"analytical sensors" T.O.C. IX

CATALOG SECTION TABS

ProMinent® DULCOTEST® Sensors

Overview: Sensors

There are four methods of measurement for reliable water treatment:

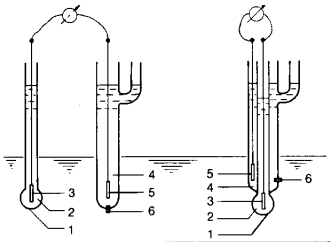
- **Potentiometric method: For pH and redox potential (ORP) measurement**
- **Amperometric method: For the measurement of chlorine, chlorine dioxide and ozone residual**
- **Conductometric method: For the measurement of electrolytic conductivity**
- **Potentiostatic method: For the measurement of hydrogen peroxide, peracetic acid and dissolved oxygen**

Potentiometry–Measurement of the potential of an electrode against an electrolyte solution.

The measuring element always consists of a **measuring electrode** that reacts specifically to changes in electrical charges, and a **reference electrode** which generates a potential that is as constant as possible and independent of the measuring electrode changes. ProMinent provides both in a combination electrode.

An example for this kind of measuring element is the pH sensor.

1 Glass electrode
2 pH buffer solution
3 Inner electrode, measuring system
4 Electrolyte filling
5 Inner electrode, reference system
6 Diaphragm



Separate measuring and reference

Combination electrode

Fig. 1

pH - that's the negative logarithm of the hydrogen ion activity

Since hydrogen ions in aqueous solutions range in concentrations from less than 10^{-14} g/L to more than 10 g/L (= mol/L) and the exponential notation is rather unwieldy, the pH scale is defined as

$$pH = -\log a_{H}+$$

When the concentration is not too high, activity and concentration can be considered as equivalent. Thus, a hydrogen ion concentration of 10^{-14} mol/L means a pH of 14, one of 10^{0} = 1 mol/L a pH of 0.

The pH value of 7 is called the neutral point. This means that the effective concentrations of H^+ ions and OH^- ions produced by the dissociation of water ($H_2O \Rightarrow H^+ + OH^-$) are equal.

If the hydrogen ions predominate because an acid (e.g. HCl) has been added, the pH value is lower than 7. If caustic has been added (e.g. NaOH), the solution becomes alkaline and the pH value is higher than 7.

pH is a logarithmic scale, such that each change of the pH by 1 corresponds to a change in concentration by the factor 10.

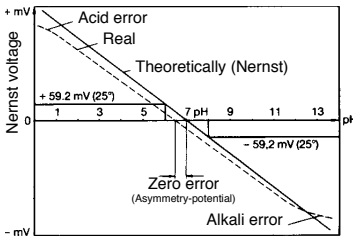


Fig. 2
Zero error and slope of a pH combination sensor

Fig. 2 shows the theoretical voltage curve of a pH glass electrode. In reality, the voltage curves of glass electrodes depart more or less from the theoretical values.

Electrode systems usually show a zero error (asymmetry potential) which, however, as a rule is less than ±0.5 pH. The slope (mV/pH) too can deviate from the theoretical value [59.2 mV/pH at 77°F (25°C)] which is true particularly for glass electrodes that have been used for some time.

An acid error which manifests itself at very low pH values; while an alkali error (or sodium error) will occur at high pH values.

pH transmitters must be calibrated so as to compensate zero and slope errors of the electrode used...

Zero calibration is made by means of a standardizing solution having a pH of 7. Slope calibration is made by means of a buffer solution, normally pH 4 or pH 10.

With pH measurements, except at pH 7, varying temperatures of the sample liquid might necessitate a correction for temperature variations. **The following questions need to be answered:**

1. At which pH will the measurement take place?
2. How great are the temperature changes?
3. How accurate a measurement is required?

The following is an example for the influence of temperature without correction:

At pH 10 an increase of the temperature by 18°F (10°C) results in an error of about +0.1 pH. The error increases with increasing distance from pH 7.

Measurement of the redox potential is a potentiometric measurement too!

The term "redox" stands for the simultaneously occuring reduction and oxidation processes in aqueous solutions. In an oxidation process electrons are transferred from the substance to be oxidized to the oxidant. Simultaneously, in oxidizing the substance, the oxidant is reduced. Oxidants are electron acceptors and reducing agents electron donors.

The redox potential is measured by means of noble metal electrodes, usually platinum electrodes. In a solution containing an oxidant (e.g. chlorine) the redox voltage will be positive, in a solution containing a reducing agent (e.g. sodium sulfite) it will be negative.

The magnitude of the redox potential is an indicator of the oxidizing or reducing properties of a solution. In water treatment the redox potential is a yardstick for the disinfecting properties of, for example, chlorine or ozone.

Thus, in water treatment the redox potential can be considered as an indicator of the disinfection potential.

It should be noted that there is a relationship between redox potential and pH so that redox measurements can be compared with each other only when the measurements were made at the same pH.

Typical applications of redox measurements:

1. Cyanide control by oxidation at high pH values, redox potential measurement by means of gold electrodes.
2. Chromate control by reduction at low pH values, redox potential measurement by means of platinum electrodes.
3. In disinfecting processes, measurement of chlorine residual or ozone concentration by means of platinum electrodes.

Amperometry– a method of measuring concentrations of certain dissolved substances in aqueous solutions.

In this method electric currents in the order of nA (10^{-9} A) or μA (10^{-6} A) are measured. The sensors used in this method are bare or membrane-covered 2-electrode cells.

Our DULCOTEST® chlorine, ozone and chlorine dioxide sensors are designed as membrane-covered 2-electrode cells of the highest quality.

By separating the electrodes from the sample liquid by means of a special microporous membrane, clearly defined measuring conditions are achieved and interferences eliminated.

The ProMinent DULCOTEST® sensor uses a platinum or gold cathode and a silver/silver chloride anode. In an appropriate electrolyte the latter assumes a well defined potential that may be used as a reference potential.

Unlike bare-electrode cells, which are extremely prone to interferences, membrane-covered cells do not require a constant flow rate of the sample liquid as long as there is a minimum flow rate of about 8 GPH (30 L/h). This does away with expensive equipment to keep the flow rate constant.

The influence of pH on the measurement of chlorine

It is important to know in what form chlorine exists in an aqueous solution. Only at a very low pH chlorine is present as a dissolved gas (Cl_2), while above pH 3 it exists in form of hypochlorous acid (HOCl) which at still higher pH dissociates into hypochlorite ion (OCl^-) (Fig. 3).

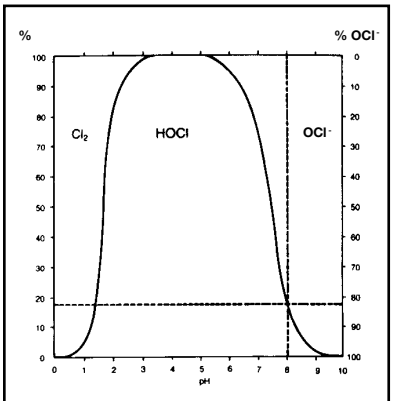


Fig. 3
Relationship between elemental chlorine, hypochlorous acid and hypochlorite ion, and pH

Compared to hypochlorous acid, the bactericidal action of hypochlorite ion is lower by the factor 100. Therefore, it makes little sense to measure hypochlorite. However, both hypochlorous acid and hypochlorite are interpreted as "free chlorine" and returned as such when determined by the DPD 1 method which is most commonly used for standardizing the chlorine analyzer.

The following example will make this clear:

At pH 8 only about 20% of the chlorine exist in form of highly effective HOCl, while about 80% are present as ineffective OCl^- (Fig. 3). If the chlorine analyzer is to read the same value as is obtained by a comparative determination by the DPD 1 method, the slope must be adjusted accordingly. ProMinent's D1C controller offers optional pH correction for free chlorine according to the dissociation curve (Fig. 3). The WS series with CLE sensor measures only the hypochlorous acid component of free chlorine.

The influence of temperature on the chlorine reading must be considered. That is why the reading of the DULCOTEST® chlorine sensor is automatically corrected for variations in temperature.

While the amperometric method of ascertaining chlorine does not pose any problems when inorganic chlorine is used (chlorine gas Cl_2, sodium hypochlorite NaOCl or calcium hypochlorite $Ca(OCl)_2$), provided the pH is constant, some complications might be introduced when chlorinated organic compounds as sources of chlorine are used, but under certain conditions such problems can be eliminated.

When chlorinated organic compounds are added to the water they do not only react to form hypochlorous acid, which is registered by the chlorine sensor, but they also form combined chlorine which is bound to ammonia or isocyanuric acid, and as such is less effective and not registered by the CLE chlorine sensor.

However, the DPD 4 method measures total chlorine, which is measurable using the amperometric method with the CTE sensor.

The determination of chlorine is interfered with in the presence of bromine, iodine, ozone or chlorine dioxide, but not in the presence of dissolved oxygen. Surface-active substances (fats, tensides) block the membrane and prohibit the use of the chlorine sensor.

For determining chlorine dioxide or ozone residual, a sensor similar to the chlorine sensor is used. The reading is independent of the pH. The influence of temperature is negligible. Dissolved oxygen and chlorite do not interfere.

The benefits of the DULCOTEST® sensors at a glance

Easy handling.
- No dechlorinating filter for sample liquid required.
- Quick installation and calibration.
- No buffers or reagents.

Reliable reading
- The DULCOTEST® method of ascertaining chlorine is not affected by dissolved solids and therefore may be used for sea water.
- The reading is not affected by the flow rate of the sample liquid above a minimum of 0.5 L/min.

Low maintenance
- Maintenance work is limited to changing membrane cap and electrolyte filling approx. once every 6 or 12 months.
- Low long-term operating costs.
- No continual changing of buffer solutions or reagants.

Conductometry– measurement of the electrolytic conductivity

Unlike the conductivity of metals which is brought about by the migration of electrons, electrolytic conductivity is caused by the migration of ions, that is, of positively or negatively charged atoms or groups of atoms existing in aqueous solutions owing to dissociation. Conductivity measuring cells are distinguished by the following criteria:

The cell constant

A system in which the conductivity of an electrolyte would be measured in a pipe of a length L = 1 cm and a cross sectional area of A = 1 cm^2 has a cell constant k = 1 cm^{-1}. If the length were L = 10 cm (or the area were A= 0.1 cm^2) the cell constant would be k = 10 cm^{-1}. If the area were increased to A = 10 cm^2 (or the length decreased to L = 0.1 cm) then the cell constant would be k = 0.1 cm^{-1}. A measuring cell having a small cell constant is used for determining low conductivities and one having a large cell constant for determining high conductivities. The reason behind it is obviously to increase the sensitivity for low conductivities (e.g. k = 0.1 cm^{-1}) and to decrease it for high conductivities (e.g. k = 10 cm^{-1}).

Conductivity varies with temperature

As a rule different dissolved substances possess different temperature coefficients α (alpha) so that the temperature behavior is very complex and varies as the concentration and the temperature change.

Since the objective of conductivity measurement usually is to determine the concentration of a substance, readings must be corrected for temperature changes if accurate measurement is required, especially when conductivity is to be corrected to the internationally used reference temperature of 77° F (25°C). The temperature is sensed by an NTC resistor or a Pt 100 (platinum resistance thermometer), the Pt 100 being superior as far as linearity, and hence accuracy.

Potentiostatic Measurement– combining potentiometry and amperometry

The measurement of hydrogen peroxide, peracetic acid and dissolved oxygen use the potentiostatic measurement principle. This combines a three-electrode technique (working electrode, counter electrode and reference electrode) with a two-electrode amperometric measurement (working and counter electrodes), plus temperature compensation. The complexity of the system requires a special microprocessor capable of recognizing the unique signatures of low concentrations for accurate measurement and control without cross-sensitivity to other oxidants.

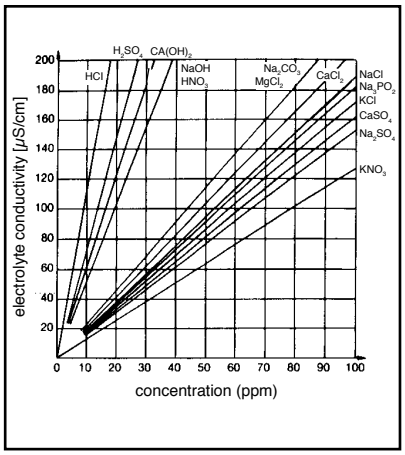


Figure 4. Electrolytic conductivity – concentration relationship for dilute acids, bases and salt solutions.

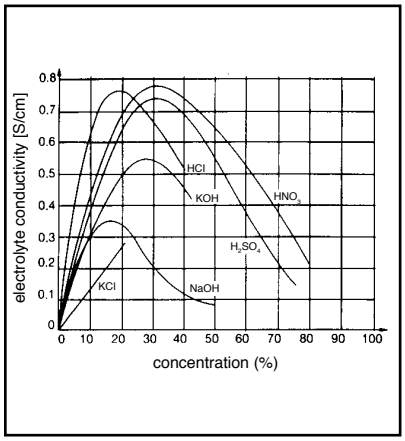


Figure 5. Specific conductivity – concentration relationship for dilute acids, bases and salt solutions (% w/w).

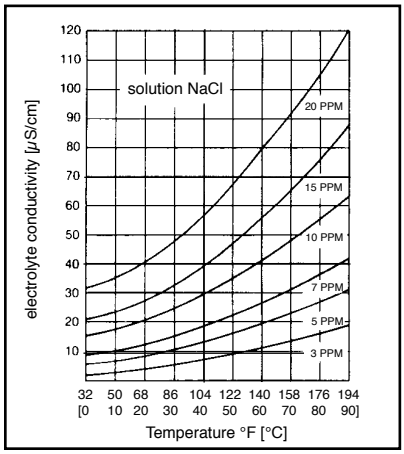


Figure 6. Conductivity of aqueous solutions of table salt vs. temperature at different concentrations.

ProMinent® DULCOTEST® Sensors

pH Identcode description

Aid to selection of pH-electrodes see page 6

Identcode Description (Type description)

PHEX T 112 SE 3D

pH-combination probe

X: with solid electrolyte and circular gap diaphragm

K: with strong plastic shaft

N: refillable KCl electrode

E: insertion electrode

R: with PTFE ring diaphragm

P: pressure tight up to 87 psi (6 bar)

D: 2 ceramic diaphragms (double junction)

S: swimming pool electrode

F: hydrofluoric acid solution-resistant

unspecified: standard gel electrode

with integrated temperature sensor

pH measurement range: 1-12

V: Vario Pin socket

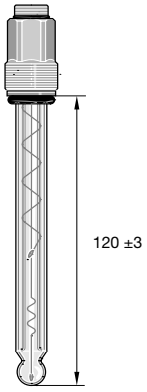
S: Plug connector for SN6 coax plug

L: KCl refillable laboratory electrode

E: mounting thread PG 13.5

3D: 3 ceramic diaphragms

pH Combination Sensors With SN6



pk_6_016

PHE 112 SE

pH range: 1-12
Temperature: 32-140 °F (0-60 °C)
Max. pressure: 7.25 psi (0.5 bar)
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
Installation length: 4.72“ (120 ±3 mm), thread PG 13.5
Typical applications: Swimming pool, atmospheric pressure installation, potable water, lightly contaminated waste water.

