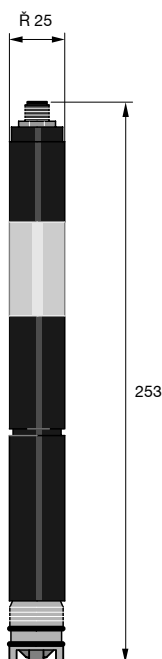
CLE 3.1-mA

| | |
|----------------------------------|---|
| Measured variable: | Free chlorine (hypochlorous acid HOCl) where there is a high rate of combined chlorine and/or in the case of pH values up to 8.5 (with D1C pH correction). |
| Analysis: | DPD 1 |
| Measurement range: | 0.02...2.00 mg/l (CLE 3.1-mA-2 ppm) 0.01...5.0 mg/l (CLE 3.1-mA-5 ppm) 0.1...10.0 mg/l (CLE 3.1-mA-10 ppm) |
| pH range: | 5.5...8.0 (up to pH 8.5 for pH correction in the D1C) |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 1 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | 16...24 VDC (two-wire technology) |
| Output signal: | 4...20 mA † measurement range (un-calibrated) |
| | Warning: no electrical isolation! |
| Typical applications: | CLE 3-mA-2.0/10 ppm, swimming pool, potable, industrial, process water (surfactant free) |
| Measurement and control devices: | D1C, D2C, DULCOMARIN® |
| In-line probe housing: | DGM, DLGA |

| | |
|---|----------|
| CLE 3.1-mA-0.5 ppm set, with 100 ml electrolyte | 1020530. |
| CLE 3.1-mA-2 ppm set, with 100 ml electrolyte | 1018369. |
| CLE 3.1-mA-5 ppm set, with 100 ml electrolyte | 1019398. |
| CLE 3.1-mA-10 ppm set, with 100 ml electrolyte | 1018368. |

6.3 DULCOTEST® Sensors for Chlorine

6.3.2 DULCOTEST® Sensors for free chlorine - CLE 3-mA and CLE 3.1-mA



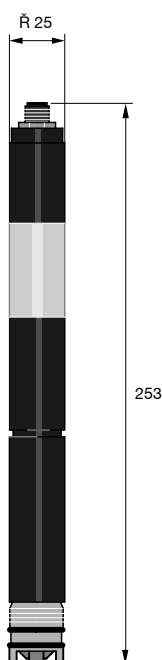
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CLE 3-CAN

| | |
|----------------------------------|---|
| Measured variable: | Free chlorine (hypochlorous acid HOCl) |
| Analysis: | DPD 1 |
| pH range: | 5.5...8.0 |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 1 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | Via CAN interface(11-30V) |
| Output signal: | un-calibrated, temperature compensated, electrically isolated |
| Typical applications: | swimming pool, potable water (surfactant free) |
| Measurement and control devices: | DULCOMARIN® |
| In-line probe housing: | DGM, DLGA |

CLE 3-CAN-10 ppm 0.01 ... 10.0 mg/l 1023425.

complete with 100 ml electrolyte



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CLE 3.1-CAN

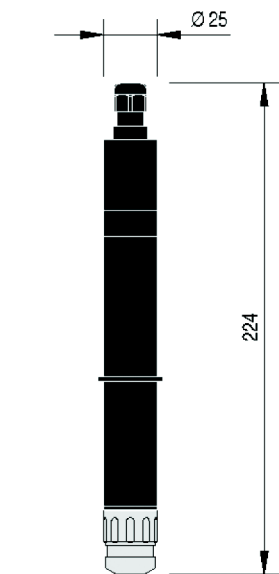
| | |
|----------------------------------|---|
| Measured variable: | Free chlorine (hypochlorous acid HOCl) with large proportions of bound chlorine; to detect bound chlorine using DULCOMARIN® II and Sensor for Total Chlorine type CTE 1-CAN |
| Reference Method: | DPD 1 |
| pH range: | 5.5...8.0 (up to pH 8.5 for pH correction in the D1C) |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 1 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | Via CAN interface (11-30V) |
| Output signal: | un-calibrated, temperature compensated, electrically isolated |
| Typical applications: | swimming pool, potable water with a high percentage of bound chlorine (surfactant free) |
| Measurement and control devices: | DULCOMARIN® II |
| In-line probe housing: | DGM, DLGA |

