"DULCOTEST® Sensors" T.O.C. IX

CATALOG SECTION TABS

ProMinent® DULCOTEST® Sensors

Overview: Sensors

DULCOTEST® Sensors

DULCOTEST® sensors supply exact, reliable and application-specific measured values in real time for the purpose of effectively monitoring or controlling processes. The sensors can be optimally integrated in the ProMinent® control circuit together with controllers and metering pumps. Many different types of fitting are available for optimum integration in specific processes. The measurement methods

- Potentiometry (pH, ORP, fluoride)
- Amperometry (disinfectant)
- Conductivity (salinity, alkalinity, acidity)

cover the most important measurement parameters found in water treatment applications. The sensors are stable in the long term, require minimum maintenance and are easy to install, calibrate and service.

Potentiometric DULCOTEST® Sensors

The DULCOTEST® pH and ORP sensors represent a comprehensive range of sensors for solving all measurement tasks. The range of applications extends from simple use in water treatment systems through to industrial process applications with demanding requirements in terms of temperature, pressure as well as resistance to soiling and chemicals.

- Long service life ensured by premium glass quality and an optimum combination of automated and manual production
- Precise and reliable measurement for efficient processes and maximum process reliability
- Tailored process integration guaranteed by special versions with individual installation lengths, cable lengths and connectors
- Short delivery and storage times ensure optimum electrode life

Amperometric DULCOTEST® Sensors

The amperometric sensors of the DULCOTEST® product line supply measured values for the most diverse range of disinfectants such as e.g. chlorine, bromine, chlorine dioxide, ozone. The selective and exact measured values ensure maximum process reliability and are made available round the clock in real time either for monitoring or controlling applications. ProMinent sets standards with its sensor systems: Innovative sensors such as for chlorite, total chlorine, peracetic acid, hydrogen peroxide and dissolved oxygen enhance the product range. The sensors are available for different measuring ranges, in different connection variants for DULCOMETER® measuring and control devices and as special versions for specific applications.

DULCOTEST® Sensors for Electrolytic Conductivity

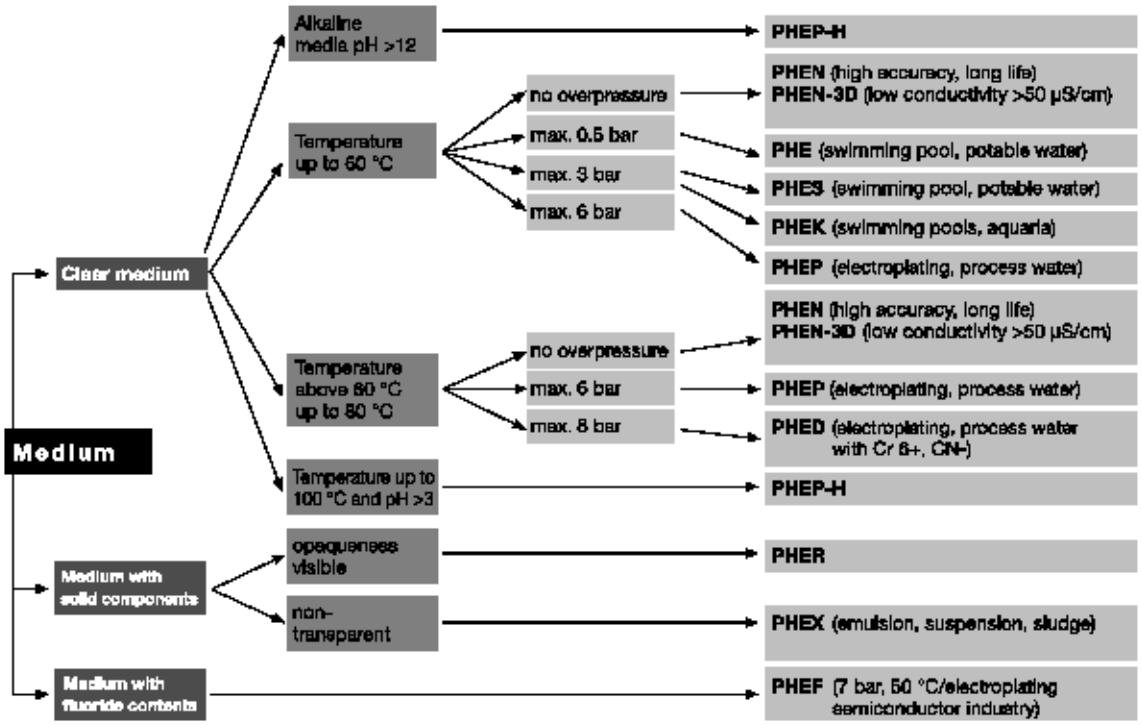
The comprehensive product line of DULCOTEST® conductivity sensors ensures the right sensor is selected with optimum price/performance ratio in applications ranging from simple water treatment through to intricate industrial process waste water processing. 27 different types of sensor tailored to the most diverse range of requirements: Measuring range, temperature, chemical resistance, soiling compatibility and process integration

- From simple conductometric 2-electrodes through to inductive high-end sensors
- Precise and reliable measurement for efficient process control and maximum process reliability
- Long service life and long maintenance intervals reduce downtimes and increase the availability of the measured values
- Completely preassembled fitting and sensor sets for simple, fast and flawless installation

ProMinent® DULCOTEST® Sensors

Overview: Sensors

Selection Guide DULCOTEST® pH Sensors



Selection Guide: Amperometric Sensors

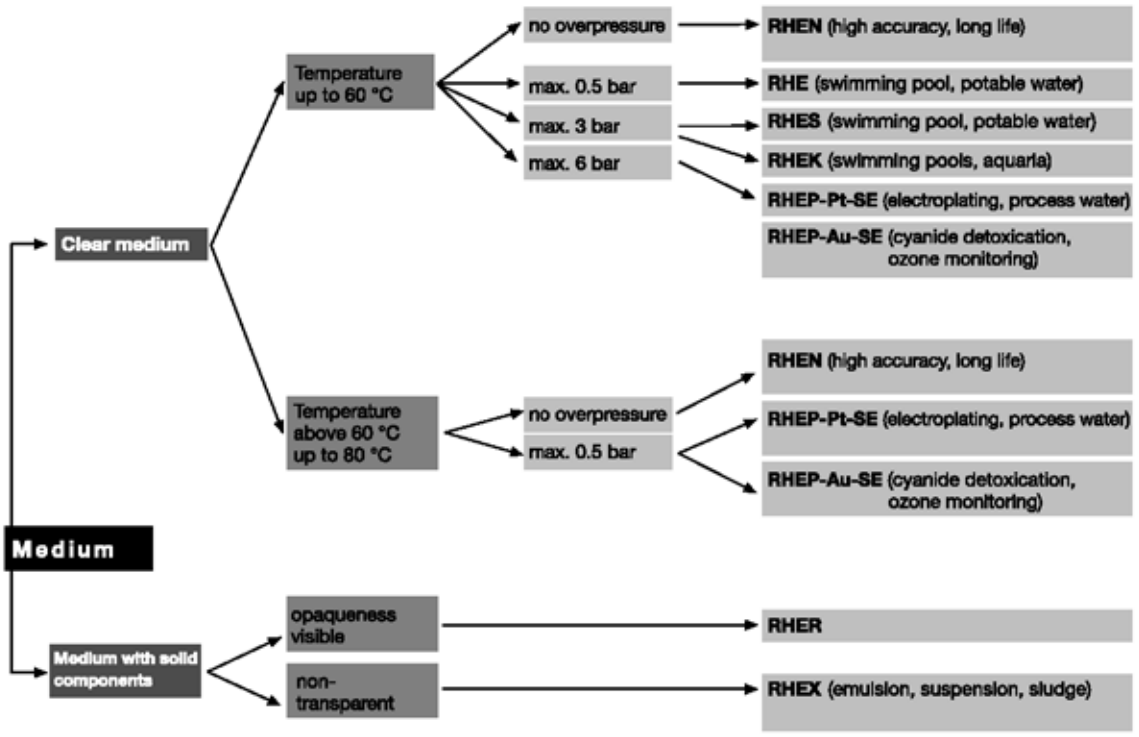
Measured variable	Applications	measuring range	Connection to DULCOMETER®	Sensor type
Free chlorine	Drinking water, swimming pool	0.01–100 ppm	D1C, DAC	CLE 3-mA-xppm, CLE 3.1-mA-xppm
Free chlorine	Drinking water, swimming pool water, in situ electrolysis (without diaphragm)	0.02-10 ppm	D1C, DAC	CLO 1-mA-xppm
Free chlorine	Hot water up to 70 °C (legionella), in situ electrolysis (without diaphragm)	0.02-2 ppm	D1C, DAC	CLO 2-mA-2ppm
Free chlorine	Drinking water, swimming pool	0.01–50 ppm	DMT	CLE 3-DMT-xppm
Free chlorine	Drinking water, swimming pool	0.01–10 ppm	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-
Free chlorine	Drinking water, swimming pool	0.05-5 ppm	COMPACT	CLB 2-µA-xppm
Free chlorine	Cooling water, process water, waste water, water with higher pH values (stable)	0.01-10 ppm	D1C, DAC	CBR 1-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.02–10 ppm	D1C, DAC	CGE 2-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.01–10 ppm	DULCOMARIN® II	CGE 2- CAN-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	D1C, DAC	CTE 1-mA-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DMT	CTE 1-DMT-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm
Combined chlorine	Swimming pool water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm + CLE 3.1-CAN-xppm