	Part No.
PHE 112 SE	305054
PHE 112 SE as above, but length 8.9“ (225 ±3 mm)	150092

PHES 112 SE

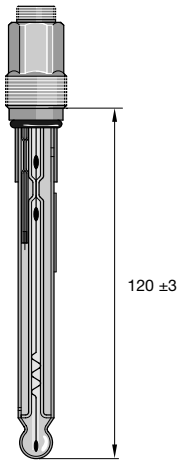
As PHE 112 SE but max. pressure 43.5 psi (3 bar)

Typical uses: Swimming pools during pressurisation, drinking water, slightly contaminated industrial and wastewater

	Part No.
PHES 112 SE	150702

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

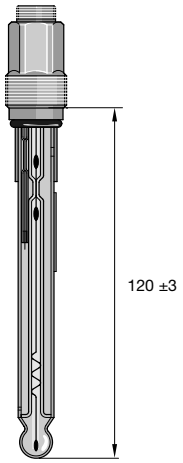


pk_6_019

PHEP 112 SE

pH range: 1-12
Temperature: 32-176 ºF (0-80 °C)
Max. pressure: 87 psi (6 bar)
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
Installation length: 4.72“ (120 ±3 mm), thread PG 13.5
Mounting hole: min Ø 0.6“ (14.5 mm)
Typical uses: Swimming pools under pressure for higher temperatures and pressures, potable and industrial water, lightly soiled wastewater and the electroplating and chemical industries

	Part No.
PHEP 112 SE	150041



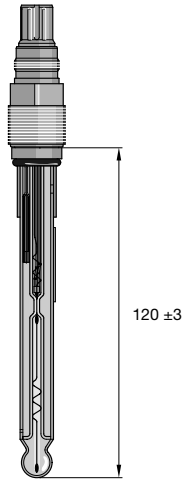
pk_6_019

PHEP-H 314 SE

pH range: 3-14 (Note: use below pH 3 shortens the service life)
Temperature: 32-212 ºF (0-100 °C)
Max. pressure: 87 psi (6 bar) at 77 ºF (25 °C)
43.5 psi (3 bar) at 212 ºF (100 °C)
Min. conductivity: 150 µS/cm
Diaphragm: ceramic
Insertion length: 4.72“ (120 ±3 mm), screw-in thread PG 13.5
Shank diameter: 0.47“ (12 mm) min. diam.
Typical applications: monitoring or control of chemical processes with neutral to highly-alkaline media and temperatures up to 100 °C

	Part No.	
PHEP-H 314 SE	1024882	**Note:**

the electrode will be available from the first quarter of 2005



pk_6_068

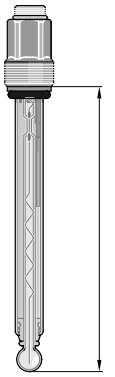
PHEPT 112 VE

Technical data and conditions for use as type PHEP 112 SE, however, with integrated Pt 100 enclosed in glass shaft and Vario Pin plug with gold plated contacts.

	Part No.
PHEPT 112 VE	1004571

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

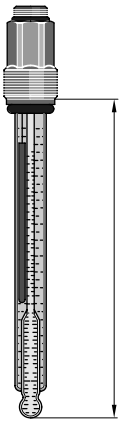


pk_6_018

PHER 112 SE

pH range: 1-12
Temperature: 32-176 °F (0-80 °C)
Max. pressure: 87 psi (6 bar)
Min. conductivity: >50 µS/cm
Electrolyte with solid KCl supply (salt rings in the reference electrolyte)
Diaphragm: PTFE ring diaphragm
Installation Length: 4.72“ (120 ±3 mm)
Typical applications: Municipal and industrial wastewater, process water, water in the chemical and paper manufacturing industries. General, for water with suspended solid content.

	Part No.
PHER 112 SE	1001586



pk_6_017

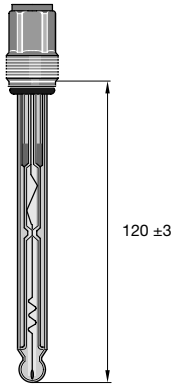
PHEX 112 SE

pH range: 1-12
Temperature: 32-212 °F (0-100 °C)
Max. pressure: 232 psi (16 bar) at 77 °F (25 °C); 87 psi (6 bar) at 212 °F (100 °C)
Min. conductivity: >500 µS/cm
Diaphragm: Circular gap diaphragm (solid electrolyte)
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Waste water, industrial water, process chemistry, emulsions, suspensions, fluids containing protein and sulphide (not for chlorine/fluoride or when subject to temperature fluctuations). General, for water with a high suspended solid content.
Not suitable for use in clear water

	Part No.
PHEX 112 SE	305096
PHEX 112 SE as above but length 8.9“ (225 ±3 mm)	150061

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

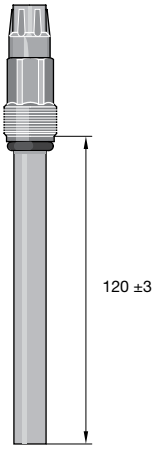


pk_6_022

PHED 112 SE

pH range: 1-12
Temperature: 32-176 ºF (0-80 °C)
Max. pressure: 116 psi (8 bar)
Min. conductivity: >150 µS/cm
Diaphragm: Double junction
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Potable, industrial water, lightly contaminated waste water, cooling tower water

	Part No.
PHED 112 SE	741036



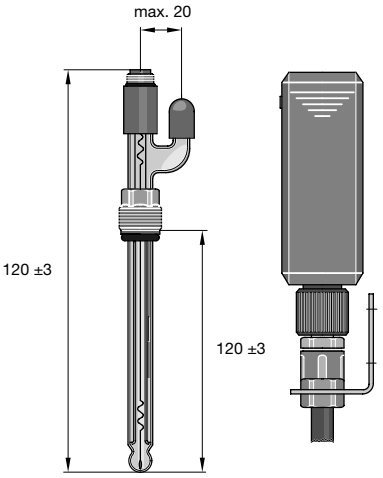
pk_6_007

PHEF 012 SE

HF

pH range: 1-12
Temperature: 32-122 ºF (0-50 °C)
Max.pressure: 100 psi/7 bar
Min.conductivity: >150 µS/cm
Diaphragm: HDPE ring diaphragm, flat (Double Junction)
Glass membrane: flat membrane glass, largely resistant to hydrofluoric acid solutions
Electrode shaft: epoxy
Typical applications: achieves a significantly longer service life in hydrofluoric acidic fluids as compared to standard pH electrodes, e.g. in wastewaters from the chip industry or electroplating applications.
The electrode is protected against dirt by the flat glass membrane and the circumferential flat PE diaphragm.

	Part No.
PHEF 012 SE	1010511



pk_6_021

PHEN 112 SE

pH range: 1-12
Temperature: 32-176 ºF (0-80 °C)
Max. pressure: Atmospheric pressure
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
KCl electrolyte, refillable
Installation Length: 4.72“ (120 ±3 mm)
Typical applications: Waste water
Supplied without PE storage container and tubing

		Part No.
PHEN 112 SE		305090
Accessories:		
PE storage container with connectors and tubing		305058
We recommend installation approx. 1.5 - 3 ft. (0.5-1 m) above sample fluid level		
KCl solution 3 molar	250 ml	791440
KCl solution 3 molar	1000 ml	791441

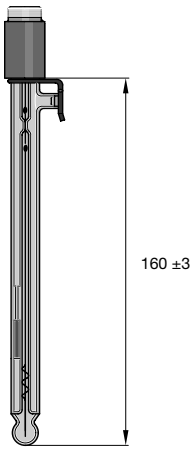
PHEN 112 SE 3D

As PHEN 112 SE but
Min. conductivity: >50 µS/cm
Diaphragm: 3 ceramic diaphragms
Typical applications: As PHEN but for lower conductivity

	Part No.	
PHEN 112 SE 3D	150078	**PHEN 012 SL**

pH range: 0-12
Temperature: 32-176 °F (0-80 °C)
Max. pressure: Atmospheric pressure operation
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
KCl electrolyte, refillable
No internal mounting thread
Typical applications: Manual measurement in laboratory

	Part No.	
PHEN 112 SL	305078	**PHEN 012**



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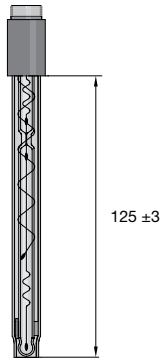
SL 3D

As above but
Min. conductivity: >50 µS/cm
Diaphragm: 3 ceramic diaphragms
Typical applications: Laboratory, lower conductivity

	Part No.
PHEN 112 SL 3D	791508



pk_6_023

PHEK 112 SE

pH range 1-12
Temperature: 32-140 °F (0-60 °C)
Max. pressure: Atmospheric pressure operation
Min. conductivity: >150 µS/cm
Diaphragm: Glass fiber
No internal mounting thread, plastic shaft
Typical applications: Hand-held measurement in swimming pool, potable water

	Part No.
PHEK 112 SE	305051

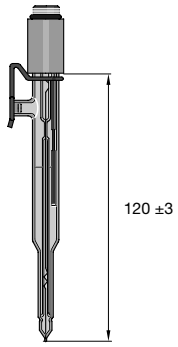
PHEK-L 112 SE

pH range 1-12
Temperature: 32-140 °F (0-60 °C)
Max. pressure: 44 psi
Min. conductivity: 150 µS/cm
Diaphragm: Ceramic
Shaft material: Polycarbonate
Installation dimensions: length:120mm, diameter: 12mm
Installation position: vertically to horizontal (0-90°)
Typical applications: swimming pool at elevated sample pressures, drinking water, slightly contaminated industrial water and wastewater, aquariums.

	Part No.
PHEK-L 112 SE	1034918

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6



pk_6_025

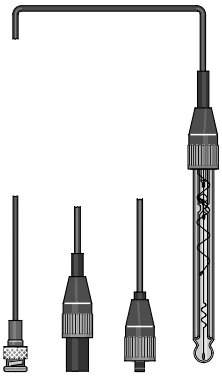
PHEE 112 S

pH range: 1-12
Temperature: 32-140 ºF (0-60 °C)
Max. pressure: Atmospheric pressure operation
Diaphragm: 3 ceramic diaphragms
No internal mounting thread
Typical applications: pH measurement in foodstuffs, e.g. meat, cheese
non sterilisable

	Part No.
PHEE 112 S	791094
Accessories	
Cleaning fluid Pepsin/hydrochloric acid 250 ml	791443

pH Combination Sensors with Fixed Cable

The fixed cable electrodes with threaded male adapter, type - FE are fitted with a rotating threaded sleeve. This facilitates installation in inline probe housings because you rotate only the threaded sleeve and not the whole electrode when installing.



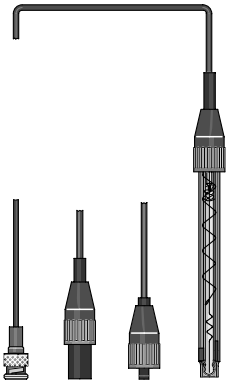
pk_6_024

Type PHE 112 F

pH combination probes, gel-filled, with fixed coax cable and device plug, no internal thread.

Type	Cable length	Device plug	Part No.
PHE 112 F 301 S	3.3 ft. (1 m)	SN6	304976
PHE 112 F 501 D	3.3 ft. (1 m)	DIN	304978
PHE 112 F 301 B	3.3 ft. (1 m)	BNC	304980
PHE 112 F 303 B	9.8 ft. (3 m)	BNC	304981

Further types on request.



pk_6_027

Type PHEK 112 F

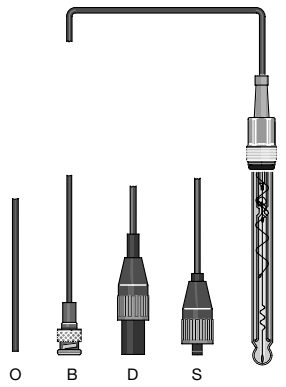
pH combination probe with plastic shaft, glass stem, fixed coax cable and connector, no internal thread.

Type	Cable length	Device plug	Part No.
PHEK 112 F 301 S	3.3 ft. (1 m)	SN6	304994
PHEK 112 F 501 D	3.3 ft. (1 m)	DIN	304995
PHEK 112 F 301 B	3.3 ft. (1 m)	BNC	304996

Further types on request.

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With Fixed Cable

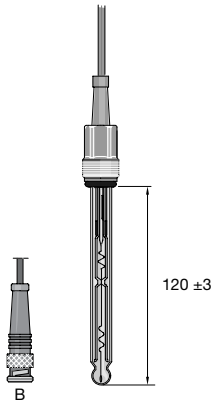


pk_6_028

Type PHE 112 FE

Type	Cable length	Device plug	Part No.
PHE 112 FE 303 S	9.8 ft. (3 m)	SN6	304984
PHE 112 FE 310 S	32.8 ft. (10 m)	SN6	304985
PHE 112 FE 503 D	9.8 ft. (3 m)	DIN	304986
PHE 112 FE 303 B	9.8 ft. (3 m)	BNC	304988
PHE 112 FE 310 O	32.8 ft. (10 m)	without	304990

Further types on request.



pk_6_030

pk_6_029

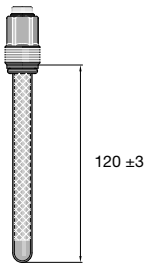
Type PHED 112 FE

Type	Cable length	Connector	Part No.
PHED 112 FE 303 B	9.8 ft. (3 m)	BNC	741038

Further types on request.

ProMinent® DULCOTEST® Sensors

Temperature Sensors



pk_6_026

Temperature range: 0…100 °C
Max. pressure: 10 bar
Typical applications: Temperature measurement and pH temperature correction

	Part No.
Pt 100 SE	305063
Pt 1000 SE	1002856

ORP Identcode Description

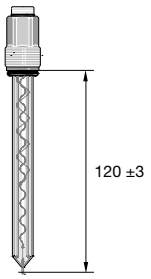
Aid to selection of Redox electrodes see page 6

Identity Code Description (Type description)

RHEX Pt SE

- ORP-combination probe
  - **X**: with solid electrolyte and circular gap diaphragm
  - **K**: with strong plastic shaft
  - **P**: pressure tight to 87 psi (6 bar)
  - **R**: with PTFE ring diaphragm
  - **N**: refillable KCl electrode
  - **S**: swimming pool electrode
  - unspecified: standard gel-filled electrode
- **Pt:** Platinum electrode (pin)
  - **Au:** Gold electrode (pin)
- **E**: internal mounting thread PG 13.5
  - **S**: connector for SN6 coax plug

ORP Combination Sensors With SN6



pk_6_031

RHE-Pt-SE

Temperature: 32-140 °F (0-60 °C)
Max. pressure: 7.3 psi (0.5 bar)
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Swimming pool, atmospheric pressure installation, potable water, lightly contaminated water

	Part No.
RHE-Pt-SE	305001

RHES-Pt-SE

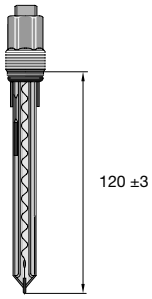
As RHE-Pt-SE but max. pressure 43.5 psi (3 bar)

Typical use: swimming pools during pressurisation, drinking water, slightly fouled industrial and wastewater

	Part No.
RHES-Pt-SE	150703

ProMinent® DULCOTEST® Sensors

ORP Combination Sensors With SN6



pk_6_035

RHEP-Pt-SE

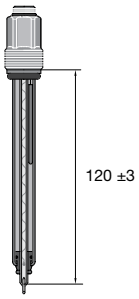
Temperature: 32-176 °F (0-80 °C)
Max. pressure: 87 psi (6 bar)
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
Installation length: 4.72“ (120 ±3 mm)
Mounting hole: min. Ø 0.57“ (14.5 mm)
For installation in DGM (delivered before 1997) the assembly kit (Part No. 791219 has to be ordered additionally.
Typical applications: Swimming pools under pressure, potable and industrial water, lightly soiled wastewater, the electroplating and chemical industries, for higher temperatures and pressures.
Not suitable for media containing ozone

	Part No.
RHEP-Pt-SE	150094

RHEP-Au-SE

Technical data as type RHEP-Pt-SE, but with gold pin electrode.
Typical application: cyanide detoxification, ozone monitoring.
Not suitable for media containing chlorine

	Part No.
RHEP-Au-SE	1003875

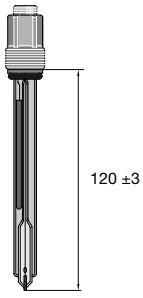


pk_6_034

RHER-Pt-SE

Temperature: 32-176 °F (0-80 °C)
Max. pressure: 87 psi (6 bar)
Min. conductivity: >50 µS/cm
Electrolyte with KCl supplement (salt rings in the reference electrolyte)
Diaphragm: PTFE ring diaphragm
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Municipal and industrial waste water, drinking and industrial water, chemical industry, paper manufacture, food industry. General, for water with distinct suspended solid content.