CLE 3.1-CAN-10 ppm 0.01 ... 10.0 mg/l 1023426.

complete with 100 ml electrolyte

6.3 DULCOTEST® Sensors for Chlorine

6.3.3 DULCOTEST® Sensors for Free Chlorine

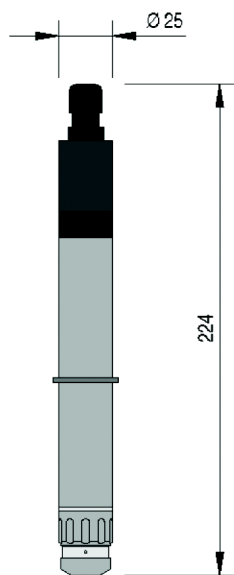


P_DT_0072_SW1

CLO 1-mA

| | |
|-----------------------------------|---|
| Measured variable | free chlorine (hypochlorous acid HOCl) |
| Reference method | DPD1 |
| pH range | 5,0 ... 9,0 |
| Temperature range | 5 ... 45 °C |
| Max. pressure | 8,0 bar |
| Intake flow | 30...60 l/h (in DGM or DLG III), constant flow as flow-dependent signal |
| Power supply | 16...24 V DC (2-wire) |
| Output signal | 4...20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated |
| Typical applications | swimming pool, uncontaminated drinking water and industrial service water, and can also be used together with diaphragm-free electrolysis processes |
| Measurement and control equipment | D1C, D2C, DULCOMARIN® |
| In-line probe housing | DGM, DLG III to 60 °C, special fitting for 60 °C-70 °C (on request) |
| Measuring principle | amperometric, 3 electrodes, no diaphragm |

| | | |
|-----------------|------------------|---------|
| CLO 1-mA-2 ppm | 0,02...2,0 mg/l | 1033871 |
| CLO 1-mA-10 ppm | 0,10...10,0 mg/l | 1033870 |

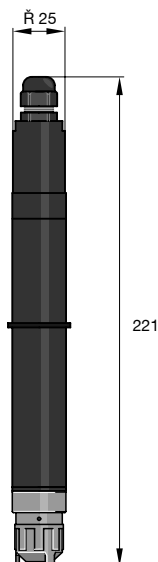


P_DT_0073_SW1

CLO 2-mA

| | |
|-----------------------------------|---|
| Measured variable | free chlorine (hypochlorous acid HOCl) |
| Reference method | DPD1 |
| pH range | 5,0 ... 9,0 |
| Temperature range | 5 ... 70 °C |
| Max. pressure | 8,0 bar |
| Intake flow | 30...60 l/h (in DGM oder DLG III), constant flow as flow-dependent signal |
| Power supply | 16...24 V DC (two-wire system) |
| Output signal | 4...20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated |
| Typical applications | Hot water up to 70°C, combating legionella uncontaminated drinking water and industrial service water, and can also be used together with diaphragm-free electrolysis processes |
| Measurement and control equipment | D1C, D2C, DULCOMARIN® |
| In-line probe housing | DGM, DLG III to 60°C, special fitting for 60°C-70°C (on request) |
| Measuring principle | amperometric, 3 electrodes, no diaphragm |

| | | |
|----------------|-----------------|---------|
| CLO 2-mA-2 ppm | 0,02...2,0 mg/l | 1033878 |
|----------------|-----------------|---------|



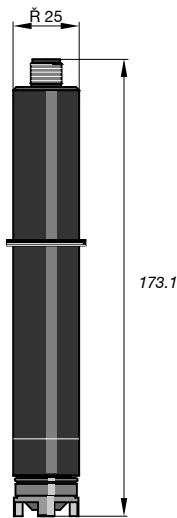
CLR 1-mA-200ppm

| | |
|-----------------------------------|---|
| Measured variable | Free chlorine (hypochlorous acid HOCl) |
| Reference method | DPD1pH range 5.5 ... 8.0 |
| Temperature | 5 ... 45 °C |
| Max. pressure | 1.0 bar |
| Intake flow | 30...60 l/h (in DGM, DLG II) |
| Power supply | 16...24 V DC (2-wire) |
| Output signal | 4...20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated |
| Typical applications | Salad, vegetable and poultry washing water, contaminated process and waste water |
| Measurement and control equipment | D1Cb, DAC, delta® solenoid diaphragm metering pump |
| In-line probe fitting | DGM, DLG III |
| Measuring principle | amperometric, 2 electrodes, diaphragm-covered |