ProMinent® DULCOTEST® Sensors

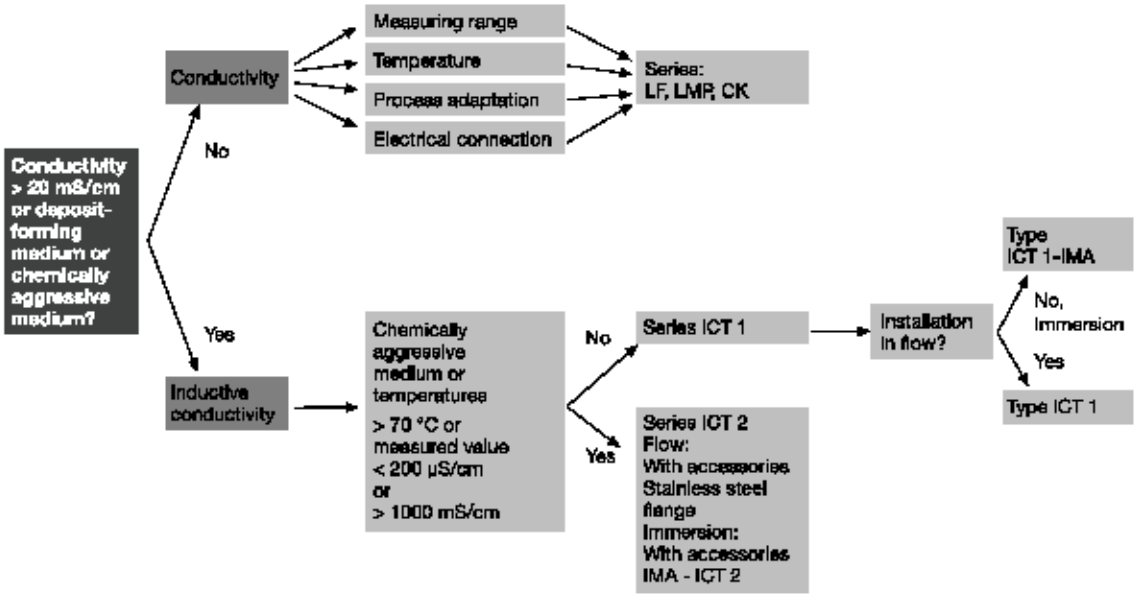
Overview: Sensors

Measured variable	Applications	Graduated measuring	Connection to DULCOMETER®	Sensor type
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with bromorganic disinfectants (e.g. BCDMH)	0.2–10 ppm	D1C, DAC	BRE 1-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with inorganic bromine compounds (e.g. NaBr/HOCl)	0.2–10 ppm	D1C, DAC	BRE 2-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirlpool water with bromorganic or inorganic bromine compounds	0.02-10 ppm	DULCOMARIN® II	BRE 3-CAN-10 ppm
Free and bound bromine	Cooling water, process water, waste water, water with higher pH values (stable)	0.02-20 ppm	D1C, DAC	CBR 1-mA-xppm
Chlorine dioxide	Drinking water	0.01–10 ppm	D1C, DAC, DULCOMARIN® II	CDE 2-mA-xppm
Chlorine dioxide	Bottle washer system	0.02–2 ppm	D1C, DAC, DULCOMARIN® II	CDP 1-mA
Chlorine dioxide	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01-10 ppm	D1C, DAC, DULCOMARIN® II	CDR 1-mA-xppm
Chlorite	Drinking, wash water	0.02–2 ppm	D1C, DAC, DULCOMARIN® II	CLT 1-mA-xppm
Ozone	Drinking, service, process, swimming pool water	0.02–2 ppm	D1C, DAC	OZE 3-mA-xppm
Dissolved oxygen	Drinking, surface water	2–20 ppm	D1C, DAC	DO 1-mA-xppm
Dissolved oxygen	Activated sludge tank, sewage treatment plant	0.1–10 ppm	D1C, DAC	DO 2-mA-xppm
Peracetic acid	CIP, antiseptic food filling process	1–2,000 ppm	D1C, DAC	PAA 1-mA-xppm
Hydrogen peroxide	Clear water, fast control	1–2,000 ppm	PEROX controller	Perox sensor PEROX-H2.10-P
Hydrogen peroxide	Process, swimming pool water	0.5–2,000 ppm	D1CA, DAC	PER1-mA-xppm

Selection Guide DULCOTEST® ORP Sensors



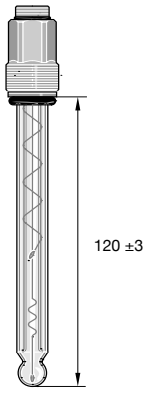
Selection Guide DULCOTEST® Conductivity Sensors



ProMinent® DULCOTEST® Sensors

pH Sensors With SN6 or Vario Pin

Series:							
PHE	pH sensor						
	Properties:						
	X	with solid electrolyte and circular gap diaphragm					
	K	with insensitive plastics shaft					
	N	refillable KCl electrode					
	E	Puncture electrode					
	R	with PFTE circular diaphragm					
	P	pressure tight up to 87.0 psi (6 bar)					
	D	2 ceramics diaphragms (double junction)					
	S	swimmimg pool electrode					
	F	resistant to hydrofluoric acid					
		unspecified: standard gel-filled electrode					
		Special equipment:					
		T	temperature up to 212 ºF (100 °C), alkali-resistant				
		H	with built in temperature gauge				
		L	vertical to horizontal installation				
			pH measuring range:				
			112	pH measuring range: 1 - 12			
				Electrical connection to electrode:			
				S	Plug for coax connector SN6		
				V	Vario Pin plug		
					Internal thread:		
					E	Internal thread PG 13.5 for installation	
					L	without, laboratory electrode refillable with KCl	
						Diaphragm:	
						3D	3 ceramics diaphragms
PHE	**X**	**T**	**112**	**S**	**E**	**3D**	



pk_6_016

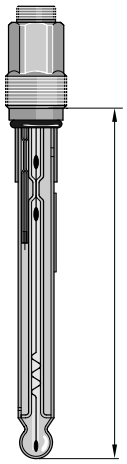
PHES 112 SE

pH range: 1-12
Temperature: 32-140 ºF (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.
PHES 112 SE	150702

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

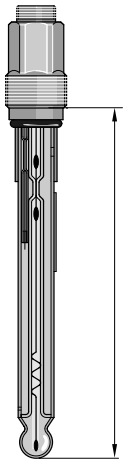


pk_6_019

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

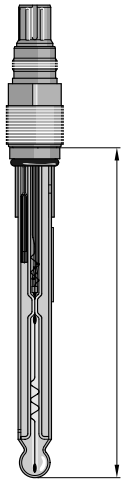


pk_6_019

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



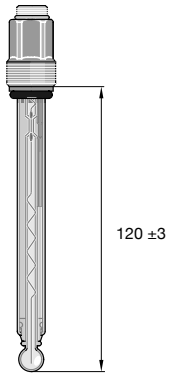
pk_6_068

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

pH Combination Sensors With SN6

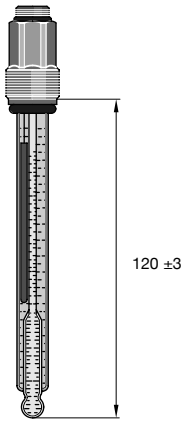


pk_6_018

PHER 112 SE

pH range: 1-12
Temperature: 32-176 ºF (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

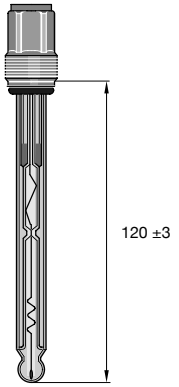
PHEX 112 SE

pH range: 1-12
Temperature: 32-212 ºF (0-100 °C)
Max. pressure: 232 psi (16 bar) at 77 ºF (25 °C); 87 psi (6 bar) at 212 ºF (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 Same as above but length 8.9“ (225 ±3 mm)	150061

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

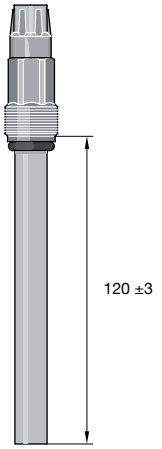


pk_6_022

PHED 112 SE

pH range: 1-12
Temperature: 32-176 °F (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



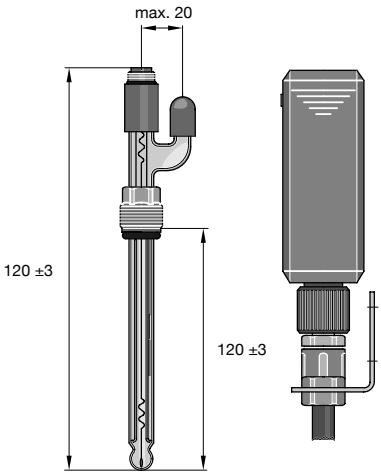
pk_6_007

PHEF 012 SE

HF

pH range: 1-12
Temperature: 32-122 °F (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 °F (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