	Part No.
RHER-Pt-SE	1002534



pk_6_033

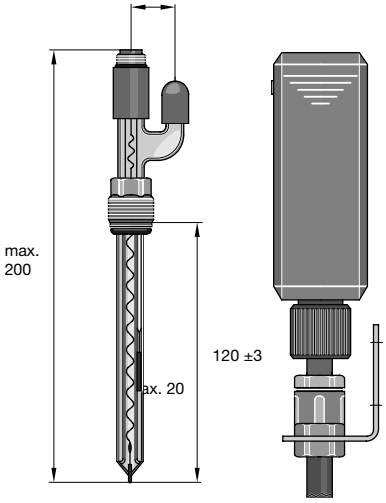
RHEX-Pt-SE

Temperature: 32-212 °F (0-100 °C)
Max. pressure: 232 psi (16 bar) at77 °F (25 °C); 87 psi (6 bar) at 212 °F (100 °C)
Min. conductivity: >500 µS/cm
Diaphragm: circular gap (solid electrolyte)
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Waste water, industrial water, process chemistry, emulsions, suspensions, fluids containing protein and sulphide (not chlorine/fluoride or when subject to temperature fluctuations). General, for water with high suspended solid content.
Not suitable for clear media

	Part No.
RHEX-Pt-SE	305097

ProMinent® DULCOTEST® Sensors

ORP Combination Sensors With SN6

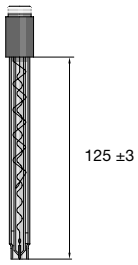


pk_6_032

RHEN-Pt-SE

Temperature: 32-176 °F (0-80 °C)
Max. pressure: Atmospheric pressure operation
Min. conductivity: >150 µS/cm
Diaphragm: Ceramic
KCl electrolyte, refillable
Installation length: 4.72“ (120 ±3 mm)
Typical applications: Waste water
Supplied without PE storage container and tubing

		Part No.
RHEN-Pt-SE		305091
Accessories:		
PE storage container with connectors and tubing		305058
We recommend installation approx. 1.6 - 3.3 ft. (0.5-1 m) above sample fluid level.		
KCl solution 3 molar	250 ml	791440
KCl solution 3 molar	1000 ml	791441

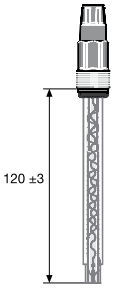


pk_6_036

RHEK-Pt-S

Temperature: 32-140 °F (0-60 °C)
Max. pressure: Atmospheric pressure operation
Min. conductivity: >150 µS/cm
Diaphragm: Glass fibre
No internal thread
Typical applications: Manual measurements of e.g. swimming pool, potable water etc.

	Part No.
RHEK-Pt-S	305052

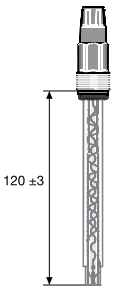


pk_6_091

RHEK-Pt-SE

Temperature: 32-140 °F (0-60 °C)
Max. pressure: 44 psi (3.0 bar)
Min. conductivity: 150 µS/cm
Diaphragm: Ceramic
Thread: PG 13.5
Typical applications: Swimming pool at elevated sample water pressures, drinking water, lightly contaminated waste water.

	Part No.
RHEK-Pt-SE	1028459



pk_6_091

RHEK-L-Pt-SE

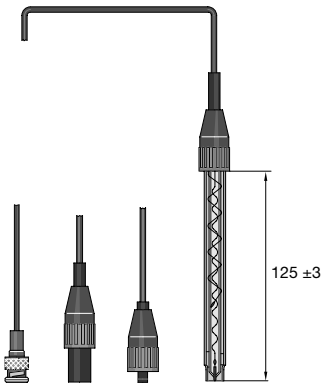
Temperature: 32-140 °F (0-60 °C)
Max. pressure: 44 psi (3.0 bar)
Min. conductivity: 150 µS/cm
Diaphragm: Ceramic
Electrode shaft: Polycarbonate
Dimensions: length: 120mm, diameter 12mm
Installation position: vertically to horizontally (0-90°)
Thread: PG 13.5
Typical applications: swimming pool at elevated sample water pressures, drinking water, slightly contaminated wastewater.

	Part No.
RHEK-L-Pt-SE	1034919

pk_6_037

ProMinent® DULCOTEST® Sensors

ORP Combination Sensors With Fixed Cable



Type RHE-Pt-FE

ORP combination probes with Pt electrode probe gel-filled, with glass shaft, internal mounting thread PG 13.5 with fixed coax cable and device plug.

Type	Cable length	Connector	Part No.
RHE-Pt-FE 310 B	32.8 ft. (10 m)	BNC	304993

Type RHE-Pt-F

As above but without internal mounting thread.

Type	Cable length	Connector	Part No.
RHE-Pt-F 303 B	9.8 ft. (3 m)	BNC	304983

Type RHK-Pt-F

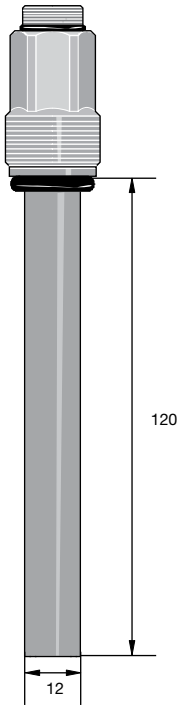
ORP combination probes with plastic shaft, Pt electrode with cover.

Fixed coax cable and device plug, no internal mounting thread.

Type	Cable length	Connector	Part No.
RHEK-Pt-F 301 S	3 ft. (1 m)	SN6	304997
RHEK-Pt-F 501 D	3 ft. (1 m)	DIN	304998

ProMinent® DULCOTEST® Sensors

Fluoride Sensors



pk_6_095

DULCOTEST® fluoride electrodes are ion-selective electrodes based on the potentiometic measurement principle. They are designed for determining the concentration of fluoride anions in aqueous solutions. These electrodes have been optimised for use in monitoring the fluoridation of potable water in waterworks. Corresponding conditions must be observed. 5.1.16 shows a complete measuring station.

FLEP 010

A 4-20 mA measurement transducer, a reference electrode and a temperature sensor for temperature compensation are required as well as the fluoride electrode.Measured variable: Fluoride ion concentration

Reference method:	photometric, see section 5.4.5: DT2A and DT2B photometers
Measurement range with measurement transducer:	0.05-10.00 mg/l
pH range:	5.5-9.5
Temp. range:	34-95 ºF (1-35 °C)
Max. Pressure:	100 psi (no pressure surges)
Intake flow:	recommended 5.3 gph (20 l/h): 2.6-26.4 gph (10 - 200 l/h)
Conductivity range:	> 100 µS/cm
Response time T95 (open):	< 30 s (for conc. > 0.5 ppm)
Enclosure rating:	IP 65
Shelf life:	approx. 6 months
Length when fitted:	4.72“ (120 mm)
Shaft diameter:	0.472“ (12 mm)
Typical application:	monitoring the fluoridation of potable water
Measurement and control equipment:	D1C
in-line probe housing:	DLG IV

	Part No.
FLEP 010 (fluoride sensor)*	1028279

Accessories

4-20 mA measurement transducer FPV1**	1028280
Sensor cable	725122
Reference electrode, REFP-SE	1018458
Temperature sensor, Pt 100	305063
Polishing paste	559810

* replaces flouride sensor (part no. 1010311)

** replaces transducer (part no. 1009962)

ProMinent® DULCOTEST® Sensors

Overview: Amperometric Sensors

For optimum functioning of chlorine, bromine, chlorine dioxide, chlorite, peracetic acid, hydogen peroxide and ozone measuring sensors please note the following guidelines:

- Use DULCOMETER® measurement and control systems.
- Install only in ProMinent® DGM or DLG III 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 sensors 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:

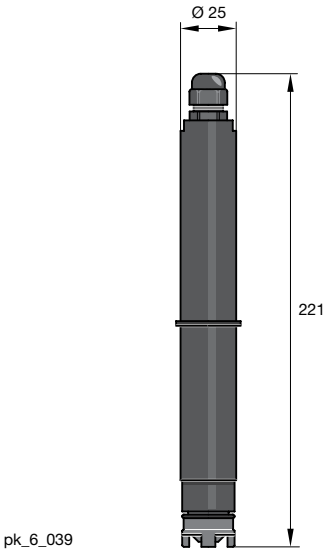
- High zero point stability
- Compact design
- Integrated temperature correction
- Simple to install
- Simple to maintain
- Short warm up period time
- Measurement signal virtually unaffected by flow

Chlorine Sensors

Chlorine dissolved in water is present in different forms:

Free (active) chlorine:	Cl_2, 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: DPD1).
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 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.

Chlorine Sensors



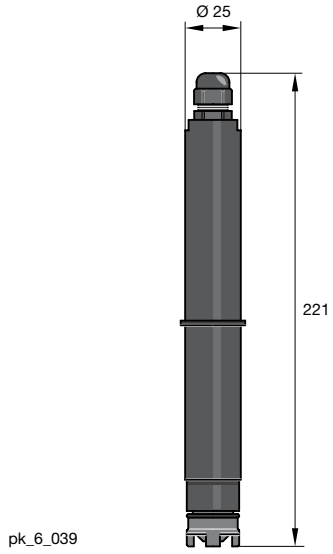
pk_6_039

Measurement of free chlorine

CLE 3-mA

Measured variable:	**Free chlorine (hypochlorus acid HOCl)**
Analysis:	DPD 1
pH range:	5.5-8.0 (up to pH 8.5 with D1C pH correction)
Temperature range:	41-113 °F (5-45 °C) temperature compensated
Max. pressure:	14.5 psi (1 bar)
Flow:	7.9-14.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (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-2/5/10 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, DLG III

	Part No.
CLE 3-mA-0.5 ppm set, with 100 ml electrolyte	792927
CLE 3-mA-2 ppm set, with 100 ml electrolyte	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 kpl. with 100 ml electrolyte	1022786



pk_6_039

CLE 3.1-mA

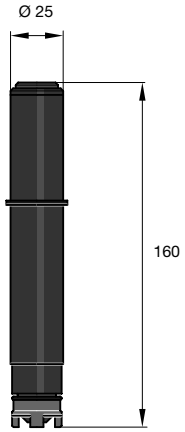
Measured variable:	**free chlorine (hypochlorous acid HOCl) where there is a high rate of combined chlorine and/or in the case of pH values up to 8.5 (with D1C pH correction)**
Reference method:	DPD1
Measurement range:	0.01-0.50 mg/l (CLE 3.1-mA-0.5 ppm) 0.02-2.00 mg/l (CLE 3.1-mA-2 ppm) 0.01-5.00 mg/l (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 with D1C pH correction)
Temp. range:	41-113 °F (5-45 °C) temperature compensated
Max. pressure:	14.5 psi (1 bar)
Inflow:	7.9-14.9 gph (30-60 l/h) in the DGM or DLG III
Supply voltage:	16-24 V DC (two wire technology)
Output signal:	4-20 mA = measurement range (uncalibrated) **Important:** not electrically isolated!
Typical applications:	swimming pool, industrial and process water with higher proportions of combined chlorine and/or higher pH values to pH 8.5
Measurement and control equipment:	D1C, D2C, DULCOMARIN®
In-line probe housing:	DGM, DLG III

	Part No.
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

Signal leads, see sensor accessories, section 6.5.1

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



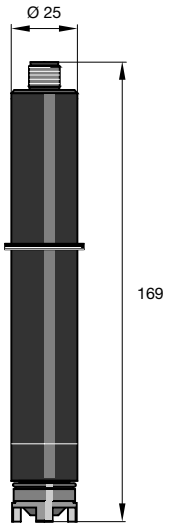
pk_6_042

CLE 2.2-4P

Measured variable:	**Free chlorine, (hypochlorous acid HOCl)**
Reference method:	DPD1
Measurement range:	0.1-20 mg/l
Remaining data as for CLE 3-mA	
Measurement and control devices:	D_4a (metering pump with integrated controller), CLWS
In-line probe housing:	DGM, DLG III

	Part No.
CLE 2.2-4P set, with 100 ml electrolyte	914958

Signal leads, see sensor technology accessories, chapter 6.5.1



pk_6_038

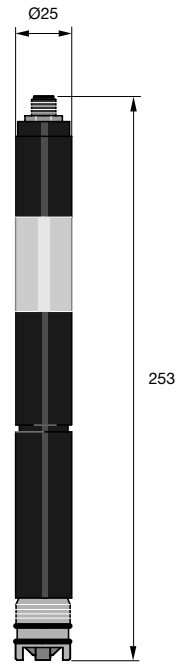
CLE 3-DMT

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
Temp. measurement:	Via integrated Pt 1000: compensation carried out in DMT
Measuring cell output:	5-pin plug
Other data as for CLE-3 mA.	

