Product catalogue 2020

Measuring, Control and Sensor Technology

ProMinent®

DULCOnneX

2020

Issued by:

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Product Catalogue Volume 2

Measuring, Control and Sensor Technology

Precision by design

Precise sensor technology and high-performance measuring and control technology are the guarantee of process reliability when metering liquid media.

Chapter 1

A wealth of DULCOTEST® **sensors** for the precise recording of the most diverse parameters in real time.

Chapter 2

Controllers introduce consistent quality into your process. From the simple conversion of measuring signals to controllers optimised for complex, application-specific control tasks.

Chapter 3

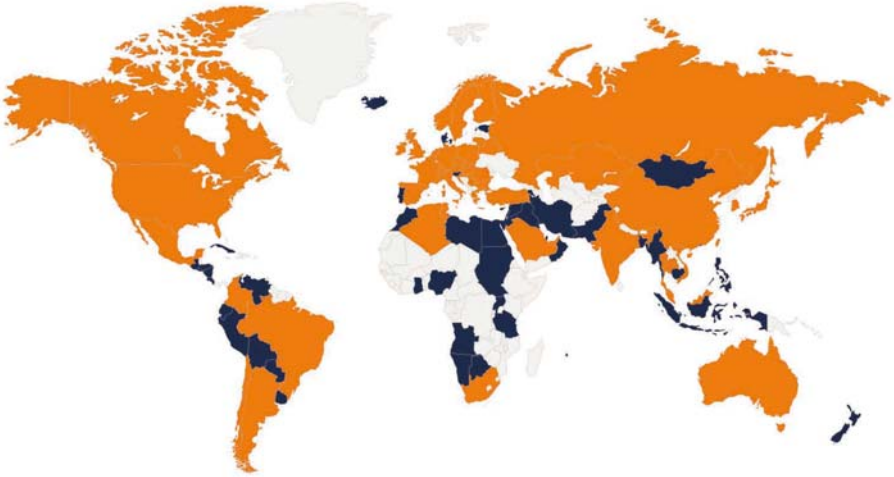
Fully assembled **measuring and control points** which are designed for the measurement of potable water, cooling water and waste water. The ready-wired plug-and-play modules, with perfectly matched components, are ready for fast and easy installation.

Chapter 4

DULCODOS® Pool for the **treatment of swimming pool water** are panel-mounted complete systems available in different models - from private pools to public swimming pools.

Ready for you. Anytime, anywhere.

ProMinent is close to hand no matter where you are: 55 dedicated sales, production and service companies guarantee service and availability in close proximity to our customers. For many years this has meant a local presence for our customers in over 100 countries.



Our sales team will be happy to be of assistance should you have any questions about metering technology or water treatment. You will find the contact details of your local contact at

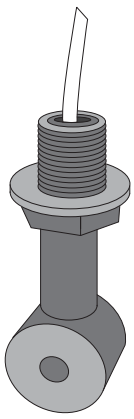
www.prominent.com/en/locations.

Pump Guide

You can also find information online. The ProMinent pump selection guide is available on our website. Just enter the required pump capacity and back pressure, and the Pump Guide will show you a list of suitable metering pumps. This is the quick and easy way to track down precisely the right pump for your needs.

www.pump-guide.com

New Measuring, Control and Sensor Technology Products

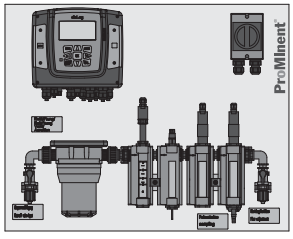


Conductivity sensor ICT 8-mA for contaminated water with 4...20 mA connection

The inductive sensor type ICT8 lets you reliably measure electrolytic conductivity in polluted water as well. The sensor delivers a temperature-corrected and factory-calibrated 4...20 mA output signal. You can therefore operate it directly with the controllers diaLog DAC, D1Cb, D1Cc, AEGIS II and DULCOMARIN®.

- Measured variable: electrolytic conductivity up to 200 mS/cm without polarisation effect
- The inductive (non-contact) measuring principle permits applications in water with solids content and in film-forming media
- Fail-safe 4-20 mA output signal for flexible connection to measuring equipment with standard 4...20 mA input
- Integrated temperature correction replaces separate temperature sensor and sensor fitting

For more information see page → 1-111



DULCOTROL – Panel-mounted measuring and control systems for potable water and waste water

The DACb controller is now used instead of the DACa controller for all measured variables, giving you the following benefits:

- the full functionality of the DACb controller is available at the highest stage of expansion (Package 4)
- a third measuring point can be retrofitted on site if the size of the configured bypass fitting permits this
- all communication interfaces of the DACb controller can be selected: MODBUS, LAN, Profibus and Profinet
- the measuring and control panel can optionally be ordered with DULCOnneX. The DULCOnneX unit can be installed remotely from the measuring and control panel