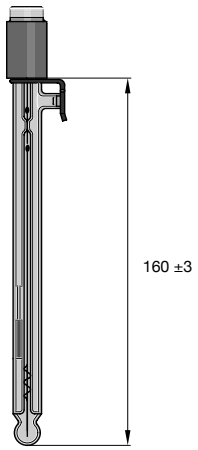
		Part No.
PHEN 112 SE		305090
Accessories:		
PE storage container with connectors and tubing		305058
We recommend installation approx. 1.5 - 3 ft. (0.5-1 m) above sample fluid level		
KCl solution 3 molar	250 ml	791440
KCl solution 3 molar	1000 ml	791441

pH Combination Sensors With SN6

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



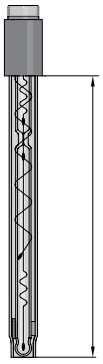
pk_6_020

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

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

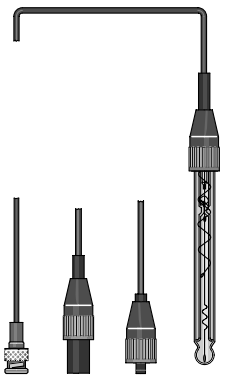
pH range 1-12
Temperature: 32-140 °F (0-60 °C)
Max. pressure: 44 psi
Min. conductivity: 150 µS/cm
Diaphragm: Ceramic
Shaft material: Polycarbonate
Installation dimensions: length:120mm, diameter: 12mm
Installation position: vertically to horizontally (0-90°)
Typical applications: swimming pool at elevated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

	Part No.
PHEK-L 112 SE	1034918

ProMinent® DULCOTEST® Sensors

pH Sensors with Fixed Cable

Series									
PHE	pH sensor								
	Properties								
	K	with insensitive plastics shaft							
	N	refillable KCl electrode							
	D	with double diaphragm (double injection)							
		Special equipment							
		T	with built in temperature gauge						
			pH measuring range						
			112	pH measurement range: 1...12					
				Electrical connection to electrode					
				F	fixed cable electrode				
					Internal thread				
					E	Internal thread			
					L	without, laboratory electrode refillable			
						Cable diameter			
						3	cable diameter 3 mm		
						5	cable diameter 5 mm		
							Cable length		
							01	cable length in meters	
								Electrical connection at device	
								S	SN6
								D	DIN
								B	BNC
								O	without connector
								M	SN6 male
PHE	**K**	**T**	**112**	**F**	**E**	**3**	**1**	**S**	



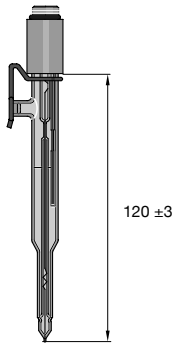
Type PHES 112 F

pH sensor, gel-filled, with coax cable and device plug, no internal thread.

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

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6



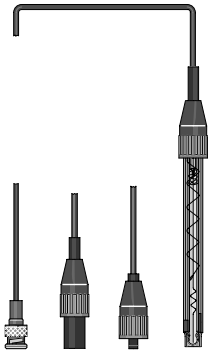
pk_6_025

PHEE 112 S

pH range: 1-12
Temperature: 32-140 °F (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



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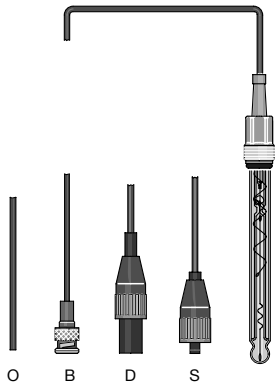
Type PHEK 112 F

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.



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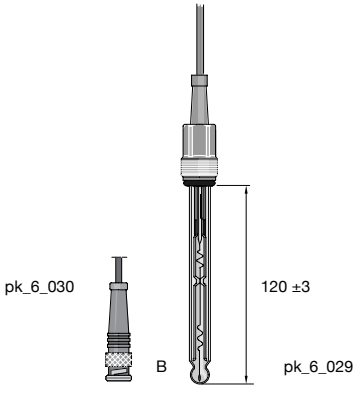
Type PHE 112 FE

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

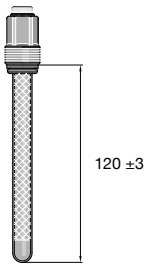
Type PHED 112 FE

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



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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

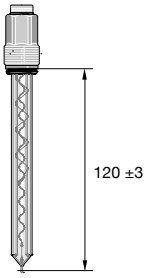
ORP Identcode Description

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

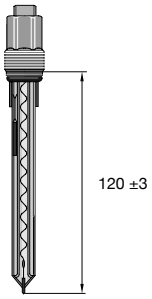
RHES-Pt-SE

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.
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)

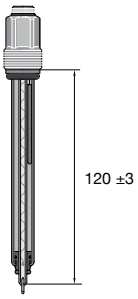
Typical applications: Swimming pools under pressure, potable and industrial water, lightly soiled wastewater, the electroplating and chemical industries, for higher temperatures and pressures.
Not suitable for media containing ozone

	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

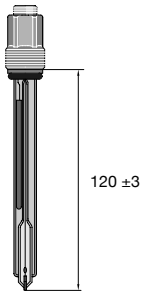


pk_6_034

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

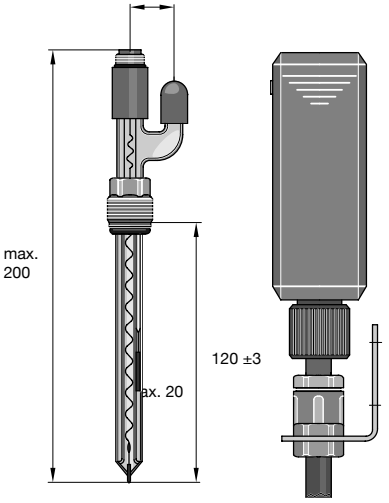
RHEX-Pt-SE

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 sulphite (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

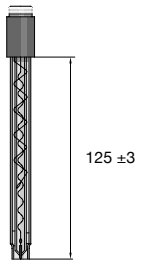


pk_6_032

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

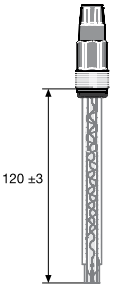


pk_6_036

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

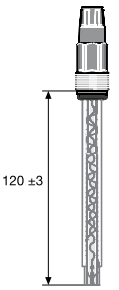


pk_6_091

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

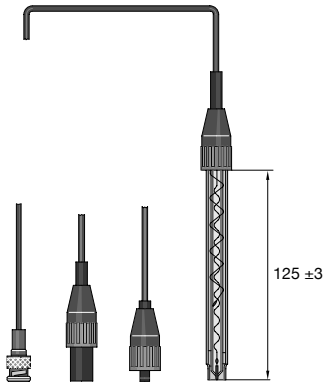
pk_6_037

ProMinent® DULCOTEST® Sensors

ORP Sensors With Fixed Cable

Series								
RHE	ORP sensor							
	Properties							
	K	Plastics shaft						
		Electrode material						
		Pt	Platinum					
			Electrical connection to electrode					
			F	Fixed cable electrode				
				Internal thread				
				E	internal thread PG 13.5			
					Cable diameter			
					3	cable diameter 0.12" (3 mm)		
					5	cable diameter 0.20" (5 mm)		
						Cable length		
						01	cable length in meters	
							Electrical connection at device	
							S	SN6
							D	DIN
							B	BNC
RHE	**K**	**Pt**	**F**	**E**	**3**	**1**	**S**	

The fixed cable electrodes with threaded male adapter, type … FE ... are fitted with a rotating threaded sleeve. This facilitates installation in in-line probe fittings because you rotate only the threaded sleeve and not the whole sensor when installing. The RHE types are replaced by higher-value types RHES. RHES sensors are supplied when order- ing RHE sensors. The conditions remain unaffected.



Type RHES-Pt-F

ORP combination probes with Pt electrode probe gel-filled, with glass shaft, without internal mounting thread.

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

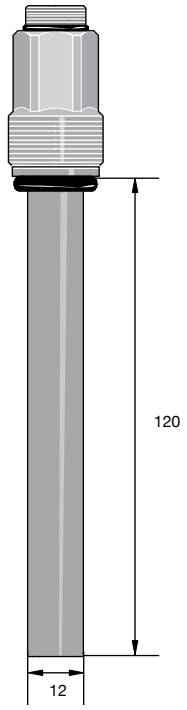
Type RHEK-Pt-F

ORP sensor 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.

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	7740215
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 and ozone sensors please note the following guidelines:

- Use DULCOMETER® measurement and control systems.
- Install only in ProMinent® DGM or DLG III in-line probe fittings.
- Defined flow between 7.9-15.8 gph (30-60 l/h).
- Chlorine measurement must only take place when pH is stable.
- 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 analog input signal.