	Part No.
CLE 3-DMT-5 ppm set with 100 ml electrolyte	1005511
CLE 3-DMT-50 ppm set with 100 ml electrolyte	1005512

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.Signal leads, see sensor technology accessories, chapter 6.5.1



pk_6_096

CLE 3-CAN

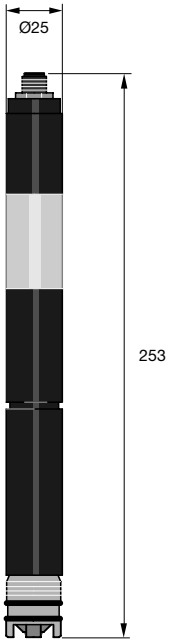
Sensors for connection to a CAN interface (e.g. DULCOMARIN® II swimming pool controller)

Measured variable:	**free chlorine (hypochlorous acid)**
Reference method:	DPD 1
Measurement range:	0.01 -10 mg/l
Power supply:	via CAN interface (11-30 V)
Temperature measurement:	via installed digital semiconducter element
Output signal:	uncalibrated, temperature compensated, electrically isolated
Compatibility:	CAN-Open bus systems
Additional data see CLE 3-mA	

	Part No.
CLE 3-CAN-10 ppm set with 100 ml electrolyte	1023425

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

Chlorine Sensors



pk_6_096

CLE 3.1-CAN

Sensor for connection to a CAN interface (e.g. DULCOMARIN® II swimming pool controller)

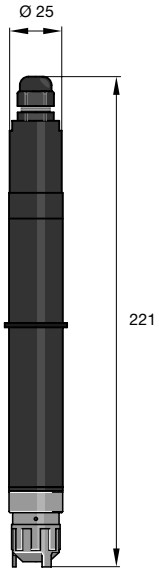
Measured variable:	**free chlorine (hypochlorous acid) with high proportion of bound chlorine and/or pH value up to 8.5 (with pH correction via D1C)**
Reference method:	DPD 1
Measurement range:	0.01 -10 mg/l
Power supply:	via CAN-interface (11-30 V)
Temperature measurement:	via installed digital semiconducter element
Output signal:	uncalibrated, temperature compensated, electrically isolated
Compatibility:	CAN-Open bus systems

Additional data see CLE 3.1-mA

	Part No.
CLE 3.1-CAN-10 ppm set with 100 ml electrolyte	1023426

Note: You require assembly kit Part No. 815079 for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

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

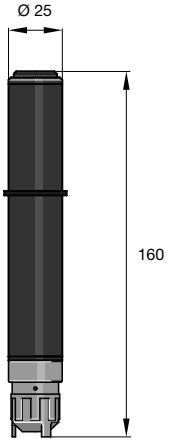


pk_6_040

CGE 2-mA

Measured variable:	**Total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine**
Reference method:	DPD1
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:	41-113 ºF (5-45 °C) temperature compensated
Max. pressure:	43.5 psi (3 bar)
Flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (un-calibrated) **Warning:** no electrical isolation!
Typical applications:	Swimming pools and in water with high pH-value
Measurement and control devices:	D1C, D2C, DULCOMARIN®
In-line probe housing:	DGM, DLG III

	Part No.
CGE 2-mA-2 ppm set, with 50 ml electrolyte	792843
CGE 2-mA-10 ppm set, with 50 ml electrolyte	792842



pk_6_041

CGE 2-4P-10 ppm

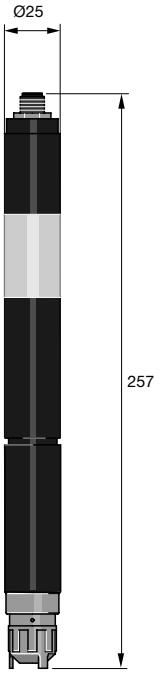
Measured variable:	**Organic combined chlorine and free chlorine**
Reference method:	DPD1
Measurement range:	0.1-10.0 mg/l

Remaining data as for CGE 2-mA

Measurement and control devices:	D_4a (metering pump with integrated controller)
In-line probe housing:	DGM, DLG III

	Part No.
CGE 2-4P-10 ppm set, with 50 ml electrolyte	792838

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.



pk_6_084

CGE 2-CAN

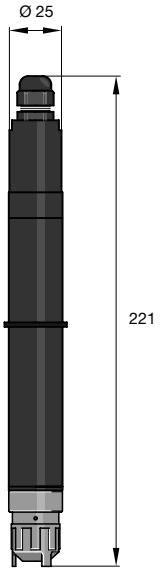
Probe for connection to a CANopen interface (e.g. DULCOMARIN® II swimming pool controller)

Measured variable:	**total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine**
Reference method:	DPD1
Range:	0.01-10.00 ppm
pH range:	5.5-9.5
Temp. range:	5-45 °C (temperature compensated)
Max. pressure:	3 bar
Incident flow;	30-60 l/h (with DGMa or DLG III)
Supply:	via CAN interface (11-30 V)
Temperature measurement:	via built-in digital semiconductor device
Output signal:	calibrated, temperature-compensated, electrically-isolated
Compatibility:	CANopen bus systems

See CGE 2-mA for other information

	Part No.
CGE 2-CAN-10 ppm c/w with 100 ml of electrolyte	1024420

Note: a mounting kit (Part No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.



pk_6_040

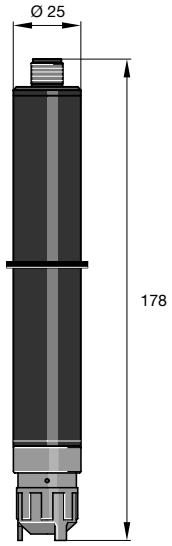
Measured variable of total chlorine

CTE 1-mA

Measured variable:	**total chlorine**
Reference method:	DPD4
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 (temperature compensated)
Max. pressure:	3 bar
Flow:	30…60 l/h (in DGM or DLG III)
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, process, industrial and cooling water. In swimming pools in combination with CLE 3.1 for determining combined chlorine.
Measurement and control devices:	D1C, DULCOMARIN® (2/10 ppm only)
In-line probe housing:	DGM, DLG III

	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

Chlorine Sensors



pk_6_015

CTE 1-DMT

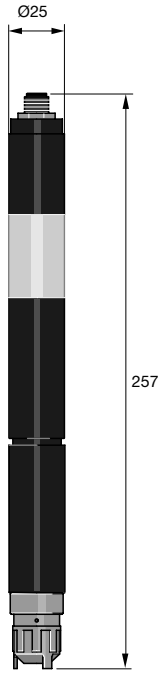
Measuring cell for use with the DMT “chlorine” measurement transducer.

Measured variable:	**Total chlorine**
Reference method:	DPD4
Measurement range:	0.01-10.0 mg/l
Power supply:	From the DMT measurement transducer (3.3 VDC)
Output signal:	Un-calibrated, not temperature compensated
Temperature measurement:	Via integrated Pt 1000: compensation carried out in DMT
Sensor output:	5-pin plug

Other data as for CTE 1 mA

	Part No.
CTE 1-DMT-10 ppm set with 50 ml electrolyte	1007540

Note: An assembly set 815079 is required for DLG III for initial installation of chlorine measuring cells.Signal leads, see sensor technology accessories, chapter 6.5.1



pk_6_084

CTE 1 -CAN

Sensor for connection to a CAN interface (e.g. DULCOMARIN® II swimming pool controller)

Measured variable:	**total chlorine**
Reference method:	DPD 4
Measurement range:	0.01 -10 mg/l
Power supply:	via CAN interface (11-30 V)
Temperature measurement:	via installed digital semiconducter element
Output signal:	uncalibrated, temperature compensated, electrically isolated
Compatibility:	CAN-Open bus systems

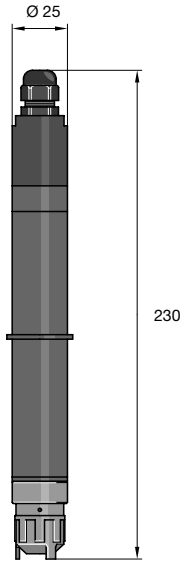
Additional data see CLE 3-mA

	Part No.
CTE 1-CAN-10 ppm set with 100 ml electrolyte	1023427

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine-sensors into the DLM III in-line probe housing

ProMinent® DULCOTEST® Sensors

Bromine Sensors



pk_6_074

The following bromating agents are used as disinfectants:

organic bromating agent

a) DBDMH (1.3-dibrom-5.5-dimethyl-hydantoin) e. g. sold as Albrom 100®

b) 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.

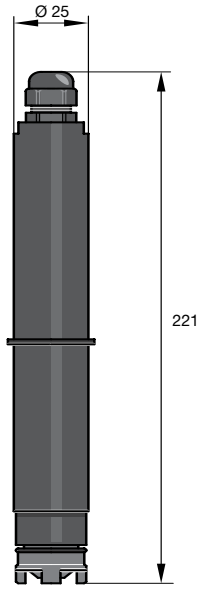
Bromine measured variable

Measured variable:	**Total available bromine (free and organic bound 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 pH 7 changes to pH 8 the sensor sensitivity is reduced accordingly a) in the case of DBDMH and free bromine by approx. 10 % b) in the case of BCDMH by approx. 25 %
Temperature range:	5-41-113 °F (45 °C)
Max. pressure:	43.5 psi (3 bar)
Sample flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Voltage:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (not calibrated) **Warning:** not electrically isolated!
Typical applications:	Swimming pools / whirlpools and cooling water; can also be used in seawater
Measurement and control device:	D1C-bromine
In-line probe housing:	DGM, DLG III

	Part No.
BRE 1-mA-2 ppm kit with 50 ml electrolyte Measurement range relates to BCDMH	1006894
BRE 1-mA-10 ppm kit with 50 ml electrolyte Measurement range relates to BCDMH	1006895
BRE 2-mA-10 ppm kit with 50 ml electrolyte Measurement range relates to DBDMH, free bromine	1020529
BRE 1-mA-0.5 ppm kit with 50 ml electrolyte	1033390
BRE 2-mA-2 ppm kit with 50 ml electrolyte	1033391

Note: Requires assembly kit (Part No. 815079) for the initial installation of the bromine sensors into the DLM III in-line probe housing.Signal leads, see sensor technology accessories.

Chlorine Dioxide Sensors



pk_6_039

CDE 2-mA

Measured variable:	**Chlorine dioxide (ClO_2)**
Reference method:	DPD1
Measurement range:	0.01 - 0.50 mg/l (CDE 2-mA-0.5 ppm) 0.02-2.00 mg/l (CDE 2-mA-2 ppm) 0.1-10.0 mg/l (CDE 2-mA-10 ppm)
Cross sensitivity:	to chlorine <2 %
pH range:	ClO_2 stability range
Temperature range:	5-41-113 °F (45 °C) temperature compensated, no significant temperature fluctuations
Max. pressure:	14.5 psi (1 bar)
Flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (un-calibrated) **Warning:** no electrical isolation!
Typical applications:	Potable, industrial, process water (surfactant free)
Measurement and control device:	D1C
In-line probe housing:	DGM, DLG III

	Part No.
CDE 2-mA-0.5 ppm set, with 100 ml electrolyte	792930
CDE 2-mA-2 ppm set, with 100 ml electrolyte	792929
CDE 2-mA-10 ppm set, with 100 ml electrolyte	792928

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

CDE 2.1-mA

Technical data:	as Type CDE 2-mA, but max. temperature 60 °C
Typical application:	chlorine dioxide treatment to combat legionella

CDE 2.1-mA

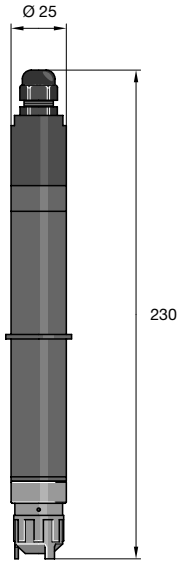
0.5 ppm comes complete with 100 ml of electrolyte

Order on request

Note: a mounting kit (Part No. 815079) is required for the initial installation of the chlorineprobe in the DLG III in-line probe housing.

ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensors



pk_6_047

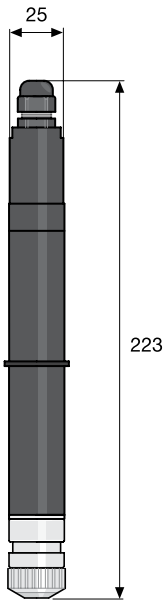
CDP 1-mA-2 ppm (ClO_2-process probe)

Applications:	Bottle washing machines and water containing surfactants
Measured variable:	**Chlorine dioxide (ClO_2)**
Reference method:	DPD1
Measurement range:	0.02-2.00 mg/l
pH range:	5.5-10.5
Temperature range:	50-113 °F (10-45 °C) short term periods 131 °F (55 °C) with **external temperature correction** via **Pt 100** (no internal temperature correction!)
Temperature variation speed:	Up to 10 K/min
Max. pressure:	43.5 psi (3 bar) no pressure surges
Flow:	7.9-15.9 gph (30-60 l/h) in DGM
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.

	Part No.
CDP 1-mA-2 ppm set with 100 ml electrolyte	1002149

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine dioxide sensors into the DLM III in-line probe housing.

Chlorine Dioxide Sensors



pk_6_083

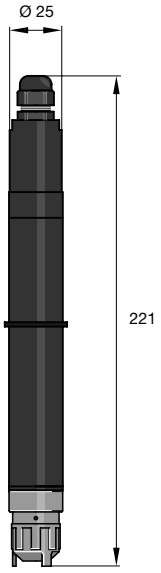
CDR 1-mA-2 ppm

Measured variable:	**Chlorine dioxide (ClO_2)**
Reference method:	DPD1
pH range:	1-10
Temperature range:	1-131 °F (-17-7 °C) short term periods 140 °F (60 °C)
Max. pressure:	44 psi (3 bar) no pressure surges
Respones time T_{90}:	2-3 min
Intake flow:	8-16 gph (30-61 l/h)
Supply Voltage:	16-24 VDC
Output signal:	4-20 mA (temperature compensated, not calibrated)
Measuring and control device:	D1C
In line probe housing:	DGMa / DLGIII

	Measuring ranges	Part No.
CDR 1-mA-0.5 ppm	0.01-0.50 ppm	1033762
CDR 1-mA-2 ppm	0.02-2.00 ppm	1033393
CDR 1-mA-10 ppm	0.01-10 ppm	1033404

ProMinent® DULCOTEST® Sensors

Chlorite Sensors



pk_6_040

Measured variable chlorite CLT 1-mA

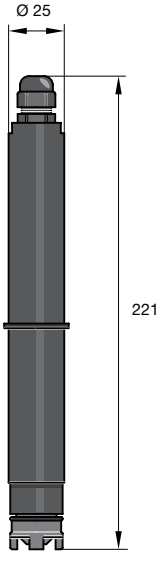
Measured variable:	**chlorite anion (ClO_2^-)**
Reference method:	DPD method Chlorite in presence of chlorine dioxide
Measurement range:	0.020-0.500 mg/l (CLT 1-mA-0.5 ppm) 0.10-2.00 mg/l (CLT 1-mA-2 ppm)
pH range:	6.5-9.5
Temp. Range:	33.8-104 °F (1-40 °C) temperature compensated
max. pressure:	1 bar
Intake flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (two-wire)
Output signal:	4-20 mA = measurement range (uncalibrated) **Important** not electrically isolated!
Model Use:	Monitoring potable water treated with chlorine dioxide or similar. Selective measurement of chlorite in presence of chlorine dioxide, chlorine and chlorate is also possible.
Measurement and control equipment:	D1C
In-line probe housing:	DGM, DLG III

	Part No.
CLT 1-mA-0.5 ppm set with 50 ml electrolyte	1021596
CLT 1-mA-2 ppm set with 50 ml electrolyte	1021595

Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorite sensors into the DLM III in-line probe housing. A complete panel-mounted system with D1C-operating languages: E, F, P., I is shown in section 5.1.16.

We recommend the DT4 photometer for calibration of the chlorite sensor.

Ozone Sensors



pk_6_039

OZE 3-mA

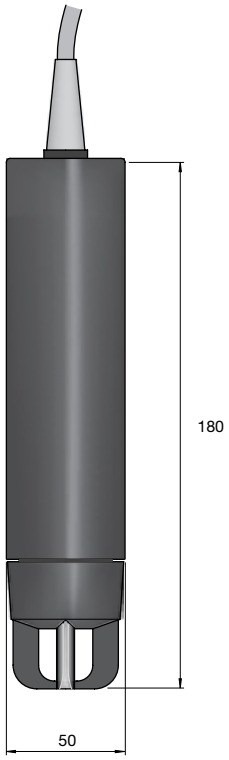
Measured variable:	**Ozone (O_3)**
Reference method:	DPD4
Measurement range:	0.02-2.00 mg/l
pH range:	Ozone stability range
Temperature range:	41-104 °F (5-40 °C) temperature compensated, no significant Temperature fluctuations
Max. pressure:	1 bar
Flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power 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 , DLG III

	Part No.
OZE 3-mA-2 ppm set, with 100 ml electrolyte	792957

Note: You require assembly kit Part No. 815079 for the initial installation of the ozone sensors into the DLM III in-line probe housing.