| | | |
|------------------|----------------------|---------|
| CLR 1-mA-200 ppm | 20.00 ... 200,0 mg/l | 1047978 |
|------------------|----------------------|---------|

6.3 DULCOTEST® Sensors for DMT

6.3.4 DULCOTEST® Sensors for free Chlorine - CLE3-DMT and CTE1-DMT



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CLE 3-DMT

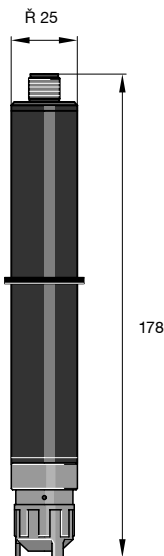
Measuring cell for use with the DMT "chlorine" measurement transducer.

Measured variable: Free chlorine (hypochlorous acid HOCl)
 Reference method: DPD1
 Measurement range: 0.01...5.0 mg/l
 0.05...50 mg/l
 Supply: From the DMT measurement transducer (3.3 VDC)
 Output signal: Un-calibrated, not temperature compensated
 Temperature: 5...45 °C
 Max. pressure: 1 bar
 Flow: 30...60 l/h (in DGM or DLGA)
 measurement: Via integrated Pt 1000: compensation carried out in DMT
 Measuring cell output: 5-pin plug
 Other data as for CLE-3 mA.

CLE 3-DMT-5 ppm set with 100 ml electrolyte 1005511.
 CLE 3-DMT-50 ppm set with 100 ml electrolyte 1005512.

See section 3.21

Universal control cable, 5-pole round connector, 5-wire, 2 m 1001300.
 Universal control cable, 5-pole round connector, 5-wire, 5 m 1001301.
 Universal control cable, 5-pole round connector, 5-wire, 10 m 1001302.



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CTE 1-DMT

Measuring cell for use with the DMT "chlorine" measurement transducer.

Measured variable: Total Chlorine
 Reference method: DPD4
 Measurement range: 0.01...10 mg/l
 Supply: From the DMT measurement transducer (3.3 VDC)
 Output signal: Un-calibrated, not temperature compensated
 Temperature: 5...45 °C
 Max. pressure: 1 bar
 Flow: 30...60 l/h (in DGM or DLGA)
 measurement: Via integrated Pt 1000: compensation carried out in DMT
 Measuring cell output: 5-pin plug
 Other data as for CLE-3 mA.

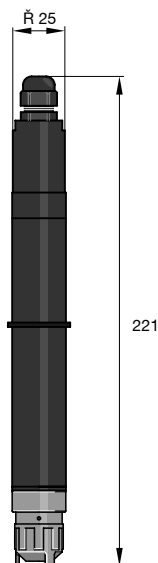
CTE 1-DMT-10 ppm set with 50 ml electrolyte 1007540.

See section 3.21

Universal control cable, 5-pole round connector, 5-wire, 2 m 1001300.
 Universal control cable, 5-pole round connector, 5-wire, 5 m 1001301.
 Universal control cable, 5-pole round connector, 5-wire, 10 m 1001302.