Summary of features:

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

Measured variable	Applications	Graduated measuring range	DULCOMETER®	Sensor type
Free chlorine	Drinking water, swimming pool	0.01–100 ppm	D1C, DAC	CLE 3-mA-xppm, CLE 3.1-mA-xppm
Free chlorine	Drinking water, swimming pool water, in situ electrolysis (without diaphragm)	0.02-10 ppm	D1C, DAC	CLO 1-mA-xppm
Free chlorine	Hot water up to 70 °C (legionella), in situ electrolysis (without diaphragm)	0.02-2 ppm	D1C, DAC	CLO 2-mA-2ppm
Free chlorine	Drinking water, swimming pool	0.01–50 ppm	DMT	CLE 3-DMT-xppm
Free chlorine	Drinking water, swimming pool	0.01–10 ppm	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-xppm
Free chlorine	Drinking water, swimming pool	0.05-5 ppm	COMPACT	CLB 2-µA-xppm
Free chlorine	Cooling water, process water, waste water, water with higher pH values (stable)	0.01-10 ppm	D1C, DAC	CBR 1-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.02–10 ppm	D1C, DAC	CGE 2-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.01–10 ppm	DULCOMARIN® II	CGE 2- CAN-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	D1C, DAC	CTE 1-mA-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DMT	CTE 1-DMT-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm
Combined chlorine	Swimming pool water	0.02–2 ppm	DAC	CTE 1-mA-2 ppm + CLE 3.1-mA-2 ppm
Combined chlorine	Swimming pool water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm + CLE 3.1-CAN-xppm
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with bromorganic disinfectants (e.g. BCDMH)	0.2–10 ppm	D1C, DAC	BRE 1-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with inorganic bromine compounds (e.g. NaBr/HOCl)	0.2–10 ppm	D1C, DAC	BRE 2-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirl- pool water with bromorganic or inorganic bromine compounds	0.02-10 ppm	DULCOMARIN® II	BRE 3-CAN-10 ppm
Free and bound bromine	Cooling water, process water, waste water, water with higher pH values (stable)	0.02-20 ppm	D1C, DAC	CBR 1-mA-xppm

ProMinent® DULCOTEST® Sensors

Overview: Amperometric Sensors

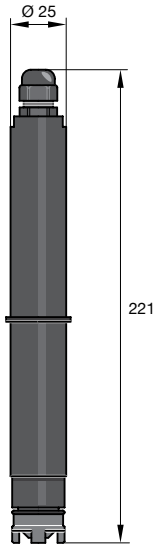
Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Chlorine dioxide	Drinking water	0.01–10 ppm	D1C, DAC, DULCOMARIN® II	CDE 2-mA-xppm
Chlorine dioxide	Bottle washer system	0.02–2 ppm	D1C, DAC, DULCOMARIN® II	CDP 1-mA
Chlorine dioxide	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01-10 ppm	D1C, DAC, DULCOMARIN® II	CDR 1-mA-xppm
Chlorite	Drinking, wash water	0.02–2 ppm	D1C, DAC DULCOMARIN® II	CLT 1-mA-xppm
Ozone	Drinking, service, process, swimming pool water	0.02–2 ppm	D1C, DAC	OZE 3-mA-xppm
Dissolved oxygen	Drinking, surface water	2–20 ppm	D1C, DAC	DO 1-mA-xppm
Dissolved oxygen	Activated sludge tank, sewage treatment plant	0.1–10 ppm	D1C, DAC	DO 2-mA-xppm
Peracetic acid	CIP, antiseptic food filling process	1–2,000 ppm	D1C, DAC	PAA 1-mA-xppm
Hydrogen peroxide	Clear water, fast control	1–2,000 ppm	PEROX controller	Perox sensor PEROX-H2.10-P
Hydrogen peroxide	Process, swimming pool water	0.5–2,000 ppm	D1C, DAC	PER1-mA-xppm

Overview: Amperometric Sensors Selection Guide

		Selection Guide							
		CLE 3	**CLE 3.1**	**CLO 1**	**CLO 2**	**CLB 2**	**CBR 1**	**CGE 2**	**CTE 1**
Measured variable	Free chlorine	x	x	x	x	x	x		
	Total available chlorine (cyanuric acid derivatives)							x	x
	Total chlorine							x	x
Selectivity of free chlorine	raised		x						
	yes	x		x	x	x	x		
	no							x	x
Application	Public swimming pools	x	x			x		(x)	
	Private swimming pools	x	x	x		x		x	
	Drinking water	x	x		x	x			x
	Cooling water						x		x
	Waste water						x		x
Disinfectant	chlorine gas, hypochlorite, electrolysis with diaphragm	x	x	x	x	x	x		x
	electrolysis without diaphragm			x	x	x			
	chlorine-containing cyanuric acid derivatives							x	
Specifications	Measuring range [ppm]	0.01-100	0.01-10	0.02-2	0.02-2	0.05-5	0.01-10	0.02-10	0.01-10
	pH range	5.5-8	5.5-8	5-9	5-9	5-9	5-9.5	5.5-9.5	5.5-9.5
	Temperaturer (°F)	41-113	41-113	41-113	41-158	41-113	41-113	41-113	41-113
	(°C)	5-45	5-45	5-45	5-70	5-45	5-45	5-45	5-45
	Max. pressure [bar]	1	1	8	8	8	1	3	3
Installation	open outlet	x	x	x	x	x	x	x	x
	direct installation in the circuit			x	x	x			

Note: Interference, such as film-forming substances, chemical residue, flow, conductivity

Chlorine Sensors



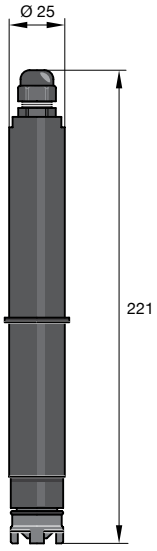
pk_6_039

Measurement of free chlorine

CLE 3-mA

Measured variable:	**Free chlorine (hypochlorous 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, DAC, 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 set with 100 ml electrolyte	1022786



pk_6_039

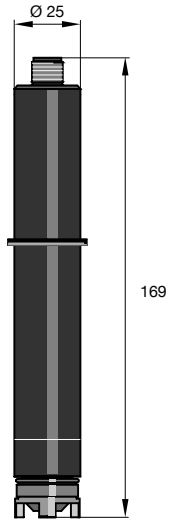
CLE 3.1-mA

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, DAC, 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

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_038

CLE 3-DMT

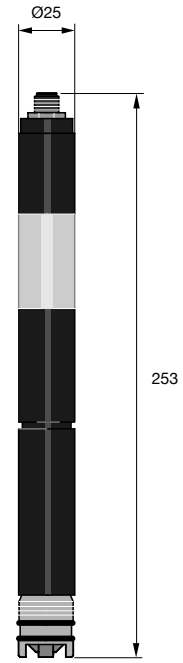
Measuring cell for use with the DMT “chlorine” measurement transducer.

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.



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

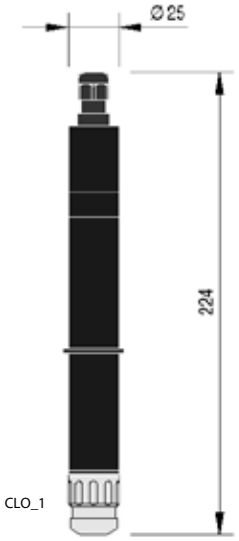
Additional data see CLE 3-mA

	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.

ProMinent® DULCOTEST® Sensors

Chlorine Sensors

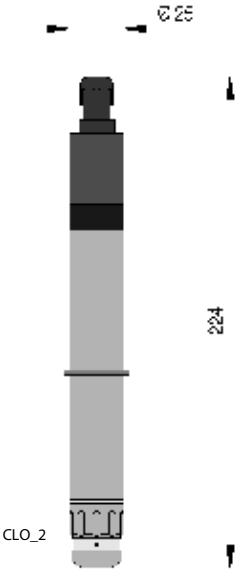


CLO_1

CLO 1-mA

Measured variable:	**Free chlorine (hypochlorous acid HOCl)**
Reference method:	DPD1
pH range:	5-9 ppm
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	116 psi (8 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III), constant flow as flow-dependent signal
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Swimming pool, uncontaminated drinking water and industrial service water, and can also be used together with diaphragm-free electrolysis processes
Measurement and control equipment:	D1C, DAC
In-line probe fitting:	DGM, DLG III to 140 °F (60 °C), special fitting for 140-158 °F (60-70 °C) on request
Measuring principle:	amperometric, 3 electrodes, no diaphragm

	Measuring range	Part No.
CLO 1-mA-2 ppm	0.02-2.0 ppm	1033871
CLO 1-mA-2 ppm	0.10-10.0 ppm	1033870