ProMinent® DULCOTEST® Sensors

Dissolved Oxygen Sensors



pk_6_050_1

The measured variable “dissolved oxygen” gives the quantity of the gaseous physical dissolved oxygen in its aqueous phase in mg/l (ppm).

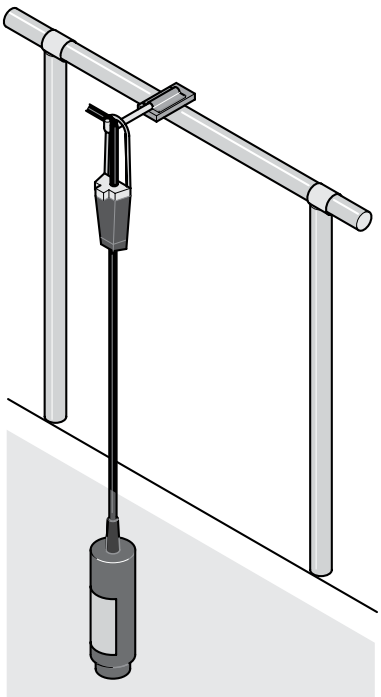
The “dissolved oxygen” is thereby an important parameter for controlling the quality of surface water and water which needs to be oxygenated for use in aqua culture and aqua zoos. The dissolved oxygen is also used to control processes in sewage plants and waterworks.

The following sensors are assigned to the different applications and can be supplied separately as 4-20 mA-transmitters to central controllers or together with the D1C as a stand alone solution (measured variable: “dissolved oxygen”: X. s. chapter 5).

DO 1-mA

Measured variable:	**dissolved oxygen**
Calibration:	of oxygen in air
Measurement range:	0-20 mg/l
Reproducibility of measurement:	± 0.5 % of measurement limit value
Temp. range:	32-122 °F (0 -50 °C)
Max. pressure:	14.5 psi (1 bar)
Velocity of sample water:	minimum: 0.16 ft./s (0.05 m/s)
Enclosure rating:	IP 68
Power supply:	12-30 V DC
Output signal:	4-20 mA. Measurement range calibrated, temperature corrected and electrically isolated
Process integration:	a) immersion, suspended on cable with or without mountain bracket for cable (see accessories. section. 6.5.5) b) Immersion of immersion pipe 1. Immersion pipe with 1.97“ (50 mm) outside diameter and 1-1/4“ (31.75 mm) internal thread (provided by the customer). Connection via immersion pipe adapter (see accessories, section. 6.5.5). 2. PVC immersion pipe with 1.97“ (50 mm) outside diameter (provided by the customer). Connection via standard PVC adhesive union (provided by the customer). c) In-flow operation to order
Typical applications	Fish and shrimp farming. Conditioning of water in large aquaria in zoological systems. Control of oxygen input in waterworks Appraisal of the biological status of surface waters

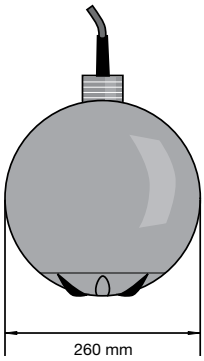
	Part No.
DO 1-mA-20 ppm	1020532



pk_6_011

ProMinent® DULCOTEST® Sensors

Dissolved Oxygen Sensors

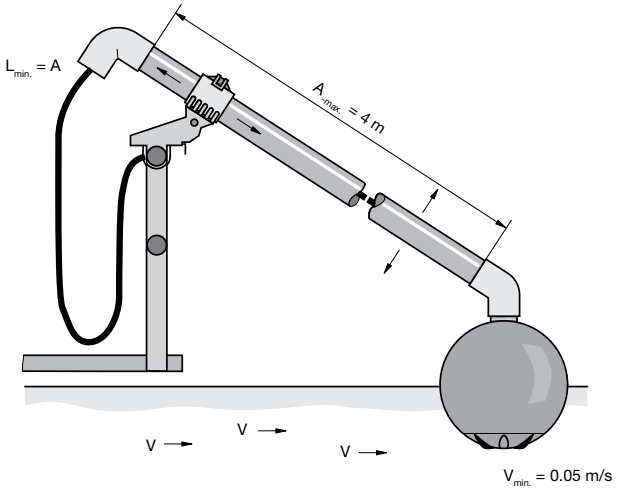


pk_6_051

DO 2-mA

Measured variable:	dissolved oxygen
Calibration:	of oxygen in air
Measurement range:	0-10 mg/l
Reproducibility of measurement:	± 0.5 % of measurement limit value
Temp. Range:	32-122 ºF (0 -50 °C)
Max. pressure:	14.5 psi (1 bar)
Velocity of sample water:	minimum: 0.16 ft./s (0.05 m/s)
Enclosure rating:	IP 68
Supply voltage:	12-30 V DC
Output signal:	4-20 mA. Measurement range calibrated, temperature corrected and electrically isolated
Process integration:	as float with venturi grooves to increase the flow of sample water for the self-cleaning of the sensor part. Supplied with adapter for connection to PVC-pipes with outside diameter: 1.97“ (50 mm) and railing bracket, also for PVC pipes with outside diameter: 1.97“ (50 mm) (see accessories section.6.5.5). The customer must provide the straight PVC tube and a 45 ° standard elbow for gluing to PVC pipes (outside diameter 50 mm).
Typical application	Control of the oxygen input in activated sludge pools (sewage plant) for the purpose of energy conservation

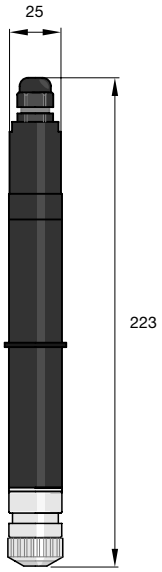
	Part No.
DO 2-mA-10 ppm	1020533



pk_6_012

ProMinent® DULCOTEST® Sensors

Peracetic Acid Sensors



pk_6_083

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).

PAA 1-mA

Measured variable:	**peracetic acid**
Reference method:	titration
Measurement range	10-200 mg/l (PAA 1-mA-200 ppm) 100-2000 mg/l (PAA 1-mA- 2000 ppm)
pH range:	1-9 (peracetic acid stability range)
Temp. range:	33.8113 ºF (1-45 °C) temperature compensated
Admissible temperature fluctuation:	0.3 °/min
Response time T_{90}	3 min.
Max. Pressure.:	14.5 psi (3 bar) at 86 ºF (30 °C), in DGM
Intake flow:	7.9-15.9 gph (30- 60 l/h) with DGM or DLG III in-line probe housing
Power supply	16-24 V DC (two wire)
Output signal:	4-20 mA measurement range (uncalibrated) **Important** not electrically isolated
Typical application:	scouring in Cleaning in Place (CIP) and rinsing systems, also designed for use in the presence of cationic and anionic tensides. Selective measurement of peracetic acid as well as hydrogen peroxide is possible.
Measurement and control equipment:	D1C
In-line probe housing:	DGM, DLG

	Part No.
PAA 1-mA-200ppm	1022506
PAA 1-mA-2000ppm	1022507

ProMinent® DULCOTEST® Sensors

Hydrogen Peroxide Sensors

The DULCOTEST® PEROX and PER1 probes are membrane-covered amperometric sensors for online determination of hydrogen peroxide concentration. Because it is totally biologically degradable, hydrogen peroxide is frequently used as a disinfectant and oxidant in water treatment and production:

- Chemical bleaching in the timber, paper, textile and mineral salt industries
- Organic synthesis in the chemical, pharmaceutical and cosmetics industries
- Oxidation of drinking water, landfill seepage water, contaminated ground water
- Disinfection of cooling water, service water and production water in the pharmaceutical and food and beverages industries, and in swimming pools
- Deodorisation (gas scrubber) in municipal and industrial wastewater purification plants
- Dechlorination in chemical processes

Sensors are selected using the following decision table:

Requirement	**Type**	
	PER1	**PEROX**
Probe matrix contaminated by dirt or chemicals	suitable due to impermeable diaphragm	more susceptible due to permeable diaphragm
Electrical interference due to interference potentials in the measured medium	immune as counter electrode is separated from process	more susceptible as counter electrode is in the medium
Temperature range	up to 122 °F (50 °C)	up to 104 °F (40 °C)
Ease of handling during installation and maintenance	suitable due to temperature compensation and transducer integrated in sensor	separate temperature sensor and transducer
Response time for H_2O_2 for fast control	sluggish T_{90} = 6-8 min	fast T_{90} = 20 s
Rapid temperature changes	sluggish due to integrated temperature sensor	fast due to separate temperature sensor
Long process cycles with no H_2O_2 present	unsuitable	suitable due to pulsed polarisation technology
Range can vary in phases by several orders of magnitude, or is not clear at time of ordering	selection of suitable sensor necessary	suitable as range can be manually selected at the sensor transducer
Cost per channel	lower	higher

ProMinent® DULCOTEST® Sensors

Hydrogen Peroxide Sensors

Operating conditions

Requirement	Type	
	PER1	**PEROX**
Measured variable	hydrogen peroxide	hydrogen peroxide
Calibration	photometric with DT4 hand-held photometer, see Chap. 5.4.4	photometric with DT4 hand-held photometer, see Chap. 5.4.4
Ranges	2.0-200.0 mg/l 20-2.000 mg/l different sensors	1-20, 10-200, 100-2000 selectable
pH range	2.5-11	2.5-10
Temperature	0-50 °C	0-40 °C (0-30 °C at > 1.000 ppm)
Permissible temperature changes	< 0.3 °C/min	< 1 °C/min (with external temp. measurement) see O.I.
Sensor response time	T_{90} approx. 480 sec	T_{90} approx. 20 sec
Reproducible accuracy	≥1 ppm or better than ± 5% of measured value	better than 5 % referred to range full scale value
Min. conductivity	0.05-5.00 mS/cm	with 20 mg/l range: 5 µS/cm 200 mg/l range: 200 µS/cm up to 1.000 mg/l: 500 µS/cm up to 2.000 mg/l: 1 mS/cm
Sampled water flow	5.3-26.4 gph (20-100 l/h) with DGMa	15.9 gph (60 l/h) recommended
Max. operating pressure	0-14.5 psi (0-1 bar)	29 psi (2 bar)
Supply	16-24 VDC (2-wire system)	16-24 VDC (3-wire system)
Output signal	4-20 mA, temperature compensated, uncalibrated, not electrically isolated	4-20 mA, temperature compensated, uncalibrated, not electrically isolated
Typical applications	swimming pool, treatment of contaminated wastewater, treatment of process media from production	treatment of clear and chemically uncontaminated water, control systems with necessarily short response times
Measurement and control device	D1Ca...H 7	D1Ca ...H 1
In-line probe housing	DGM, DLG	DGM, DLG

	Part No.
Perox sensor PEROX-H2.10-P	792976
Perox transducer PEROX-micro-H1.20-mA	741129
PER 1- mA - 200 ppm	1022509
PER - mA - 2000 ppm	1022510
PER 1- mA - 50 ppm	1030511

ProMinent® DULCOTEST® Sensors

Overview: Conductivity Sensors

For optimized functioning of conductivity sensors, please note the following guidelines:

- The sensors should be installed with the electrode totally immersed in the sample fluid
- The signal leads should be kept as short as possible
- Temperature compensation is necessary when subject to fluctuating temperatures
- Clean electrodes regularly depending on application
- Cell constant and measurement range must correspond

Summary of features:

- Simple to install
- Reliable measuring
- Simple to maintain

Overview: Conductivity Sensors

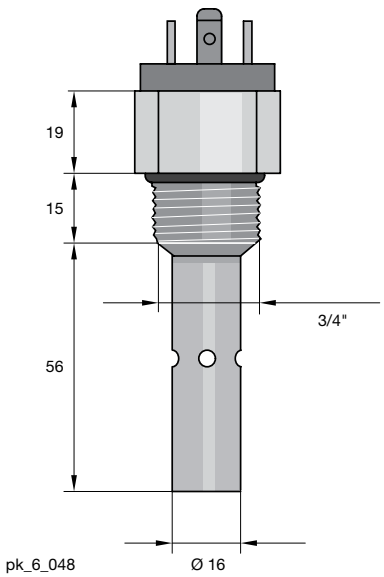
Type	Measurement range	Cell constant [cm^{-1}]	Max. temp [°C]	Max. pressure [bar]	Shaft material	T-correction	Process integration	Electrical connection
LMP 001 see p. 34	0.01 – 50 µS/cm	0.01 ±5%	70	16 (50°C)	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 001-HT see p. 35	0.01 – 50 µS/cm	0.01 ±5%	120	16 (100°C)	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01 see p. 35	0.1 – 500 µS/cm	0.1 ±5%	70	16 (50°C)	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01-HT see p. 36	0.1 – 500 µS/cm	0.1 ±5%	120	16 (100°C)	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01-TA see p. 35	0.1 – 500 µS/cm	0.1 ±5%	70	16 (50°C)	PP	Pt 100	Immersion, including immersible in-line probe housing, 1 m + 5 m cable	5 m fixed cable
LF 1 FE see p. 36	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	No	PG 13.5, flow vvtv (length: 120 mm) or immersion	5 m fixed cable
LFT 1 FE see p. 36	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable
LFTK 1 FE see p. 36	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable
LF 1 DE see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	No	PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFT 1 DE see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFTK 1 DE see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LF 1 1/2" see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	No	1/2 inch male thread, flow (length: 120 mm) or immersion	5 m fixed cable
LFT 1 1/2" see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 100	1/2 inch male thread, flow (length: 120 mm) or immersion	5 m fixed cable
LFTK 1 1/2" see p. 37	0.01 - 20 mS/cm	1 ±5%	80	16 (50°C)	PPE	Pt 1000	1/2 inch male thread, flow (length: 120 mm) or immersion	5 m fixed cable
CK 1 see p. 38	0.01 - 20 mS/cm	1 ±5%	150	16 (20°C)	PES	No	Flow R 1" outer thread	DIN 4 pin angle plug
CKPt 1 see p. 38	0.01 - 20 mS/cm	1 ±5%	150	16 (20°C)	PES	Pt 100	Flow R 1" outer thread	DIN 4 pin angle plug
LM 1 see p. 38	0.1 – 20 mS/cm	1 ±5%	70	16 (50°C)	PP	No	Flow R 3/4" outer thread	DIN 4 pin angle plug
LM 1-TA see p. 38	0.1 – 20 mS/cm	1 ±5%	70	16 (50°C)	PP	No	Immersion, including immersible in-line probe housing, 1 m + 5 m cable	5 m fixed cable