6.3 DULCOTEST® Sensors for Total Chlorine

6.3.5 DULCOTEST® Sensors for Total Chlorine



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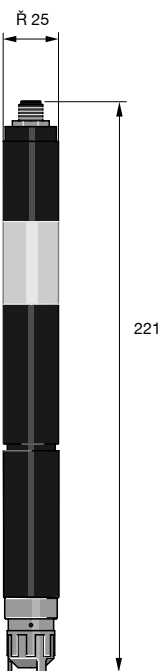
Measured variable of total chlorine

CTE 1-mA

| | |
|----------------------------------|--|
| Measured variable: | total chlorine |
| Analysis: | DPD 4 |
| Measurement range: | 0.01...0.50 mg/l (CTE 1-mA-0.5 ppm) 0.02... 2.00 mg/l (CTE 1-mA-2 ppm) 0.05... 5.00 mg/l (CTE 1-mA-5 ppm) 0.1...10.0 mg/l (CTE 1-mA-10 ppm) |
| pH range: | 5.5...9.5 |
| Temperature range: | 5...45 °C |
| Max. pressure: | 3 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | 16...24 V DC (two-wire technology) |
| Output signal: | 4...20 mA † measurement range (un-calibrated) Warning: no electrical isolation! |
| Typical applications: | CTE 1-mA-0.5 ppm, potable water CTE 1-mA-2/5/10 ppm, potable, industrial, process water, In swimming pool in combination with CLE3.1 for determining combined chlorine. |
| Measurement and control devices: | D1C, DULCOMARIN® (2/10 ppm only) |
| In-line probe housing: | DGM, DLGA |

Part No.

| | |
|--|----------|
| CTE 1-mA-0.5 ppm set, with 50 ml electrolyte | 740686. |
| CTE 1-mA-2 ppm set, with 50 ml electrolyte | 740685. |
| CTE 1-mA-5 ppm set, with 50 ml electrolyte | 1003203. |
| CTE 1-mA-10 ppm set, with 50 ml electrolyte | 740684. |



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CTE 1-CAN

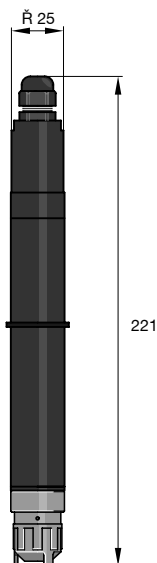
| | |
|----------------------------------|---|
| Measured variable: | total chlorine |
| Analysis: | DPD 4 |
| pH range: | 5.5...9.5 |
| Temperature range: | 5...45 °C |
| Max. pressure: | 3 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | Via CAN interface (11-30V) |
| Output signal: | un-calibrated, temperature compensated, electrically isolated |
| Typical applications: | In swimming pool in combination with CLE3.1 for determining combined chlorine. |
| Measurement and control devices: | DULCOMARIN® II |
| In-line probe housing: | DGM, DLGA |

Part No.

| | | |
|-----------------|--------------------|----------|
| CTE 1-mA-10 ppm | 0.01 ... 10.0 mg/l | 1023427. |
|-----------------|--------------------|----------|

6.3 DULCOTEST® Sensors for Total Chlorine

6.3.6 DULCOTEST® Sensors for total Chlorine

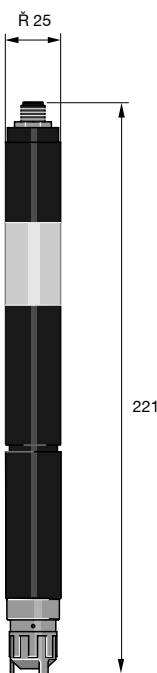


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Measured variable of organic combined chlorine and free chlorine (total available chlorine)

CGE 2-mA

| | |
|---|---|
| Measured variable: | Organic combined chlorine and free chlorine (e.g. trichloroisocyanuric acid) |
| Analysis: | DPD 1 |
| Measurement range: | 0.02...2.00 mg/l (CGE 2-mA-2 ppm) 0.1...10.0 mg/l (CGE 2-mA-10 ppm) |
| pH range: | 5.5...9.5 |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 3 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | 16...24 V DC (two-wire technology) |
| Output signal: | 4...20 mA I measurement range (un-calibrated) Warning: no electrical isolation! |
| Typical applications: | Swimming pool, potable, industrial, process water, cooling water and water with a high pH value |
| Measurement and control devices: | D1C, D2C, DULCOMARIN® |
| In-line probe housing: | DGM, DLGA |
| | Part No. |
| CGE 2-mA-2 ppm set, with 50 ml electrolyte | 792843. |
| CGE 2-mA-10 ppm set, with 50 ml electrolyte | 792842. |