CLO_2

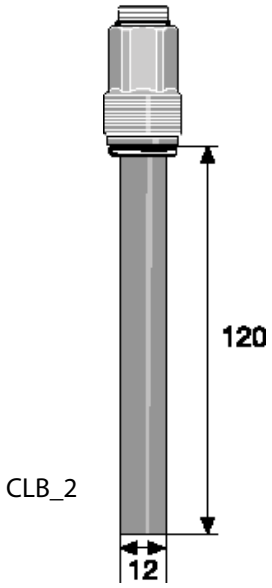
CLO 2-mA

Measured variable:	**Free chlorine (hypochlorous acid HOCl)**
Reference method:	DPD1
pH range:	5-9 ppm
Temperature:	41-158 °F (5-70 °C)
Max. pressure:	116 psi (8 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III), constant flow as flow-dependent signal
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Hot water up to 158 °F (70 °C), combatting legionella, uncontaminated drinking water and industrial service water, can, also be used together with diapgragm-free electrolysis processes
Measurement and control equipment:	D1C, DAC
In-line probe fitting:	DGM, DLG III to 140 °F (60 °C), special fitting for 140-158 °F (60-70 °C) on request
Measuring principle:	amperometric, 3 electrodes, no diaphragm

	Measuring range	Part No.
CLO 2-mA-2 ppm	0.02-2.0 ppm	1033878

ProMinent® DULCOTEST® Sensors

Chlorine Sensors

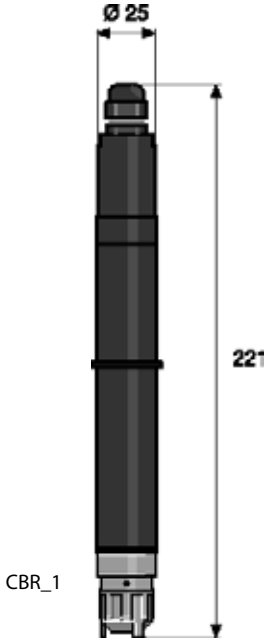


CLB_2

CLB 2-µA

Measured variable:	**Free chlorine (hypochlorous acid HOCl)**
Reference method:	DPD1
pH range:	5-9 ppm
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	116 psi (8 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III), constant flow needed as flow-dependent signal
Power supply:	16-24 V DC (2-wire)
Output signal:	Non-amplified primary current signal, non-temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Private swimming pool, can also be used together with Diaphragm-free electrolysis processes for the generation of chlorine
Measurement and control equipment:	Compact controller
In-line probe fitting:	DGM, DLG III
Measuring principle:	amperometric, 3 electrodes, no diaphragm

	Measuring range	Part No.
CLB 2-µA-5 ppm	0.05-5.0 ppm	1038902



CBR_1

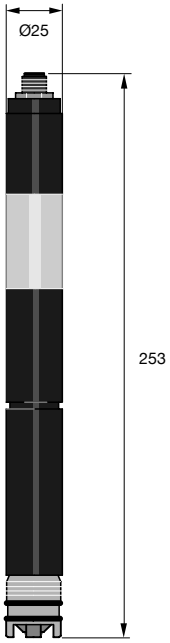
CBR 1-mA

Measured variable:	**Free chlorine (hypochlorous acid HOCl), free bromine, bound-bromine**
Reference method:	DPD1
pH range:	5-9.5 ppm
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	14.5 psi (1 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL II)
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Cooling water, Process water, Waste water, Water with high higher pH values (stable pH)
Measurement and control equipment:	D1C, DAC
In-line probe fitting:	DGM, DLG III
Measuring principle:	amperometric, 2 electrodes,diaphragm-covered

	Measuring range	Part No.
CBR 1-mA-0.5 ppm	0.01-.5 ppm	1038016
CBR 1-mA-2 ppm	0.02-2 ppm	1038015
CBR 1-mA-10 ppm	0.10-10 ppm	1038014

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_096

CLE 3.1-CAN

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

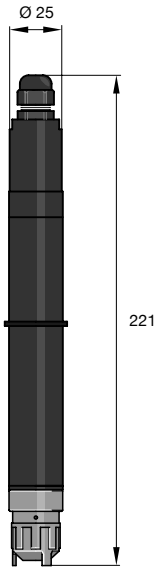
Measured variable:	**free chlorine (hypochlorous acid) with high proportion of bound chlorine and/or pH value up to 8.5 (with pH correction via D1C)**
Reference method:	DPD 1
Measurement range:	0.01 -10 mg/l
Power supply:	via CAN-interface (11-30 V)
Temperature measurement:	via installed digital semiconducter 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

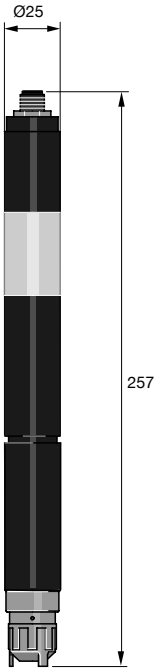
CGE 2-mA

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, DAC, 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

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_084

CGE 2-CAN

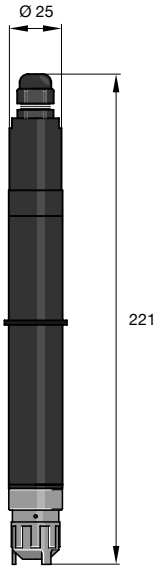
Probe for connection to a CANopen interface (e.g. DULCOMARIN® II swimming pool controller)

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

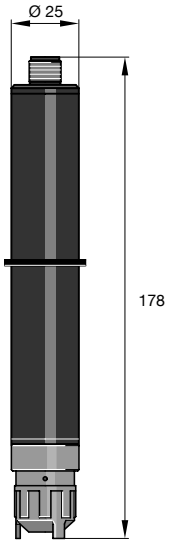
Measured variable of total chlorine

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, DAC, 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

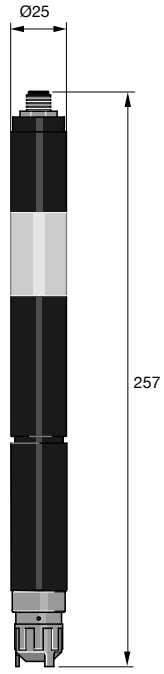
Measuring cell for use with the DMT “chlorine” measurement transducer.

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.



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

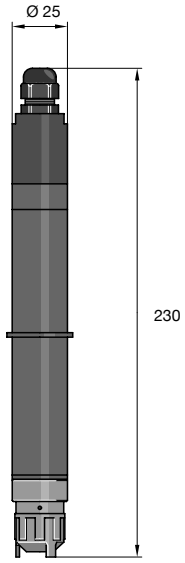
Additional data see CLE 3-mA

	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 brominating 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

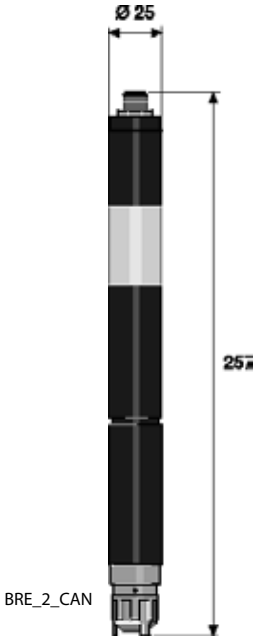
Measured variable:	**Total available bromine (free and organic bound bromine)**
Bromine chemicals:	DBDMH (1.3-dibromine 5.5-dimethyl hydantoin) BCDMH (1-bromine-3-chlorine-5.5-dimethyl hydantoin), free bromine
Reference method:	DBDMH, free bromine: DPD1 BCDMH: DPD4
Measurement range:	DBDMH free bromine: 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:	41-113 ºF (5-45 °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, DAC
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.

ProMinent® DULCOTEST® Sensors

Bromine Sensors



BRE 3-CAN

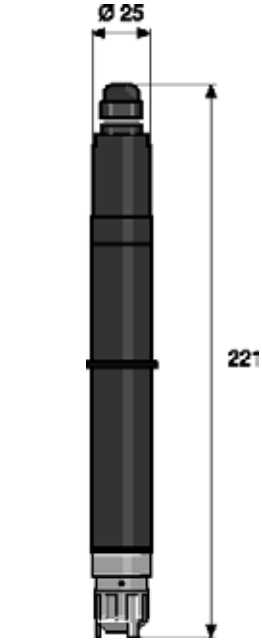
Sensor for connection to CAN interface

(e.g. swimming pool controller DULCOMARIN® II)

Measured variable:	**Total available bromine**
Reference method:	DBDMH, free bromine: DPD1
	BCDMH: DPD4
pH dependence:	if pH changes from pH 7 to pH 8, the sensor sensitivity is reduced
	a) in the case of DBDMH and free bromine by approx. 10 %
	b) in the case of BCDMH by approx. 25 %
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	43.5 psi (3 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III)
Supply Voltage:	Via CAN interface (11-30 V)
Output signal:	Uncalibrated, temerature-compensated, electrically isolated
Typical applications:	Swimming pools/whirlpools and cooling water; can also be used in seawater
Measurement and control equipment:	DULCOMARINN®II
In-line probe fitting:	DGM, DLG III
Measuring principle:	amperometric, 2 electrodes, diaphragm covered