ProMinent® DULCOTEST® Sensors

Overview: Conductivity Sensors

Type	Measurement range	Cell constant [cm^{-1}]	Max. temp [°C]	Max. pressure [bar]	Shaft material	T-cor-rection	Process integration	Electrical connection
LMP 1 see p. 38	0.1 – 20 mS/cm	1 ±5%	70	16 (50°C)	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 1-HT see p. 39	0.1 – 20 mS/cm	1 ±5%	120	16 (100°C)	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 1-TA see p. 38	0.1 – 20 mS/cm	1 ±5%	70	16 (50°C)	PP	Pt 100	Immersion, including immersible in-line probe housing, 1 m + 5 m cable	5 m fixed cable
LMP 4EI (4-electrode probe) see p. 38	0.5 – 200 mS/cm	5 ±10%	70	16 (50°C)	PP	Pt 100	Tank, flow DN40 with KV 50 threaded connector	5 m fixed cable
LMP 4EL-TA (4-Elektroden-Zelle) see p. 39	0.5 – 200 mS/cm	5 ±10%	70	16 (50°C)	PP	Pt 100	Immersion, including immersible in-line probe housing, 1 m + 5 m cable	5 m fixed cable
LF 204 (4-electrode probe) see p. 40	1 µs-500 mS/cm	0.475 ±1.5 %	90	2	Epoxy	NTC	Manual immersion	1.5 m fixed cable
ICT 1 (inductive cell) see p. 41	0.2 – 1000 mS/cm		70	8 (40 °C)	PP	Pt 100	Flow DN 50	Fixed cable 7 m
ICT 1-TA (inductive cell) 7 m see p. 41	0.2 – 1000 mS/cm		70	8 (40 °C)	PP	Pt 100	Immersion including in-line	Fixed cable probe housing 1 m
ICT 2 (inductive cell) see p. 42	0 – 2000 mS/cm		125	16	PFA	Pt 100	Installation with SS flange, immersion with immersion pipe fixed cable (Accessories)	Fixed cable 5 m

Conductivity Sensors 2-Electrode



LMP 001

Conductivity sensor with Pt 100 temperature compensation and 0.01 cm^{-1} cell constant

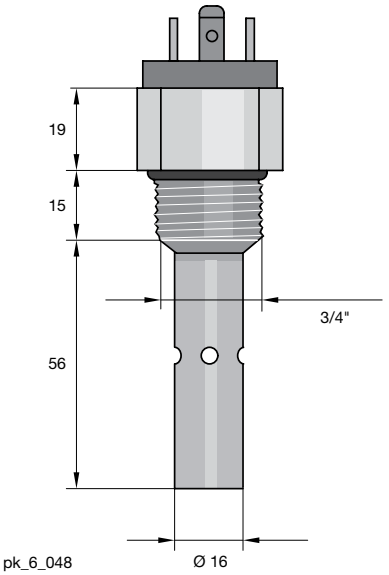
Measurement range:	0.01-50 µS/cm
Cell constant k:	0.01 cm^{-1} ±5 %
Temperature compensation:	Pt 100
Process chemical temperature:	158 °F (70 °C)
Max. pressure:	232 psi up to 122 °F (16 bar up to 50 °C)
Electrodes:	stainless steel 1.4571
Sensor shaft:	PP
Male thread:	3/4"
Length when fitted:	2.8“ (71 mm)
Electrical connector:	DIN 4 pin angle plug
Typical applications:	Clean water applications, monitoring ion exchangers and reverse osmosis systems
Part No.	1020508

Note:

We supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 2-Electrode



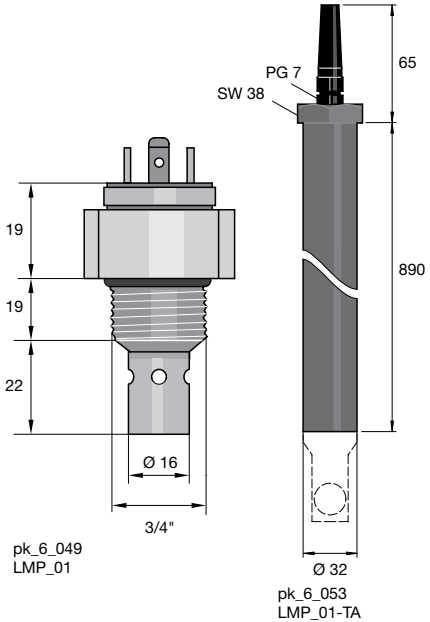
pk_6_048

LMP 001-HT

Conductivity sensor with Pt 100 temperature compensation and 0.01 cm^{-1} cell constant for higher temperatures.

Measurement range:	0.01- 50 µS/cm
Cell constant k:	0.01 cm^{-1} ±5%
Temperature compensation:	Pt 100
Process chemical temperature:	248 ºF (120 °C)
Max. pressure:	232 psi up to 212 ºF (16 bar up to 100 °C)
Electrodes:	stainless steel 1.4571
Sensor shaft:	PVDF
Male thread:	3/4"
Length when fitted:	2.8“ (71 mm)
Electrical connector:	DIN 4 pin angle plug
Typical applications:	General applications at higher temperatures, clean water applications, condensate. **Part No.** 1020509

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal



pk_6_049
LMP_01

pk_6_053
LMP_01-TA

LMP 01 and LMP 01-TA

Conductivity sensor with Pt 100 temperature compensation and 0.1 cm^{-1} cell constant. LMP 01 is fitted with a DIN 4 pin plug and a 3/4" inch male thread. LMP 01-TA has a 5 m fixed cable and fits inside the immersion accembly TA-LM via a M 38 thread, see section 6.5

Measurement range:	0.1- 500 µS/cm	
Cell constant k:	0.1 cm^{-1} ±5 %	
Temperature compensation:	Pt 100	
Process chemical temperature:	158 ºF (70 °C)	
Max. pressure:	232 psi up to 122 ºF (16 bar up to 50 °C)	
Electrodes:	stainless steel 1.4571	
Sensor shaft:	PP	
Male thread:	LMP 01:	3/4"
	LMP 01-TA:	M 28 x 1.5 for TA-LM in line probe housing
Length when fitted:	1.8“ (46 mm)	
Electrical connector:	LMP 01:	DIN 4 pin angle plug
	LMP 01-TA:	5 m fixed cable

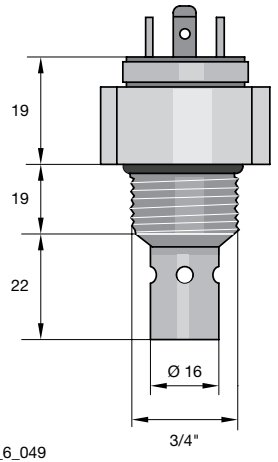
Typical applications: Monitoring ion exchangers, reverse osmosis systems and desalination systems. **Part No.**

LMP 01:	with DIN 4 pin angle plug	1020510
LMP 01-TA:	with 5 m fixed cable fitted inside the immersion assembly TA-LM, see section 6.5	1020512
LMP 01-FE:	spare sensor for LMP 01-TA with 5 m fixed cable	1020626

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 2-Electrode



pk_6_049

LMP 01-HT

Conductivity sensor with Pt 100 temperature compensation and 0.1 cm^{-1} cell constant for higher temperatures

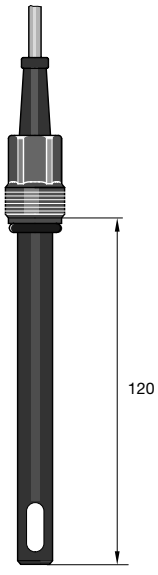
Measurement range:	0.1- 500 µS/cm
Cell constant k:	0.1 cm^{-1} ±5 %
Temperature compensation:	Pt 100
Process chemical temperature:	248 °F (120 °C)
Max. pressure:	232 psi up to 212 °F (16 bar up to 100 °C)
Electrodes:	stainless steel 1.4571
Sensor shaft:	PVDF
Male thread:	3/4"
Length when fitted:	1.8“ (46 mm)
Electrical connector:	DIN 4 pin angle plug
Typical applications:	General applications at higher temperatures, industrial + process water applications, condensate

Part No.
1020511

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

LF 1 FE

Measurement range:	0.01-20 mS/cm
Cell constant k:	1.0 cm^{-1} ±5 %
Fluid temperature:	32-176 °F (0-80 °C)
Max. pressure:	232 psi (16 bar)
Electrodes:	special graphite
Sensor shaft:	Epoxy
Internal thread:	PG 13.5
Length:	4.72“ (120 mm ±3[1)])
Electrical connection:	16.4 ft. (5 m fixed cable) (2 x 0.5 mm^2)
Typical applications:	Potable, cooling, industrial water
	The measuring cells in the LF… series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.



pk_6_085

Part No.
741152

Note: All LF(T) (K)-types are available with an epoxy shaft and a new design. Compared to earlier types, these sensors have increased mechanically stability and therefore a more stable cell constant.

LFT 1 FE

Technical data as LF 1 FE but incorporates integrated Pt 100 for automatic temperature compensation[1)]

Part No.
1001374

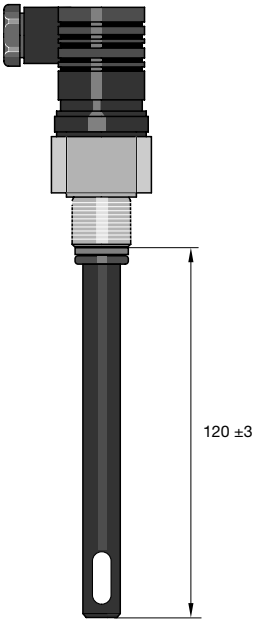
LFTK 1 FE

Technical data as LF 1 FE but with integrated Pt 1000 for automatic temperature compensation[1)]

Part No.
1002821

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 2-Electrode



pk_6_086

LF 1 DE

Technical data as LF 1 FE but with DIN 4-pin plug[1)]

Part No.
1001375

LFT 1 DE

Technical data as LF 1 FE but with DIN 4-pin angle plug and integrated Pt 100 for automatic temperature compensation[1)]

Part No.
1001376

LFTK 1 DE

Technical data as LF 1 FE but with 4-pin angle plug and integrated Pt 1000 for automatic temperature compensation[1)]

Part No.
1002822

LF 1 1/2"

Technical data as LF 1 FE but with DIN 4-pin angle plug and 1/2" internal thread

Part No.
1001377

LFT 1 1/2"

Technical data as LF 1 FE but with DIN 4-pin angle plug, 1/2" internal thread and integrated Pt 100 for automatic temperature compensation

Part No.
1001378

LFTK 1 1/2"

Technical data as LF 1 FE but with 4-pin angle plug and integrated Pt 1000 for automatic temperature compensation[1)]

Part No.
1002823

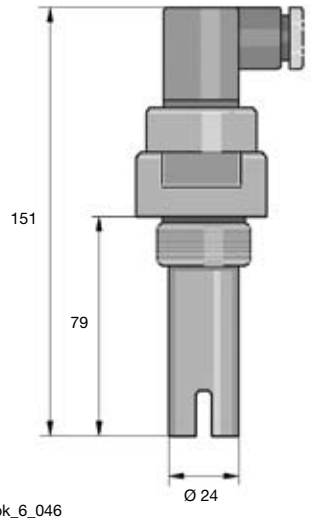
[1)] A PG 13.5 / 1" adapter set (order number 1002190) is required when installing into in-line probe housing type DLG III (1" aperture)

Connection configuration for all DIN 4-pin plugs: electrodes: ⏚ and 2
Pt 100/1000: 1 and 3

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal (see section 5)

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 2-Electrode



pk_6_046

CK 1

Measurement range:	0.1-20 mS/cm
Cell constant k:	1.0 cm^{-1} ±5 %
Fluid temperature:	32-302 °F (0-150 °C)
Max. pressure:	232 psi up to 68 °F (16 bar up to 20 °C)
Electrodes:	special graphite
Sensor shaft:	PES
Internal thread:	R 1"
Length:	3.1“ (79 mm)
Electrical connection:	DIN 4-pin angle plug
Typical applications:	Cooling, industrial, process water, tank and pipe cleaning systems in breweries and dairies, separation of media.

	Part No.
	305605

CKPt 1

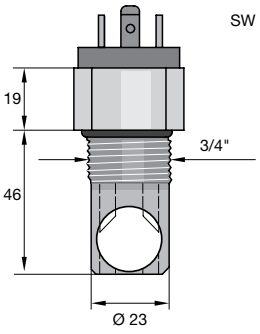
Technical data as CK 1 but with Pt 100 for automatic temperature correction.

	Part No.
	305606

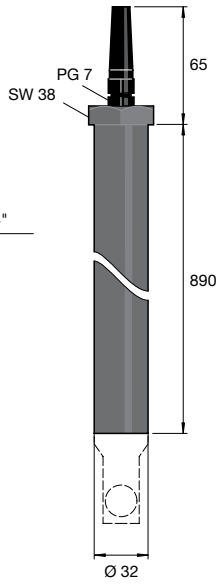
LM 1 und LM 1-TA

Conductivity sensor with cell constant 1. LM 1 is fitted with a Din 4 pin angle plug. LM 1-TA has a 16.4 ft. (5 m) fixed cable and fits inside the immersion assembly TA-LM in-line probe housing, see section 6.5

Measurement range:	0.1-20 mS/cm	
Cell constant k:	1.0 cm^{-1} ±5 %	
Process chemical temperature:	158 °F (70 °C)	
Max. pressure:	232 psi up to 122 °F (16 bar up to 50 °C)	
Electrodes:	graphite	
Sensor shaft:	PP	
Male thread:	LM 1:	3/4"
	LM 1-TA:	M 28 x 1.5 for TA-LM in line probe housing
Length when fitted:	LM 1:	1.8“ (46 mm)
Electrical connector:	LM 1:	DIN 4 pin angle plug
	LM 1-TA:	16.4 ft. (5 m) fixed cable
Typical applications:	Drinking, cooling, industrial, process water, media separation	



pk_6_052
LM(P) 1



pk_6_053
LM(P) 1-TA

		Part No.
LM 1:	with DIN 4 pin angle plug	740433
LM 1-TA:	with 16.4 ft. (5 m) fixed cable and immersion assembly TA-LM in-line probe housing, see section 6.5	1020528
LM 1-FE:	spare sensor for LM 1-TA with 5 m fixed cable	1020627

LMP 1 and LMP 1-TA

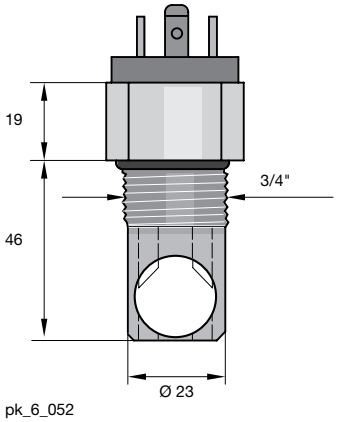
Technical data as for LM 1 and LM 1-TA but with integrated Pt 100 for automatic temperature correction.