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CGE 2-CAN

| | |
|----------------------------------|--|
| Measured variable: | Organic combined chlorine and free chlorine (e.g. trichloroisocyanuric acid) |
| Analysis: | DPD 1 |
| pH range: | 5.5...9.5 |
| Temperature range: | 5...45 °C (temperature compensated) |
| Max. pressure: | 3 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | Via CAN interface (11-30V) |
| Output signal: | un-calibrated, temperature compensated, electrically isolated |
| Typical applications: | Swimming pool water |
| Measurement and control devices: | DULCOMARIN® II |
| In-line probe housing: | DGM, DLGA |
| | Part No. |
| CGE 2-CAN-10 ppm | 1024420. |
| with 50 ml electrolyte | |

6.4 DULCOTEST® Bromine Sensors

6.4.1 DULCOTEST® Sensors for Bromine

The following bromating agents are used as disinfectants:

organic bromating agent

- DBDMH (1,3-dibrom-5,5-dimethyl-hydantoin) e. g. sold as Albrom 100®
- BCDMH (1-bromine-3-chlorine-5,5-dimethyl-hydantoin) e.g. sold as Brom-Sticks®

These bromating agents are solid and are metered as saturated solutions via brominators.

Inorganic free bromine

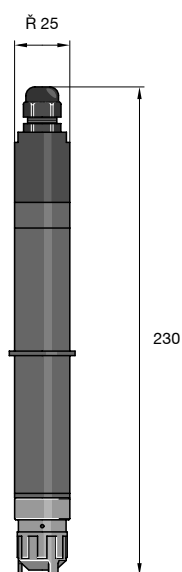
Free bromine is produced via the so-called Acti-Brom process® (Nalco) chlorine bleach + acid +sodium bromide.

For measuring DBDMH or free bromine as a bromating agent in the measurement range: 0.2 -10 ppm bromine the BRE 2-mA-10 ppm sensor is recommended along with DPD1-method calibration.

Alternatively, to measure BCDMH in the same measurement range, the BRE 1-mA-10 ppm sensor is recommended along with DPD4-method calibration.

Typical applications are in swimming pools, Jacuzzis and cooling systems. Particularly in cooling systems the quality of the sample water must be tested and, where applicable, compatibility with other chemicals employed (e.g. corrosion inhibitors). Dissolved copper(>0.1 mg/l) will interfere with the measurement.

Photometric DPD measurement is the recommended method for calibrating the bromine sensor (e.g. with DT 1), calculated and displayed as bromine. If bromine is determined as "chlorine" with DPD, note when selecting the measurement range that you need to lower the result by a factor of 2.25.



BCR 1-mA (replaces earlier BRE1)

Measured variable: Total available bromine from BCDMH(bromo-3-chloro-5,5-dimethylhydantoin) and N-Bromanide sulphonate

Reference method: DPD4

pH drange: 5.0 ... 9.5

Temperature range: 5 ... 45 °C

Max. pressure: 1 bar

Sample flow: 30 ... 60 l/h (in DGM or DLGA)

Voltage: 16 ... 24 V DC (two-wire technology)

Output signal: 4 ... 20 mA measurement range, temperature compensated

Warning: not electrically isolated!

Typical applications: Cooling water, process water, waste water, water with higher pH values (stable pH)

Measurement and

control device: D1C, D2C, DAC

In-line probe housing: DGM, DLGA

BCR 1-mA (replaces earlier BRE1)

BCR 1-mA-0.5 ppm with 50 ml electrolyte

BCR 1-mA-2 ppm with 50 ml electrolyte

BCR 1-mA -10 ppm with 50 ml electrolyte

Measurement range relates to BCDMH

Part no.