	Measuring range	Part No.
BRE 3-CAN	0.02-10.0 ppm	1029660

Note: You require an assembly kit **(part no. 815079)** for the initial installation of the bromine sensor into the in-line probe housing DLG III



BCR 1-mA

Measured variable:	Bromine from **BCDMH** (bromo-3-chloro-5.5-dimethylhydantoin) and **N-bromamide sulphate**
Reference method:	DPD4
pH range:	5-9.5 ppm
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	14.5 psi (1 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL II)
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Cooling water, Process water, Waste water, Water with high higher pH values (stable pH)
Measurement and control equipment:	D1C, DAC
In-line probe fitting:	DGM, DLG III
Measuring principle:	amperometric, 2 electrodes,diaphragm-covered

	Measuring range	Part No.
BCR 1-mA-0.5 ppm	0.01-.5 ppm	1041697
BCR 1-mA-2 ppm	0.02-2 ppm	1040115
BCR 1-mA-10 ppm	0.10-10 ppm	1041698

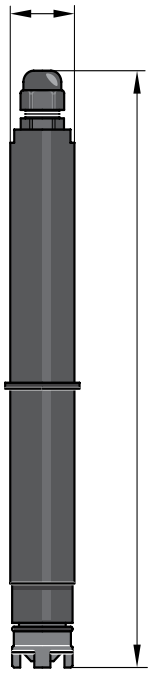
ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensor Overview

Sensor type	CDE 2-mA	CDE 3-mA	CDP 1-mA	CDR 1-mA
Application	Drinking water	Hot water circuits	Bottle Washer system	Cooling water, waste water, Agriculture
Measurement range	0.01-10	0.01-0.50	0.02-2	0.01-10
Temperature	41-113 °F (5-45 °C)	41-140 °F (5-60 °C)	50-113 °F (10-45 °C)	33.8-131 °F (1-55 °C)
Max. pressure	14.5 psi (1.0 bar)	14.5 psi (1.0 bar)	43.5 psi (3.0 bar)	43.5 psi (3.0 psi)
pH range	4-11	4-11	5.5-10.5	1.0-10.0
Response time	120 sec	120 sec	60 sec	180 sec
Run-in time	2-6 hrs	2-6 hrs	4-12 hrs	2-6 hrs
Surfactant-resistance	no	no	yes	yes
Contamination resistance	no	no	under certain conditions	yes

Cross sensitivity CDE <2% to Chlorine and Ozone interference

Chlorine Dioxide Sensors



CDE 2-mA

Measured variable:	Chlorine dioxide (ClO2)
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:	ClO2 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, DAC
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 maximum temperature 140 °F (60 °C)

Typical application: chlorine dioxide treatment to combat legionella

CDE 2.1-mA

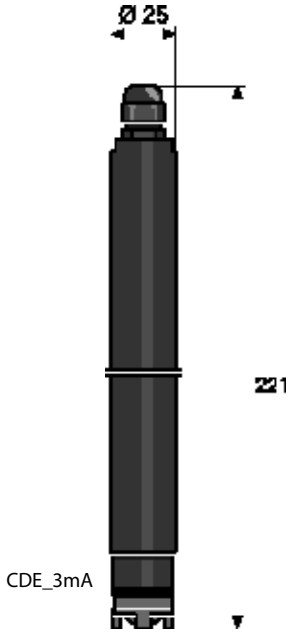
0.5 ppm comes complete with 100 ml of electrolyte

Order on request

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

ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensors



CDE 3-mA

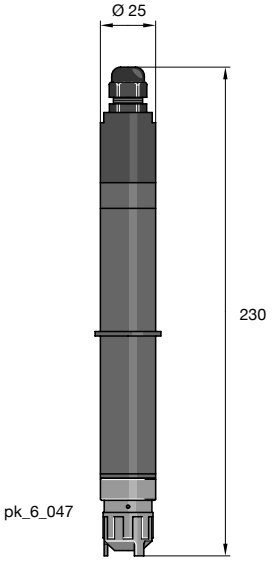
Measured variable:	**Chlorine dioxide (ClO_2)**
Reference method:	DPD1
pH range:	4-11 ClO_2 stability range
Cross sensibility:	Ozone, compared with chlorine <2%
Temperature:	41-140 °F (5-60 °C)
Max. pressure:	14.5 psi (1 bar) no pressure surges
Intake flow:	7.9-15.9 gph (30-60 l/h) in DGM
Supply voltage:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Type application:	chlorine dioxide treatment of uncontaminated warm water to combat legionellae
Measuring and control device:	D1C, DAC
In line probe fitting:	DGM, DLG III
Measuring principle	amperometric, 2 electrodes, diaphragm-covered

	Measuring range	Part No.
CDE 3-mA-0.5 ppm	0.01-0.5 ppm	1026154

Chlorine dioxide sensors complete with electrolyte, 100 ml

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

Chlorine Dioxide Sensors



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

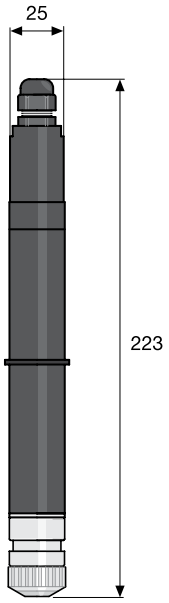
Applications:	Bottle washing machines and water containing surfactants
Measured variable:	**Chlorine dioxide (ClO_2)**
Reference method:	DPD1
Measurement range:	0.02-2.00 mg/l
pH range:	5.5-10.5
Temperature range:	50-113 °F (10-45 °C) short term periods 131 °F (55 °C) with **external temperature correction** 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, DAC 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.

ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensors



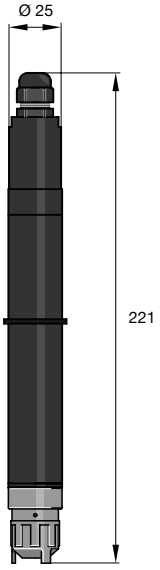
pk_6_083

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, DAC
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

Chlorite Sensors



pk_6_040

Measured variable chlorite CLT 1-mA

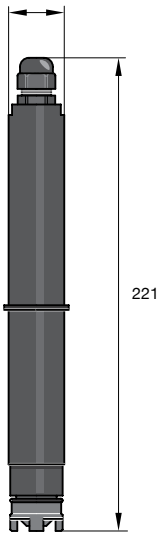
Measured variable:	**chlorite anion (ClO_2^-)**
Reference method:	DPD method Chlorite in presence of chlorine dioxide
Measurement range:	0.020-0.500 mg/l (CLT 1-mA-0.5 ppm) 0.10-2.00 mg/l (CLT 1-mA-2 ppm)
pH range:	6.5-9.5
Temp. Range:	33.8-104 °F (1-40 °C) temperature compensated
max. pressure:	1 bar
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, DAC
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.

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

Ozone Sensors



pk_6_039

OZE 3-mA

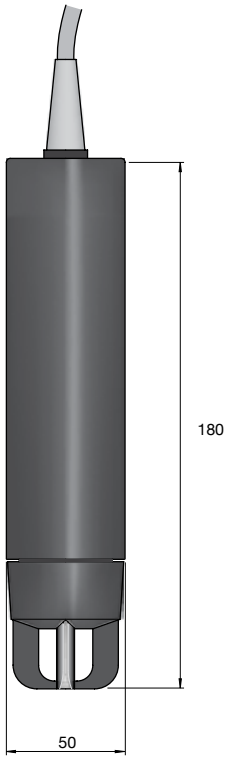
Measured variable:	**Ozone (O_3)**
Reference method:	DPD4
Measurement range:	0.02-2.00 mg/l
pH range:	Ozone stability range
Temperature range:	41-104 °F (5-40 °C) temperature compensated, no significant Temperature fluctuations
Max. pressure:	1 bar
Flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power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

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

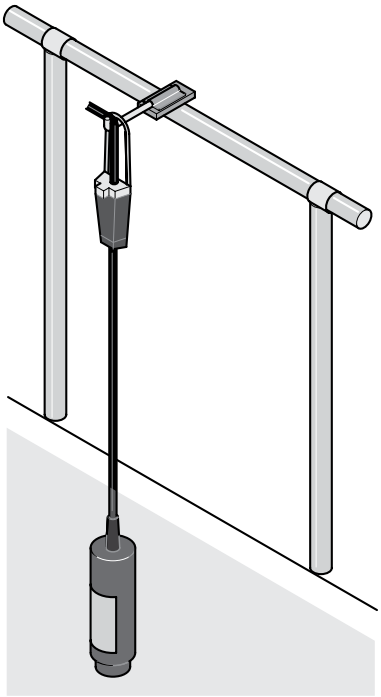
Note: You require assembly kit Part No. 815079 for the initial installation of the ozone sensors into the DLM III in-line probe housing.

ProMinent® DULCOTEST® Sensors

Dissolved Oxygen Sensors



pk_6_050_1



pk_6_011

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.

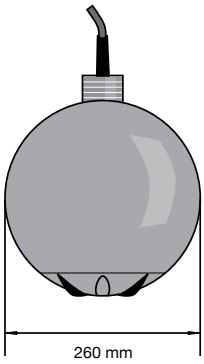
The following sensors are assigned to the different applications and can be supplied separately as 4-20 mA-transmitters to central controllers or together with the D1C as a stand alone solution.