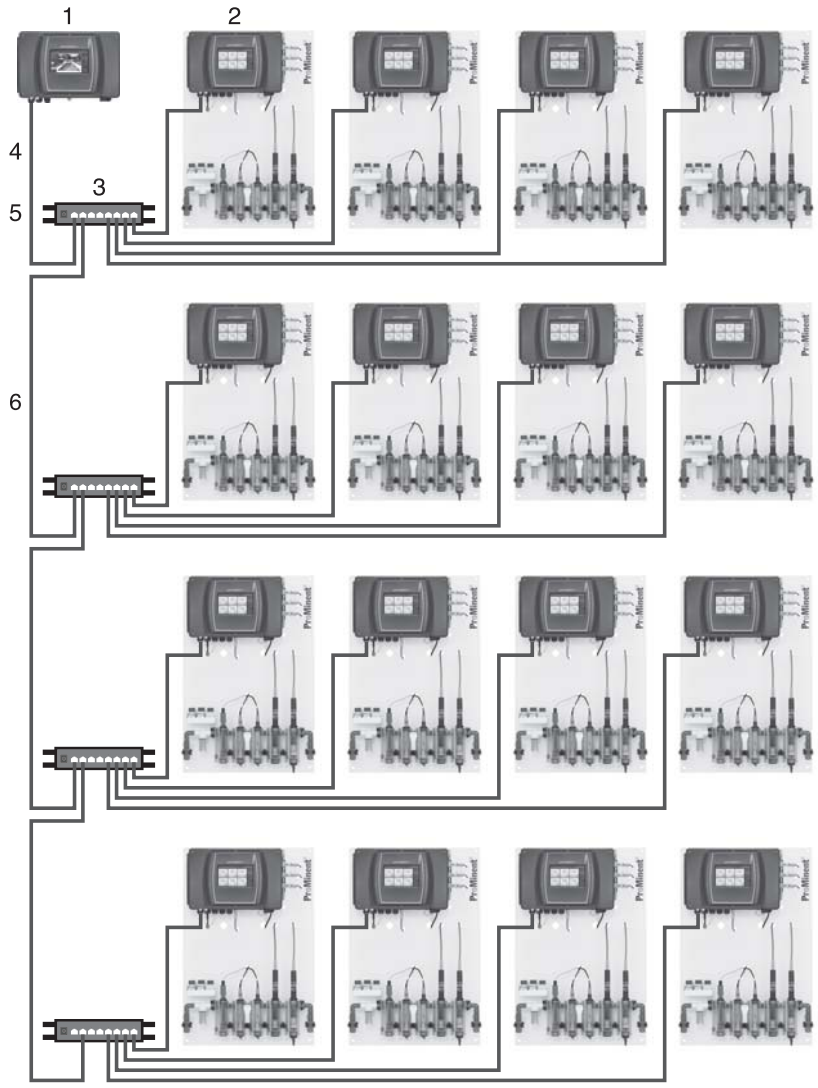
For more information see page → 3-1

New Measuring, Control and Sensor Technology Products

DULCOMARIN® 3 Multipool system

- Up to 16 filtration circuits can be controlled
- No restrictions relating to system expansion, cabling with conventional LAN components

1	Global Unit
2	up to 16 Local Units
3	LAN switch, e.g. TP-Link 8 Port Switch
4	Connecting cable LAN M12 - RJ45 5.0 m
5	LAN coupling IP68
6	Customer's LAN cable, up to 100 m in length



For more information see page → 2-32

DULCOnneX – the total solution for your digital fluid management

ProMinent's DULCOnneX is the smart overall solution for digitally networking your system components. The DULCOnneX is based on robustly networked products that can be individually adapted to operating conditions. As all the components of a system are networked, metering pumps, disinfection systems, controllers and sensors can interact in an optimised manner – increasing process reliability and system efficiency.

Location-independent system monitoring in real time

You always have all the key data and measured values about your pump installations in sight at all times with DULCOnneX. Monitor the status of your system in real time and benefit from continuous documentation. Check your unit data safely and reliably when you're out and about. Simply use the terminal device of your choice: smartphone, tablet or PC. Configurable alarms and messages inform you of relevant events 24/7.

Be in a position to act promptly at all times with DULCOnneX. Whether industrial and process water, cooling water, potable water or swimming pool water – DULCOnneX supports you in ensuring the reliable treatment of your fluids.

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DULCOnneX – the total solution for your digital fluid management

Smart process monitoring – any time, anywhere

✓ Improved process safety, reliability and transparency due to real-time monitoring, individual alarms and automated reports.

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Reference Cooling Tower

In cooling water treatment, the AEGIS II cooling tower controller processes the most diverse parameters (e.g., pH, ORP, chlorine, conductivity, temperature and water flow) and controls the metering of biocides, inhibitors, stabilisers and dispersants, among others.

Apart from individually adaptable alarm conditions, connecting your cooling tower to DULCOnneX above all offers automatic and continuous documentation of the process data recorded by the AEGIS II and the connected metering pumps, enabling you to log the hygiene-compliant operation conforming to the relevant regulations without the risk of tampering.