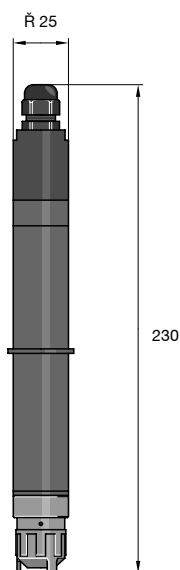
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6.4 DULCOTEST® Bromine Sensors

6.4.2 DULCOTEST® Sensors for Bromine



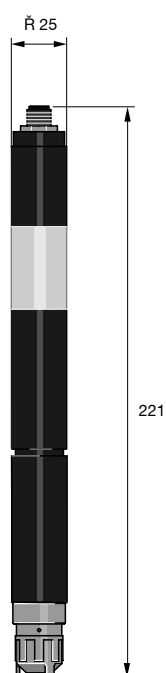
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CBR 1-mA (replaces earlier BRE2)

| | |
|------------------------------------|---|
| Measured variable: | Free chlorine (hypochlorous acid HOCl), free bromine, bound bromine |
| Reference method: | DPD1 |
| pH range: | 5.0 9.5 |
| Temperature | 5 ... 45 °C |
| Max. pressure: | 1 bar |
| Flow: | 30 ... 60 l/h (in DGM or DLGA) |
| Power supply: | 16 ... 24 V DC (2-wire) |
| Supply: | From the DMT measurement transducer (3.3 VDC) |
| Output signal: | 4 ... 20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated |
| Typical applications: | Cooling water, Process water, Waste water, Water with higher pH values (stable pH) |
| Measurement and control equipment: | D1C, ProMcon |
| In-line probe fitting | DGM, DLGA |
| Measuring principle | amperometric, 2 electrodes, diaphragm-covered |

| | | |
|------------------|--------------------|----------|
| 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 | 1038015. |
| CBR 1-mA-10 ppm | 0.10 ... 10.0 mg/l | 1038014. |

Note: the above measuring range is based on chlorine. The upper and lower limits of the measuring range are increased by a factor of 2.25 when measuring bromine e.g. CBR 1-mA-2 ppm = 4.5 ppm



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BRE 3-CAN

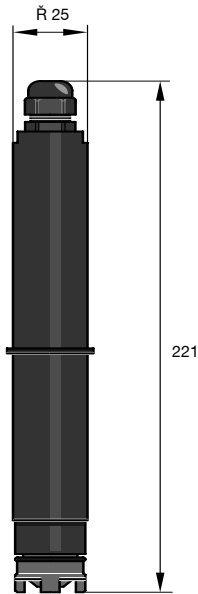
| | |
|---------------------------------|---|
| Measured variable: | Total available bromine |
| Bromine chemicals: | DBDMH (1.3-dibromine 5.5-dimethyl hydantoin) BCDMH (1-bromine-3-chlorine-5.5-dimethyl hydantoin), free bromine |
| Reference method: | DBDMH, free bromine:DPD1 BCDMH:DPD4 |
| Measurement range: | DBDMH free bromine:0.2...10.0 mg/l with type BRE 2-mA-10 ppm BCDMH:0.2...10.0 mg/l with type BRE 1-mA-10 ppm |
| pH dependence: | if 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 range: | 5...45 °C |
| Max. pressure: | 3 bar |
| Sample flow: | 30...60 l/h (in DGM or DLGA) |
| Voltage: | Via CAN interface (11-30V) |
| Output signal: | uncalibrated, temperature compensated, electrically isolated |
| Typical applications: | Swimming pools / whirlpools and cooling water; can also be used in seawater |
| Measurement and control device: | Dulcomarin® II |
| In-line probe housing: | DGM, DLGA |

| | | |
|-----------------|--------------------|----------|
| BRE 3-CAN-10ppm | 0.02 ... 10.0 mg/l | 1029660. |
|-----------------|--------------------|----------|

Part no.

6.5 DULCOTEST® Chlorine Dioxide Sensors

6.5.1 DULCOTEST® Sensors for Chlorine Dioxide



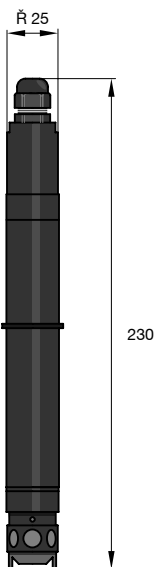
CDE 2-mA

| | |
|-----------------------------------|--|
| Measured variable | Chlorine dioxide (ClO ₂) |
| Reference method | DPD1 |
| pH range | 4.0 ... 11 |
| Cross sensibility | Ozone, compared with chlorine <2% |
| Temperature range | 1 ... 45 °C |
| Max. pressure | 1,0 bar |
| Intake flow | 30...60 l/h (in DGMA or DLG III) |
| Supply voltage | 16...24 V DC |
| Output signal | 4...20 mA temperature compensated, uncalibrated, not electrically isolated |
| Typical applications | uncontaminated potable water (surfactant-free) |
| Measurement and control equipment | D1C, D2C, DAC |
| In-line probe housing | DGMa / DLG III |
| Measuring Principle | amperometric, 2 electrodes, diaphragm-covered |