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 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 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

Dissolved Oxygen Sensors

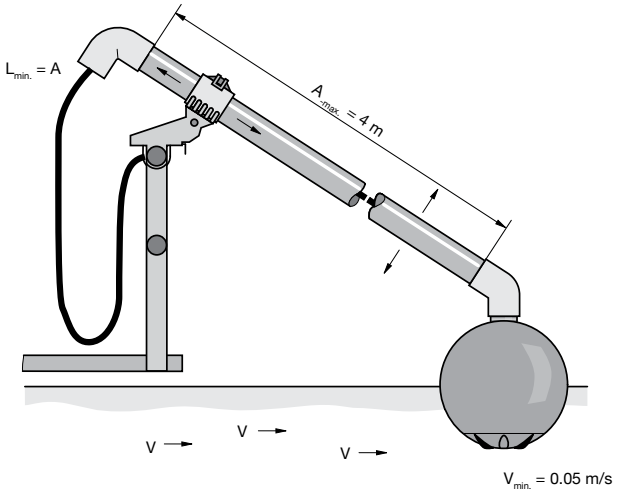


pk_6_051

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). 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

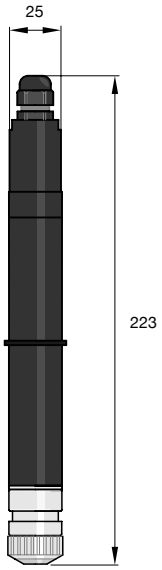
	Part No.
DO 2-mA-10 ppm	1020533



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 °F (1-45 °C) temperature compensated
Admissible temperature fluctuation:	0.3 °/min
Response time T_{90}	3 min.
Max. Pressure.:	43.5 psi (3 bar) at 86 °F (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, DAC
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
- Deodorization (gas scrubber) in municipal and industrial wastewater purification plants
- Dechlorination in chemical processes

Sensors are selected using the following decision table:

Requirement	Type	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

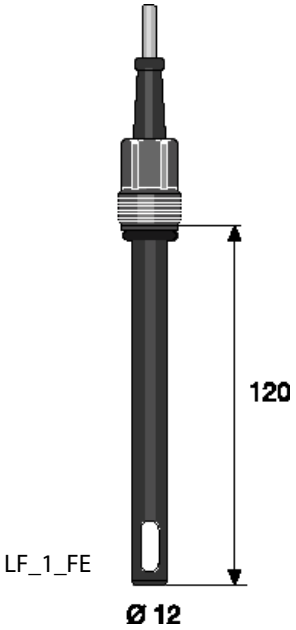
Operating conditions

Requirement	Type	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	DAC...H 7	DAC...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	1034100
PER 1- mA - 200 ppm	1022509
PER - mA - 2000 ppm	1022510
PER 1- mA - 50 ppm	1030511

ProMinent® DULCOTEST® Sensors

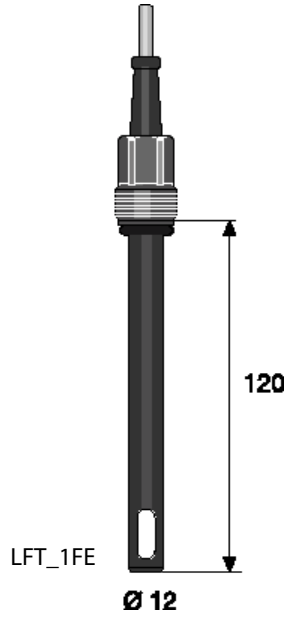
Conductivity Sensors



LF 1 FE

Measurement range:	0.01-20 mS/cm
Cell constant k:	1 cm^{-1} ± 5%
Temperature compensation:	-
Fluid temperature:	32-176 °F (0-80 °C)
Max. pressure:	232 psi (16 bar)
Electrode material:	Special graphite
Shaft material:	Epoxy
Thread:	PG 13.5
Installation length:	120 ± 3 mm
Electrical connection:	5 m fixed cable (2 x 0.5 mm^2)
Typical applications:	Drinking, cooling, industrial water.The sensors in the LF series are not wholly suitable for the measurement of cleaning solutions containing surfactants or liquids containing solvents.

	Part No.
LF 1 FE	741152



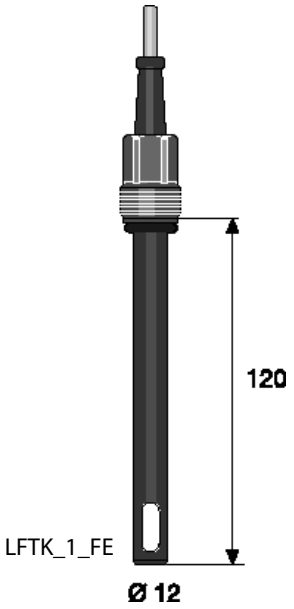
LFT 1FE

Measurement range:	0.01-20 mS/cm
Cell constant k:	1 cm^{-1} ± 5%
Temperature compensation:	Pt 100
Fluid temperature:	32-176 °F (0-80 °C)
Max. pressure:	232 psi (16 bar)
Electrode material:	Special graphite
Shaft material:	Epoxy
Thread:	PG 13.5
Installation length:	120 ± 3 mm
Electrical connection:	5 m fixed cable (2 x 0.5 mm^2)
Typical applications:	Drinking, cooling, industrial water.The sensors in the LF series are not wholly suitable for the measurement of cleaning solutions containing surfactants or liquids containing solvents.

	Part No.
LFT 1FE	1001374

ProMinent® DULCOTEST® Sensors

Conductivity Sensors

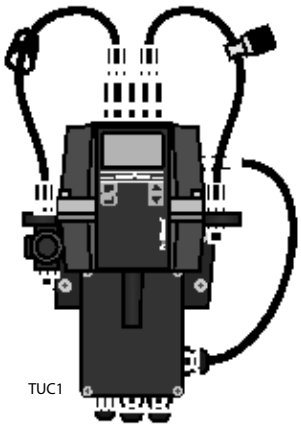


LFTK 1 FE

Measurement range:	0.01-20 mS/cm
Cell constant k:	1 cm^{-1} ± 5%
Temperature compensation:	Pt 1000
Fluid temperature:	32-176 °F (0-80 °C)
Max. pressure:	232 psi (16 bar)
Electrode material:	Special graphite
Shaft material:	Epoxy
Thread:	PG 13.5
Installation length:	120 ± 3 mm
Electrical connection:	5 m fixed cable (2 x 0.5 mm^2)
Typical applications:	Drinking, cooling, industrial water.The sensors in the LF… series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents

	Part No.
LFTK 1 FE	1002821

Measuring Points for Turbidity



The new DULCOTEST® measuring points for turbidity in the DULCO® turb C range with versions TUC1, TUC2, TUC3 and TUC4, are compact online turbidity measuring points, consisting of a sensor, inline flow fitting and measuring device. The measuring device permits the measured value to be displayed, calibration, transmission of the measured value via a 4-20 mA signal and the indication of limit value transgressions and device faults. The measuring cuvette integrated in the measuring device enable the device to operate in the bypass of the process line. The visual measuring unit does not come into contact with the sample medium.

The intended application is the treatment of drinking water, whereby the DULCO® turb C can be used in all treatment stages of raw water, from filter monitoring to measurement of fine turbidity in dispensed drinking water. It is also possible to monitor the turbidity of slightly contaminated process water and waste water, as well as treated water from the food and beverage industry up to a turbidity value of 1,000 NTU. Compared with the TUC 1 / TUC 2, the measuring stations TUC 3 / TUC 4 include an ultrasound-based self-cleaning function. This helps in particular to extend the service intervals particularly when used with the types of water that form films.

The measuring principle is identical to light scatter measurements. The light beam that is beamed into the measuring cuvette filled with sample water is dispersed on turbidity particles and the scattered light is measured at right angles (90°) to the beamed in light (Nephelometric measurement). The measuring unit for the turbidity measurement can be given as NTU (Nephelometric Turbidity Unit) or as FNU (Formazin Nephelometric Unit). The measuring process of types TUC1/TUC3 (infrared light) corresponds to the globally applicable standard ISO 7027 and the European Standard DIN EN 27027. The measuring process of types TUC3/TUC4 (achromatic light) corresponds to the US American standard USEPA 180.1.