		Part No.
LMP 1:	with DIN 4 pin angle plug	1020513
LMP 1-TA:	with 16.4 ft. (5 m) fixed cable and immersion assembly TA-LM, see section 6.5	1020525
LMP 1-FE:	spare sensor for LMP 1-TA with 5 m fixed cable	1020727

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 2-Electrode



pk_6_052

LMP 1-HT

Conductivity sensor with Pt 100 temperature compensation and 1 cm^{-1} cell constant, suitable for higher temperatures

Measurement range:	0.1-20 mS/cm
Cell constant k:	1 cm^{-1} ±5 %
Temperature compensation:	Pt 100
Process chemical temperature:	248 °F (120 °C)
Max. pressure:	232 psi up to 212 °F (16 bar up to 100 °C)
Electrodes:	graphite
Sensor shaft:	PVDF
Male thread:	3/4"
Length when fitted:	18.1" (46 mm)
Electrical connector:	DIN 4 pin angle plug
Typical applications:	General applications at higher temperatures, industrial, process water, media separation, CIP in breweries and dairies

Part No.
1020524

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

ProMinent® DULCOTEST® Sensors

Conductivity Sensors 4-Electrode

pk_6_076

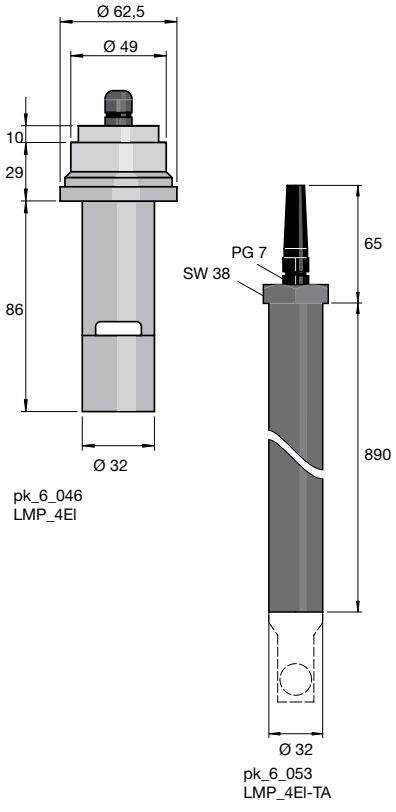
LF 204

4-electrode conductivity sensor for use with the portable manual measurement device Portamess® 911 Cond (see section 5.4)

Measurement range:	1 µS/cm-500 mS/cm
Cell constant:	0.475 cm^{-1} ±1.5 %
No. of electrodes:	4
Shaft:	Epoxy, black
Electrode material:	graphite
Shaft length:	4.72” (120 mm)
Shaft diameter:	0.6” (15.3 mm)
Cable length:	4.9 ft. (1.5 m)
Temperature gauge:	NTC (30 k - 5-+1000 °C)
Immersion depth:	min. 1.4” (36 mm)
Pressure rating:	29 psi (2 bar)
Temperature range:	32-194 °F (0-90 °C)

	Part No.
Conductivity sensor LF 204	1008723

Note: only in conjunction with Portamess® 911 Cond (see section 5.4)



pk_6_046
LMP_4EI

pk_6_053
LMP_4EI-TA

LMP 4EI and LMP 4EI-TA

4-electrode conductivity sensors with Pt 100 temperature compensation and 5.0 cm cell constant. LMP 4EI is fitted with a 5 m fixed cable and a KV 50 threaded connector for installation into tanks or pipe work. LMP 4EI-TA has a 5 m fixed cable and fits into the TA-LM immersion assembly via an M 28-thread, see section 6.5. The sensors are suitable for minimising polarsation effects in media with high conductivity levels and/or media which tend to form deposits.

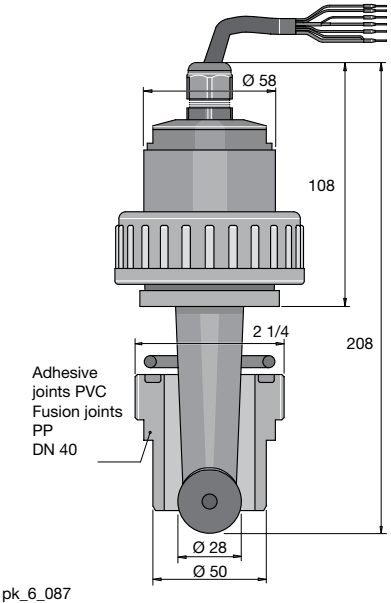
Measurement range:	0.5-200 mS/cm
Cell constant k:	5.0 cm^{-1} ±10 %
Temperature compensation:	Pt 100
Process chemical temperature:	158 °F (70 °C)
Max. pressure:	232 psi up to 122 °F (16 bar up to 50 °C)
Electrodes:	electrographite, titanium
Sensor shaft:	PP
Male thread:	LMP 4EI KV 50 threaded connector
	LMP 4EI-TA: M 28 x 1.5 for TA-LM immersion assembly
Length when fitted:	101 mm
Electrical connector:	LMP 4EI: 16.4 ft. (5m) fixed cable
	LMP 4EI-TA: 16.4 ft. (5m) fixed cable
Typical applications:	General applications for water with high conductivity levels and contaminated wastewaters

		Part No.
LMP 4EI:	KV 50 threaded connector	1020526
LMP 4EI-TA:	with 16.4 ft. (5 m) cable installed in TA-LM in-line, see section 6.5	1020527
LMP 4EI-FE:	Spare sensor for LMP 4EI-TA with 5 m cable	1020628

Note: we supply the DMT transducer to convert the measurement signal into a (temperature compensated) 4-20 mA signal

ProMinent® DULCOTEST® Sensors

Inductive Conductivity Sensors



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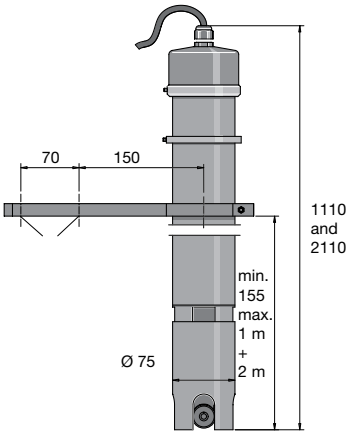

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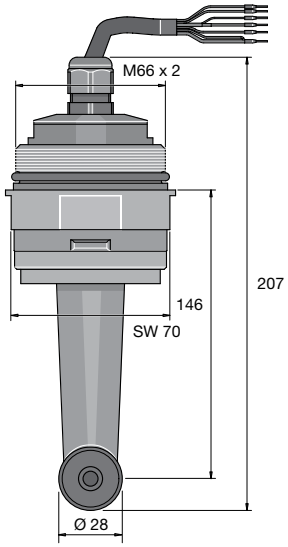

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Electrode-free inductive conductivity sensors are used to measure the electrolytic conductivity over a wide measurement range in heavily soiled and/or aggressive media and offer a particularly low maintenance operating method. The sensors are particularly suitable for the measurement of high conductivity levels since there is no electrode polarisation.**ICT 1 and ICT 1-IMA-1m/ICT 1-IMA-2m**

Economical inductive conductivity sensors for all soiled water types and for high conductivity levels up to a temperature of 70 °C. The ICT 1 sensor is designed for in-flow measurement and is installed in DN40 pipes (optionally PVC or PP). The ICT 1-IMA-1 m and ICT 1-IMA-2 m immersion sensors comprise the ICT 1-IM sensor and the ready-fitted IMA-ICT1 immersion pipe, length 1 m or 2 m.Measurement range: 0.2-1000 mS/cm

Cell constant:	8.5 cm^{-1}
Temperature compensation:	Pt 100
Medium temperature:	0 - 70 °C
Max. pressure:	8 bar/40 °C, 1 bar/70 °C
Material:	Sensor: PP, Seals: FPM
Assembly:	
ICT 1: (measurement in flow):	with union nuts, 2¼ imperial internal thread, DN40, PVC incl. DN40 Adhesive joints with 2¼ imperial external thread for installation in DN40 standard PVC pipes (included in scope of supply). The fusion joints for installation in standard PP pipes are available as optional accessories (see section 6.5.5)
ICT 1-IMA-1m (immersion sensor):	supplied with immersion pipe, 1 m
ICT 1-IMA-2m (immersion sensor):	supplied with immersion pipe, 2 m
	The assembly accessories for the IPHa 3-PP in-line probe housing (see 6.5.4) can be used for both immersion sensors.
Power supply:	all versions, 7 m fixed cable
Enclosure rating:	IP65
Measurement and control equipment:	D1C for inductive conductivity (see section 5.1.7)
Typical application:	All types of soiled water, desalination control in cooling towers, control of electroplating baths, Cleaning in Place (CIP), product monitoring

		Part No.
ICT 1	for installation in pipes	1023244
ICT 1-IMA-1 m	ready fitted in in-line probe housing 1 m	1023349
ICT 1-IMA-2 m	ready fitted in in-line probe housing 2 m	1023351
ICT 1-IM	spare sensor for ICT 1-IMA-1 m and ICT-IMA-2 m	1023245

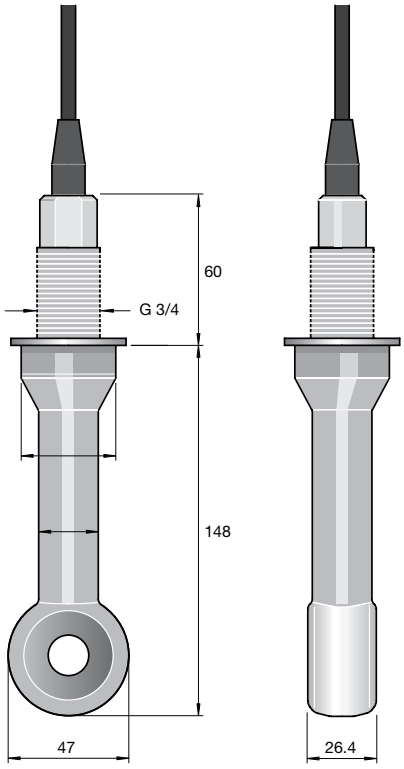
ICT 2

High performance sensors for aggressive media, maximum conductivity and high temperatures up to 125 °C. Available for installation in tanks, pipes or the IMA-ICT 2 in-line probe housing.Measurement range: 0-2000 mS/cm

Cell constant:	2 cm^{-1}
Reproducibility of measurement:	± (5 µS/cm + 0.5 % of the measured value)

ProMinent® DULCOTEST® Sensors

Inductive Conductivity Sensors



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Temperature compensation:	Pt 100, class A, completely extrusion-coated
Medium temperature:	0 °C-125 °C (for use together with D1C, temperature compensation is limited to 100 °C)
Max. pressure:	16 bar
Material: sensor:	PFA, completely extrusion-coated
Assembly:	
installation in pipes, tanks (on the side):	G ¾ stainless steel thread (1.4571)
or flange mounted:	with accessories: Stainless steel flange ANSI 2 imperial 300lbs, SS 316L (can be adapted to DIN counter-flange DN 50 PN 16) (see section 6.5.5)
Installation in immersion pipe for tank from above:	With accessories: IMA-ICT 2 in-line probe housing via stainless steel flange DN 80 PN (see section 6.5.4)
Length when fitted:	1 m, diameter when fitted 70 mm
Power supply:	5 m fixed cable
Measurement and control equipment:	D1C
Enclosure rating:	IP67
Typical applications:	Production processes in the chemical industry, Phase separation of product mixtures, Determining concentrations of aggressive chemicals
	Part No.
	ICT 2 1023352

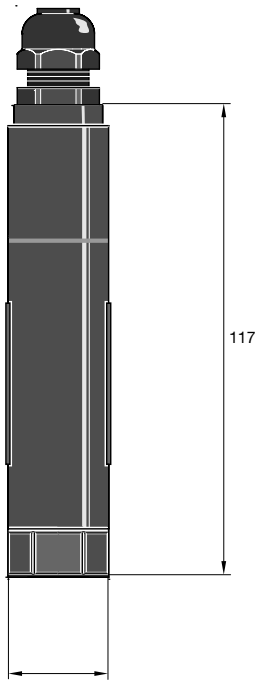
Sensor Accessories

Measurement Transmitter 4 - 20 mA (Two Wire)

Advantages:

- Safer signal transfer, even across large distances
- Interference free 4-20 mA signal
- Simple installation directly onto sensor

Typical applications: Measurement signal transfer over large distances, or to transfer signals subject to disturbance (e.g. pH, redox) in conjunction with D1C, D2C and DULCOMARIN® measurement and control systems, or for direct connection to PC/PLC.



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pH measurement transmitter 4-20 mA, type pH V1

Measurement range:	pH 0…14
Accuracy:	better than pH 0.1 (typical ±pH 0.07)
Socket:	SN6
Input resistance:	10^{12} Ω
Signal output:	4…20 mA ≈ -500…+500 mV ≈ pH 15.45 - -1.45 not calibrated, not electrically isolated
Power supply:	18…24 V DC
Ambient temperature:	-5…50 °C, non-condensing
Enclosure rating:	IP 65
Dimensions:	141 mm length, 25 mm Ø

Part No.
809126

Redox measurement transmitter 4-20 mA, type RH V1

Technical data as for pH transmitter, but:

Measurement range:	0…1000 mV
Accuracy:	better than ±0.5 mV (typical ±3 mV)
Input resistance:	> 5 x 10^{11} Ω
Signal output:	4…20 mA ≈ 0…+1000 mV not electrically isolated

Part No.
809127

Temperature measurement transmitter 4-20 mA, type Pt 100 V1

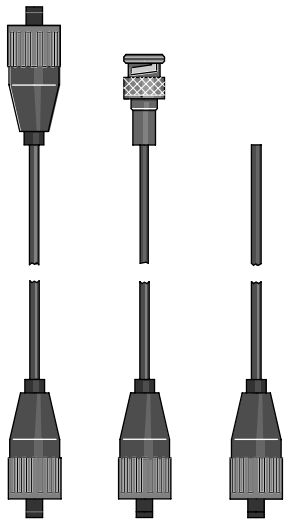
Technical data as for pH transmitter, but:

Measurement range:	0…100 °C
Accuracy:	better than ±0.5 °C (typical ±0.3 °C)
Input resistance:	~ 0 Ω
Signal output:	4…20 mA ≈ 0…+100 °C not electrically isolated

Part No.
809128

Sensor Accessories

Signal Cables



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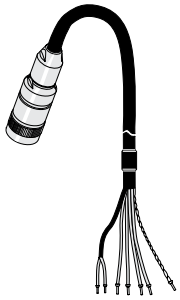
General guidelines:

- Ensure that signal leads are as short as possible.
- Ensure signal leads are separated from power cables running parallel to them.
- Use pre-assembled combined signal leads wherever possible.

Signal leads for pH/ORP measurement

- Pre-assembled to facilitate installation
- Factory tested to ensure function reliability
- IP 65

Design	Description		Part No.
2 x SN6	coax Ø 5 mm	3 ft. (0.8 m) - SS	305077
	coax Ø 5 mm	6 ft. (2.0 m) - SS	304955
	coax Ø 5 mm	15 ft. (5.0 m) - SS	304956
	coax Ø 5 mm	30 ft. (10.0 m) - SS	304957
SN6 - open end	coax Ø 5 mm	6 ft. (2.0 m) - S	305030
	coax Ø 5 mm	15 ft. (5.0 m) - S	305039
	coax Ø 5 mm	30 ft. (10.0 m) - S	305040
SN6 - BNC	coax Ø 3 mm	30 ft. (10.0 m) - SB	305099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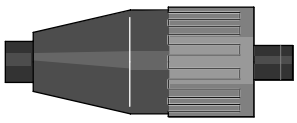
Signal leads for electrodes with Vario Pin plug

Pre-assembled 6-core signal lead with Vario Pin plug for connection to electrode type PHEPT 112 VE.

	Part No.
Vario Pin signal lead VP 6-ST/ 2 m	1004694
Vario Pin signal lead VP 6-ST/ 5 m	1004695
Vario Pin signal lead VP 6-ST/10 m	1004696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SN6 coax connector

K 74 crimping pliers and a soldering iron are required for connecting coax connectors to cables.

	Part No.
SN6 coaxial plug for 5 mm Ø coaxial signal lead	304974
SN6 coaxial plug for 3 mm Ø coaxial signal lead	7304975


pk_6_055

LK coax signal cable

For pH and ORP measurements.