| | | |
|------------------|------------------|---------|
| CDE 2-mA-0.5 ppm | 0,01...0,5 mg/l | 792930. |
| CDE 2-mA-2 ppm | 0,02...2,0 mg/l | 792929. |
| CDE 2-mA-10 ppm | 0,10...10,0 mg/l | 792928. |

pk_5_046

with 100 ml of electrolyte



CDP 1-mA-2 ppm (ClO₂-process probe)

| | |
|------------------------------|---|
| Applications: | Bottle washing machines and water containing surfactants |
| Measured variable: | Chlorine dioxide (ClO ₂) |
| Analysis: | DPD 1 |
| Measurement range: | 0.02...2.00 mg/l |
| pH range: | 5.5...10.5 |
| Temperature range: | 10...45 °C (short term periods 55 °C) with external temperature correction via Pt 100 (no internal temperature correction!) |
| Temperature variation speed: | Up to 10 K/min |
| Max. pressure: | 3 bar (no pressure surges) |
| Flow: | 30...60 l/h (in DGM or DGMA) |
| Supply voltage: | 16...24 V DC (two-wire technology) |
| Output signal: | 4...20 mA † measurement range (un-calibrated) |

Warning: no electrical isolation!

Type application: Process water containing surfactants (bottle washing machines)

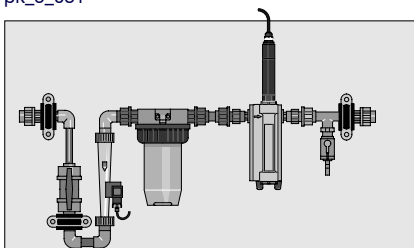
Measuring and control device: D1C with automatic temperature compensation only

In line probe housing: the following is recommended (see fig.)

Probe housing quote on request.

pk_5_050

pk_5_081



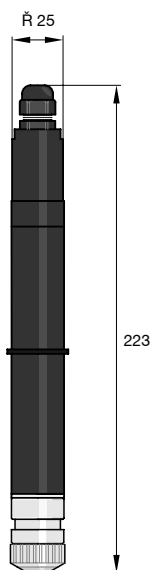
CDP 1-mA-2 ppm set with 100 ml electrolyte

Part No.

1002149

6.5 DULCOTEST® Chlorine Dioxide Sensors

6.5.2 DULCOTEST® Sensors for Chlorine Dioxide

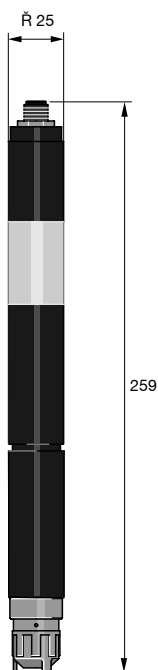


CDR 1-mA

| | |
|-----------------------------------|--|
| Measured variable | Chlorine dioxide (ClO ₂) |
| Reference method | DPD1 |
| pH range | 1.0 ... 10 |
| Temperature range | 1 ... 55 °C (short-term periods 60 °C) |
| Max. pressure | 310 bar (30 °C in DGMA) |
| Intake flow | 30...60 l/h (in DGMA or DLG III) |
| Supply voltage | 16...24 V DC |
| Output signal | 4...20 mA temperature compensated, uncalibrated, not electrically isolated |
| Typical applications | contaminated industrial, process water, containing surfactants, Cooling water, irrigation water, slightly contaminated waste water, warm water |
| Measurement and control equipment | D1C |
| In-line probe housing | DGMa / DLG III |
| Measuring Principle | amperometric, 2 electrodes, diaphragm-covered |