ProMinent® DULCOTEST® Sensors

Measuring Points for Turbidity

Measurement range:	0 … 1,000.0 NTU
Accuracy	± 2 % of the displayed value or ± 0.02 NTU below 40 NTU, depending on which value is the greater
	± 5 % of the displayed value above 40 NTU
Resolution:	0.0001 NTU below 10 NTU
Response time:	configurable
Display:	Multiple row LCD display with background lighting
Alarm relay:	Two programmable alarms, 120-240 VAC, 2 A Form C relay
Output signal:	4-20 mA, 600 Ω, not electrically isolated: dual-isolated, degree of interference, overvoltage category II
Communication interface:	Bi-directional RS-485, Modbus
Max. pressure:	Integrated pressure regulating valve regulates 1380 kPa (200 psi), based on the flow rate Flow 1.6-15.9 gph (6 – 60 l/h)
Temperature:	33.8-122 ºF (1-50 °C)
Material that contacts with the media:	Polyamide (PA), silicone, polypropylene (PP), stainless steel, borosilicate glass
Voltage supply:	100 - 240 VAC, 47-63 Hz, 80 VA
Ambient conditions:	Not suitable for outdoor use
	Maximum altitude 1.24 miles above sea level
	Maximal 95 % relative air humidity (non-condensing).
Enclosure rating:	IP 66
Standard:	USEPA 180.1 with the "Infrared" version, ISO 7027 or DIN EN 27027 with the "Achromatic light" version
Dimensions H x W x D:	34" x12" x 12" (35 x 30 x 30 cm)
Shipping weight:	5.5 lbs. (2.5 kg)

	Standard	Ultrasonic cleaning	Part no.
TUC 1	Infrared: ISO 7027, DIN EN 27027	No	1037696
TUC 2	Achromatic light: US EPA 180.1	No	1037695
TUC 3	Infrared: ISO 7027, DIN EN 27027	Yes	1037698
TUC 4	Achromatic light: US EPA 180.1	Yes	1037697

Spare parts

	Part no.
Drying agent	1037701
Cuvette TUC 1 / TUC 2	1037877
Cuvette TUC 3 / TUC 4	1037878
Infrared lamp TUC 1 / TUC 3	1037702
Achromatic light lamp TUC 2 / TUC 4	1037703
Hose kit	1037879
Pressure regulating valve	1037885

Accessories

	Part no.
Calibration set	1037699
Flow control	1037880
Air bubble trap	1037790

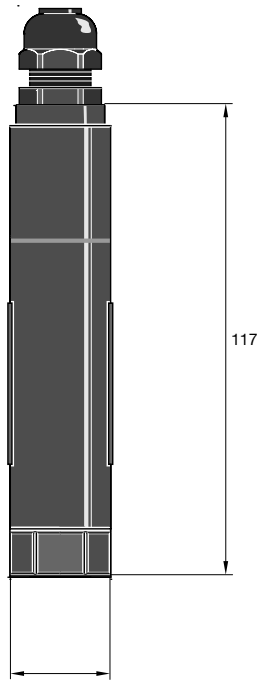
Sensor Accessories

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.



pk_5_064

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

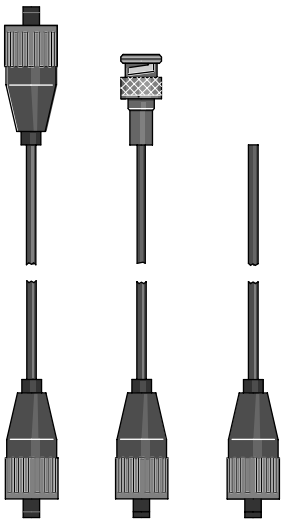
Technical data as for pH transmitter, but:

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



pk_6_054

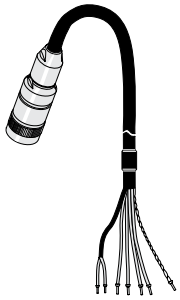
General guidelines:

- 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

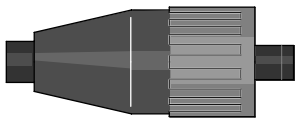
Design	Description		Part No.
2 x SN6	coax Ø 5 mm	3 ft. (0.8 m) - SS	305077
	coax Ø 5 mm	6 ft. (2.0 m) - SS	304955
	coax Ø 5 mm	15 ft. (5.0 m) - SS	304956
	coax Ø 5 mm	30 ft. (10.0 m) - SS	304957
SN6 - open end	coax Ø 5 mm	6 ft. (2.0 m) - S	305030
	coax Ø 5 mm	15 ft. (5.0 m) - S	305039
	coax Ø 5 mm	30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


pk_6_069

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


pk_6_056

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

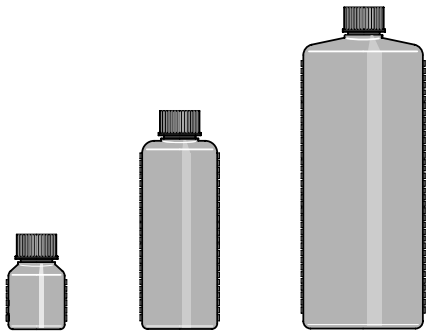
	Part No.
Please specify length with order.	723712

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.	7740215

Buffer Solutions



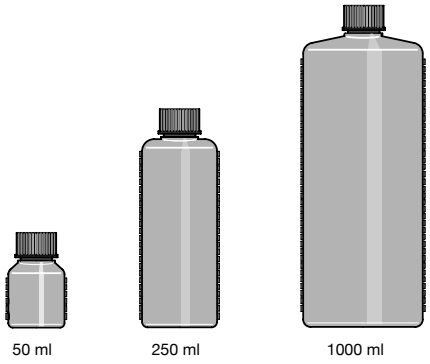
pk_6_058

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



pk_6_058

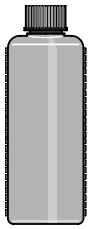
3 molar KCl solutions

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

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.

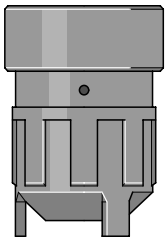
	Part No.
Buffer sol. LF 1413 myS/cm 250 ml	1027655
Buffer sol. LF 1413 myS/cm 1000 ml	1027656
Buffer sol. LF 12,88 mS/cm 250 ml	1027657
Buffer sol. LF 12,88 mS/cm 1000 ml	1027658

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



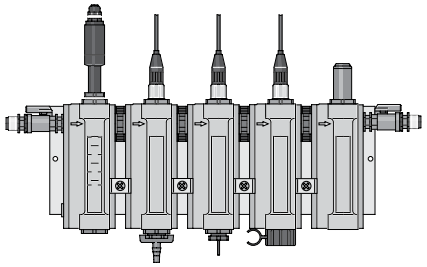
pk_6_075

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

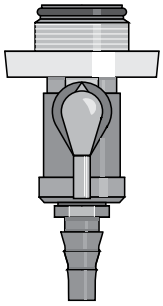
To accept conductivity, Pt 100, pH or ORP probes with PG 13.5 screw-in thread, or amperometric sensors with R 1" screw-in thread.

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:	140 °F, (60 °C)
Max. pressure:	87 psi, (6 bar) / 86 °F, (30 °C) 14.5 psi, (1 bar) / 140 °F, (60 °C) 29 psi, (2 bar),(with flow monitor, 86 °F, (30 °C))
Flow volume:	Up to 21 gph, (80 l/h),(10.5 gph, (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 mΩ
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	Series Version:							
	A	Series						
		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				
				Number of 25 mm modules:				
				0	None			
				1	One 25 mm module*			
				2	Two 25 mm modules*			
					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
DGM	**A**	**0**	**0**	**0**	**T**	**0**	**0**	

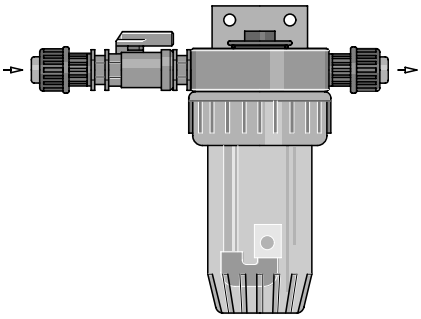
NOTE: Add 15 mm mounting set for PHEP/RHEP sensors

* 25 mm mounting set needed, P/N 791818

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

Sensor Accessories

DLG Sensor Housings



pk_6_063

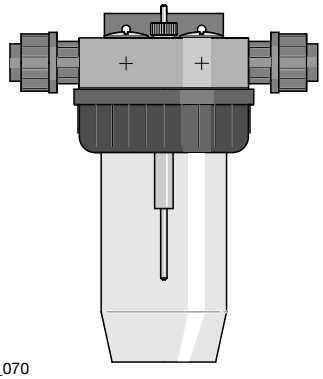
DLG III type in-line probe housing

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



pk_6_070

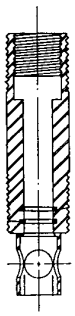
DLG IV type in-line probe housing

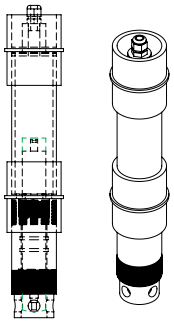
To take **4 electrodes** (pH, ORP, Pt 100, conductivity) with PG 13.5 threaded connector, with integrated stainless steel pin as liquid reference potential. Bracket for wall mounting.

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.	7500192

PVDF holder (for pH/ORP)

PVDF universal in-line sensor holder with 3/4" MNPT, 5" (127 mm) long body.	7500139

Stainless steel holder (for pH/ORP)

Stainless steel universal in-line sensor holder with 3/4" MNPT, 5" (127 mm)long body.	7500194

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.	7500005

25 mm Submersible holder (consult factory for details)

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