	Part No.
Coax low noise 5 mm Ø, black	723717
Coax low noise 3 mm Ø, black	723718
Please specify length with order.	

Sensor Accessories

Signal Cables

pk_1_085

Signal leads for DMT type chlorine measuring cells

The signal lead is required for connection of DMT type measuring cells to the DMT transducer.

		Part No.
Universal cable, 5-pin round plug; 5-core	6 ft. (2 m)	1001300
Universal cable, 5-pin round plug; 5-core	15 ft. (5 m)	1001301
Universal cable, 5-pin round plug; 5-core	30 ft. (10 m)	1001302

Cable accessories for CAN-type chlorine sensors

	Part No.
T-distributors M12 5 pole CAN	1022155
Moving load M12-joint	1022154
Moving load M12-plug	1022592
Connecting cable - CAN M12 5 pole 0.5 m	1022137
Connecting cable - CAN M12 5 pole 1 m	1022139
Connecting cable - CAN M12 5 pole 2 m	1022140
Connecting cable - CAN M12 5 pole 5 m	1022141
Connecting cable – CAN, sold in meters	1022160
Plug-CAN M12 5 pole Screw terminal	1022156
Coupling-CAN M12 5 pole Screw terminal	1022157

pk_6_054

Signal leads for Pt 100/Pt 1000 (2 x 0.5 mm²)

			Part No.
Length	15 ft. (5 m)	SN6 - open ended	1003208
Length	30 ft. (10 m)	SN6 - open ended	1003209
Length	60 ft. (20 m)	SN6 - open ended	1003210

Sensor adapters

	Part No.
SN6 male to BNC male	7305024
SN6 female to BNC female	7305065
SN6 male to SN6 male	7305025

pk_6_055

LKT signal lead for conductivity measuring cells

4-core, shielded, Ø 6.2 mm

	Part No.
Please specify length with order.	723712

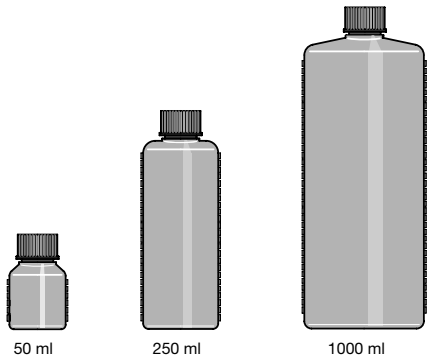
Two-wire signal lead (2 x 0.25 mm²; Ø 4 mm)

For -mA type chlorine/bromine/chlorine dioxide/ozone measuring cells and pH, ORP; Pt 100, conductivity transducers.

	Part No.
Please specify length with order.	725122

Sensor Accessories

Buffer Solutions



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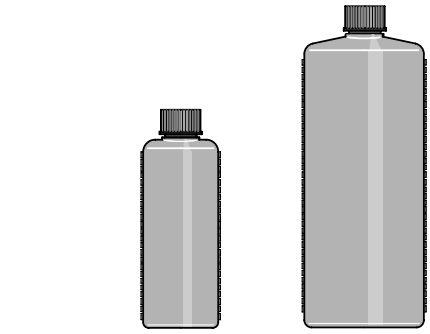
pH quality buffer solutions

Accuracy ±pH 0.02 (±0.05 at pH 10). The shelf life depends upon frequency of use and the amount of chemical drag-in.

Alkaline buffer solutions can react with CO_2 if left open. This will affect their values, therefore close after use. Buffer solutions should be replaced after a maximum of three months after opening. The solution contains a biocide to prevent bacteria forming.

		Part No.
pH 4.0 - red	50 ml	506251
	250 ml	791436
	1000 ml	506256
pH 5.0	50 ml	506252
pH 7.0 - green	50 ml	506253
	250 ml	791437
	1000 ml	506258
pH 9.0	50 ml	506254
	1000 ml	506259
pH 10.0 - blue	50 ml	506255
	250 ml	791438
	1000 ml	506260



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ORP quality buffer solutions

Accuracy to ±5 mV. Shelf life depends upon frequency of use and the strength of the chemicals in sample solutions.

Buffer solutions should be replaced after a maximum of three months after opening.

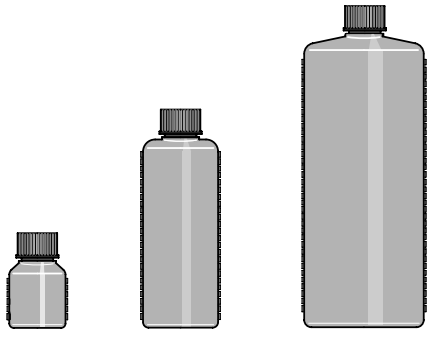
Warning: The 470 mV ORP buffer solution is an irritant!

		Part No.
ORP buffer **470** mV	250 ml	7791439
	1000 ml	7506241

3 molar KCl solutions

3 molar KCl solution is ideally suited to the protection of pH and ORP electrodes (e.g. in electrode case) and as an electrolyte for refillable electrodes (e.g. PHEN, RHEN). However, for earlier version refillable electrodes with reference electrodes without the larger AgCl reservoir we recommend the AgCl saturated KCl solution.

		Part No.
KCl solution, 3 molar	50 ml	505533
KCl solution, 3 molar	250 ml	791440
KCl solution, 3 molar	1000 ml	791441
KCl solution, 3 molar, AgCl saturated	250 ml	791442
KCl solution, 3 molar, AgCl saturated	1000 ml	505534



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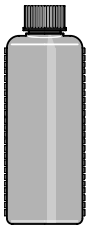
Sensor Accessories

Electrolyte Solutions



250 ml

pk_6_058

Cleaning solutions

Pepsin/hydrochloric acid cleaning solutions:

For cleaning pH electrode diaphragms contaminated with protein.

	Part No.
250 ml	791443

Conductivity calibration solution

For the accurate calibration of conductivity sensors we recommend using calibration solutions with known conductivity levels. One pack contains two 25 ml sacks holding **1413 µS/cm** and **12.88 mS/cm**.

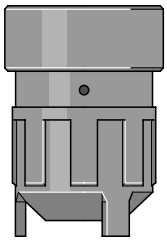
	Part No.
4 pack conductivity calibration solution (4 x 25 ml)	1005212

pk_6_061

Electrolyte for chlorine, bromine, chlorine dioxide and ozone measuring cells

	Part No.
CLE all chlorine measuring cells electrolyte, 100 ml	506270
CDM 1 type chlorine dioxide measuring cells electrolyte, 100 ml	506271
CDE chlorine dioxide measuring cells electrolyte, 100 ml	506272
OZE ozone measuring cells electrolyte, 100 ml	506273
Electrolyte for measuring cells types CGE/CTE/BRE, 50 ml	792892
Electrolyte for chlorine dioxide measuring cells type CDP, 100 ml	1002712
Electrolyte for peracetic acid sensors, type PAA 1, 100 ml	1023896
Electrolyte for chlorine probes, Type CLT 1, 50 ml	1022015

Membrane Caps



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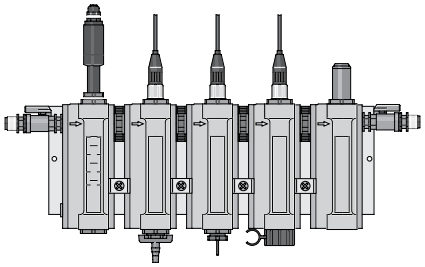
Spare membrane caps, accessory sets for chlorine, bromine, chlorine dioxide and ozone sensors

	Part No.
Membrane cap for types CLE II T, CDM 1 and OZE 1	790486
Membrane cap for types: CLE 2.2, CLE 3, CDE 1.2, CDE 2, OZE 2 and OZE 3: this membrane cap is marked with a red dot	790488
Membrane cap for CGE/CTE 1 (2/5/10 ppm) and BRE 1 this membrane cap is orange	792862
Membrane cap for CTE 1 (0.5 ppm); this membrane cap is blue	741274
Membrane cap for CDP 1; this membrane cap is black	1002710
Membrane cap for PAA 1	1023895
Membrane cap for CLT 1	1021824
Accessory set for CGE 2/CTE 1 (2/5/10 ppm) and BRE 1 (2 membrane caps + 50 ml electrolyte)	740048
Accessory set CTE 1 (0.5 ppm) (2 membrane caps + 50 ml electrolyte)	741277
Accessory set for CDP 1 (2 membrane caps + 100 ml electrolyte)	1002744
Accessory kit CLT 1	1022100
Accessory kit PAA 1	1024022

Sensor Accessories

DGMa Sensor Housings



pk_6_066

DGM modular in-line probe housing

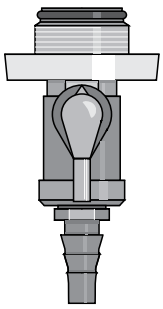
To accept conductivity, Pt 100, pH or ORP probes with PG 13.5 screw-in thread, or amperometric sensors with R 1" screw-in thread.

Advantages:

- Simple to assemble (already mounted on panel up to max. 7 units)
- Simple retrofit expansion possibility (see expansion modules)
- Module for monitoring flow of sampled water
- Simple to calibrate measured variables due to low sample water volume
- Ball valve on either end for adjusting and impeding flow

Each fully-assembled DGM is equipped with a single sampling cock.

Material:	Transparent PVC (all modules) FPM (seals) PP (calibration cup) PVC white (mounting panel)
Max. temperature:	60 °C
Max. pressure:	6 bar (30 °C) 1 bar (60 °C) 2 bar (with flow monitor, 30 °C)
Flow volume:	Up to 80 l/h (40 l/h recommended)
Flow sensor:	Reed contact max. switch power 3 W max. switch voltage 175 V max. switch current 0.25 A max. operating current 1.2 A max. contact resistance 150 m
Switch hysteresis:	approx. 20 %
Enclosure rating:	IP 65
Applications:	Potable, swimming pool water or water of similar quality with no suspended solids
Assembly:	Max. 5 modules pre-assembled onto baseboard: more than 5 modules, pre-assembled onto baseboard as custom version, priced accordingly.FPM = Fluorine Rubber



pk_6_071

Sampling tap for DGM

for PG 13.5 and 25 mm modules designed as a convenient ball valve.

	Part No.
PG 13.5 sampling tap	1004737
25 mm sampling tap	1004739

Expansion modules for DGM

For simple retrofit to an existing DGM.

	Part No.
Flow expansion module with scale in l/h	1023923
Flow expansion module with scale in gph	1023973
Flow sensor for flow expansion module (optional)	791635

Sensor Accessories

DGMa Identcode

DGM **In-line Sensor Housing**

A **Series Version**

Flow monitor module:
- 0 none
- 1 With l/h scale
- 2 With gph scale
- 3 With flow monitor, l/h scale
- 4 With flow monitor, gph scale

Number of PG 13.5 modules:
- 0 none
- 1 One PG 13.5 module
- 2 Two PG 13.5 modules
- 3 Three PG 13.5 modules
- 4 Four PG 13.5 modules

Note: add 15 mm mounting set for PHEP/RHEP sensors

Number of 25 mm modules
- 0 none
- 1 One 25 mm module*
- 2 Two 25 mm modules*

* 25 mm mounting set needed

Material:
- T Transparent PVC

Seal material:
- 0 Viton®

Connections:
- 0 1/2" x 3/8" tubing adapters
- 1 PVC half-union connections with 1/4" MNPT adapter

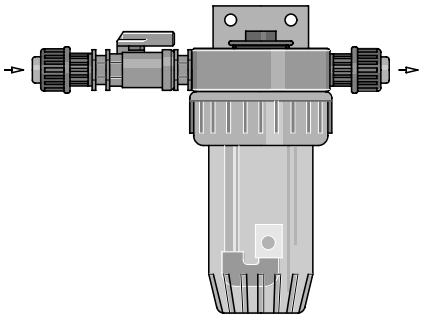
Versions:
- 0 Standard

Recommended accessories:	**Part No.**
reference potential plug with SS pin	791663
flow sensor (spare)	791635
calibration cup (spare)	791229
Sampling Tap for PG 13.5 module	1004737
Sampling Tap for 25 mm module	1004739
Mounting set for 15 mm (PHEP/RHEP)	791219
Mounting set for 25 mm module (CLE, CTE, CGE, CDE, CDP, 0ZE)	791818
Bubble disperser for Cl sensor	740207
Bubble disperser for pH/ORP sensors	791703

DGM A 3 2 1 T 0 0 0

Sensor Accessories

DLG Sensor Housings



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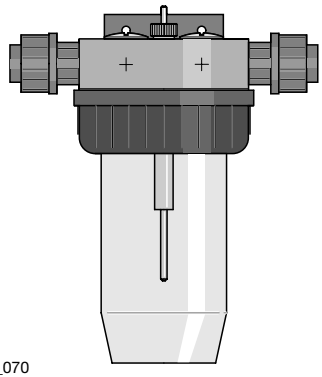
DLG III type in-line probe housing

To accept **2 electrodes** (conductivity, Pt 100, pH or ORP electrodes) with PG 13.5 screw-in thread, **as well as a sensor** with R 1″ thread (amperometric sensors) with integrated stainless steel pin as liquid reference potential.

The DLG III is fitted with a plastic ball valve on the input side for stopping and adjusting the sample water flow.

Material:	Rigid PVC
Transparent housing cup:	Polyamide
Ball valve material:	Rigid PVC
Max. pressure:	1 bar
Max. temperature:	55 °C

	Part No.
DLG III A with PVC hose connectors for 8/5 mm Ø PE tubing	914955
DLG III B with PVC adhesive connectors for 16 mm Ø DN 10 pipe	914956
Assembly kit for fitting amperometric sensors	815079



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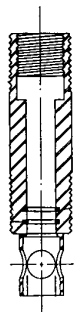
DLG IV type in-line probe housing

To take **4 electrodes** (pH, ORP, Pt 100, conductivity) with PG 13.5 threaded connector, with integrated stainless steel pin as liquid reference potential. Bracket for wall mounting.

Material:	Hard PVC or PP
Transparent housing:	Polyamide
Max. pressure:	1 bar
Max. temperature:	55 °C for PVC version 80 °C for PP version
Sample water connector:	Union with d 16/DN 10 insert

	Part No.
DLG IV PVC for Ø 16/DN 10 pipe work connector	1005332
DLG IV PP for Ø 16/DN 10 pipe work connector	1005331

Sensor Holders



CPVC holder (for pH/ORP)

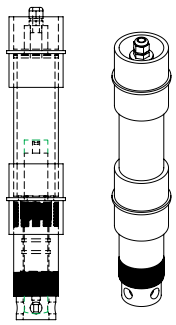
CPVC universal in-line sensor holder with 3/4" MNPT, 5" (127 mm) long body.	7305020

PVDF holder (for pH/ORP)

PVDF universal in-line sensor holder with 3/4" MNPT, 5" (127 mm) long body.	7305021

Stainless steel holder (for pH/ORP)

Stainless steel universal in-line sensor holder with 3/4" MNPT, 5" (127 mm)long body.	7305022



PG 13.5 Submersible holder (for pH/ORP)

CPVC Waterproof sensor holder with 1-1/2" NPT, 5" (127 mm) long body.	7744693

CPVC holder (for 25 mm sensors)

CPVC universal in-line sensor holder with 2" MNPT, 5" (127 mm) long body (needs pn. 791818).	7740719

25 mm Submersible holder (consult factory for details)

CPVC Waterproof sensor holder 1-1/2" FNPT, 5" (127 mm) long body.	7744008