| | | |
|------------------|------------------|---------|
| CDR 1-mA-0.5 ppm | 0,01...0,5 mg/l | 1033762 |
| CDR 1-mA-2 ppm | 0,02...2,0 mg/l | 1033393 |
| CDR 1-mA-10 ppm | 0,10...10,0 mg/l | 1033404 |

pk_6_083



CDR 1-CAN

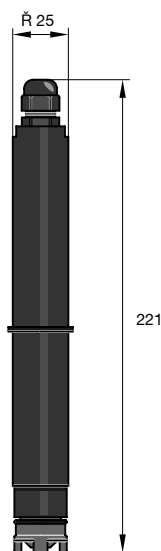
| | |
|-----------------------------------|--|
| Measured variable | Chlorine dioxide (ClO ₂) |
| Reference method | DPD1 |
| pH range | 1.0 ... 10 |
| Temperature range | 5 ... 45 °C |
| Max. pressure | 1.0 bar (30 °C in DGMA) |
| Response time sensor | t ₉₀ ~ 3 min. |
| Intake flow | 30...60 l/h (in DGMA or DLG III) |
| Supply voltage | Via CAN interface (11-30V) |
| Temperature measurement | via integral digital semiconductor device |
| Output signal | uncalibrated, temperature-compensated, electrically isolated |
| Typical applications | contaminated industrial, process water, containing surfactants, cooling water, irrigation water, slightly contaminated waste water, warm water |
| Measurement and control equipment | Dulcomarin® Disinfection Controller |
| In-line probe housing | DGMa / DLG III |
| Measuring Principle | amperometric, 2 electrodes, diaphragm-covered |

| | | |
|------------------|------------------|---------|
| CDR 1-can-10 ppm | 0,10...10,0 mg/l | 1041145 |
|------------------|------------------|---------|

pk_6_084

6.6 DULCOTEST® Ozone Sensor

6.6.1 DULCOTEST® Sensors for Ozone



pk_5_046

OZE 3-mA

| | |
|-------------------------------------|---|
| Measured variable: | Ozone (O ₃) |
| Analysis: | DPD 4 |
| Measurement range: | 0.02...2.00 mg/l |
| pH range: | Ozone stability range |
| Temperature range: | 5...40 °C (temperature compensated), no significant Temperature fluctuations |
| Max. pressure: | 1 bar |
| Flow: | 30...60 l/h (in DGM or DLGA) |
| Power supply: | 16...24 VDC (two-wire technology) |
| Output signal: | 4...20 mA † measurement range (un-calibrated) |
| | Warning: no electrical isolation! |
| Typical applications: | Swimming pools, potable, industrial, process water, surfactant free |
| Measurement and control devices: | D1C |
| In-line probe housing: | DGM , DLGA |

Part No.

OZE 3-mA-2 ppm set, with 100 ml electrolyte

792957.

OZE 3-mA-5 ppm set, with 100 ml electrolyte

*** 792957-5PPM

*** **special** *** not carried in stock, 6 week delivery

The DULCOTEST® PAA 1 sensor models are membrane-covered amperometric 2-electrode sensors for the selective measurement of peracetic acid. Peracetic acid is used as a disinfectant particularly in the food and beverage industries as well as in the cosmetic, pharmaceutical and medical industries. The continuous measurement and control of the peracetic acid is essential to comply with demanding disinfection requirements and for quality control. Unlike with the sensors in the earlier Perox PES system the PAA 1-mA can be used with the D1Ca controller. Commissioning and maintenance is greatly simplified. The sensors can even be used in the presence of surfactants (tensides).

The DULCOTEST® PEROX and PER1 sensors are membrane-covered, amperometric sensors for the online concentration measurement of hydrogen peroxide. Due to its complete biodegradability, hydrogen peroxide is a disinfectant and oxidising agent frequently used in water treatment and production: chemical bleach in the wood, paper, textile and mineral compounds industries, organic synthesis in the chemical, pharmaceutical and cosmetics industries, oxidation of potable water, landfill seepage water, contaminated ground water, disinfection of cooling, process and production water in the pharmaceutical, food and beverage industries as well as in swimming pools, deodorisation (gas scrubbers) in municipal and industrial clarification plants, dechlorination in chemical processes