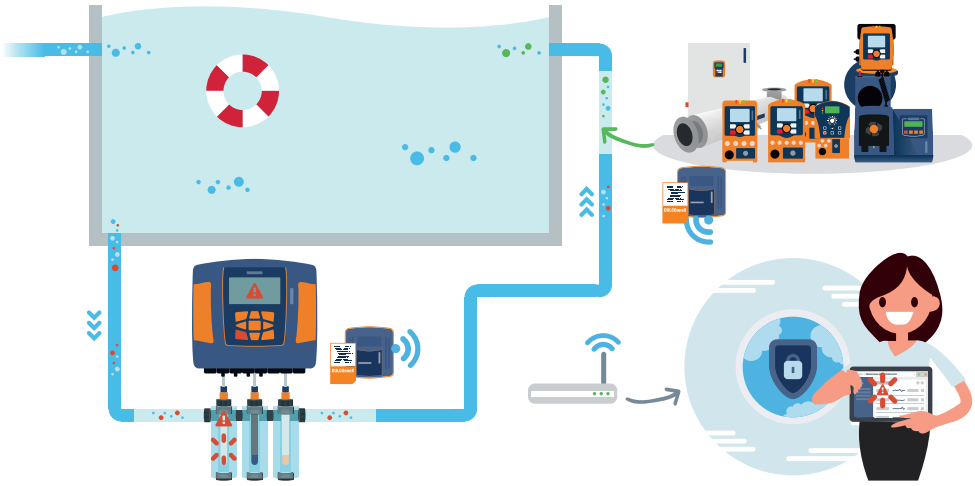
Whether you wish to record the metering of chemicals or the water parameters affected by them, DULCOnneX provides you with access to value diagrams and summarised reports anywhere and at any time. By connecting liquid level measuring devices, you can also avoid shortages when metering.

DULCOnneX – the total solution for your digital fluid management

Reference Swimming Pool

DULCOnneX helps you to avoid downtimes, saving you the need to check on the individual controllers, pumps and UV systems in your pools. You can control the pH, chlorine and temperature values of controllers irrespective of your location, and also access the status of other connected components. Whether you wish to monitor the correct metering of chemicals or the status of disinfection systems, DULCOnneX immediately informs you by e-mail about every fault or limit value transgression, thanks to individually configurable alarms.

DULCOnneX continuously logs the water values of your swimming pool installations, making them available to you in the form of value diagrams and summarised reports. That way you can always ensure a smooth and carefree swimming pool operation – your guests will thank you for it.



The benefits with DULCOnneX

- **Complete overview of all your devices and installations** – any time and from anywhere.
- **Reliable saving of your complete value history** including alarms and warnings that occur.
- **Individual alarms by e-mail** – Keep up to date at all times.
- **Continuous logging and automatic reports** – Documentation and evidence of correct operation.
- **Clear visualisation** – Graphic display of value and parameter combinations.
- **Access via the web** – Simply use any of your smart devices with an installed browser. You do not need an additional app nor a permanent link to the connected device.

The DULCOnneX platform can be accessed at **https://dulconnex.prominent.com**. Please contact us for a demonstration and e-mail your questions directly to us at **dulconnex@prominent.com**. We'd be delighted to help you further.

DULCOnneX – the total solution for your digital fluid management

Privacy and data security

The architecture of DULCOnneX is already designed to achieve maximum safety and reliably protect your data. For example, there is a systematic separation of user-specific data and measured values. In addition, all measured values are anonymised internally and the entire system is regularly inspected by professional IT safety service providers for possible safety gaps.

Examples of relevant safety measures:

- Encryption in accordance with the latest state of the art
- Multiple redundant data memories
- Systematic control of the equipment ownership

Constantly growing portfolio of supported devices

We are continuously working at full throttle to extend our range of solutions. Below are just some of the devices and systems supported as standard to date. We also support the connection of additional components via flexibly combinable modules with digital or analogue inputs. This enables older devices to be connected (such as the chlorine dioxide system Bello Zon® CDLb) or other manufacturers' components (e.g., liquid level gauges, water meters, gas detectors).

- **Controllers**
  - AEGIS II / SlimFLEX 5a
  - DULCOMETER® diaLog DACb
- **Pumps**
  - gamma/ X
  - gamma/ XL
  - DULCO flex Control – DFXa
  - DULCO flex Control – DFYa
  - Sigma X
  - DULCO®flex DF4a
  - delta®
- **Disinfection systems**
  - UV systems Dulcodes LP/MP
  - Chlorine dioxide system Bello Zon® CDKd and CDVd
- **Standard signals via dedicated modules**
  - Digital inputs (relays, also with counter)
  - Analogue inputs (4…20 mA)

DULCOnneX gateway

Our DULCOnneX gateway enables all smart products to be connected to our web-based fluid management platform.

The prerequisite for the correct operation of DULCOnneX is a "DULCOnneX gateway" compatible with the relevant product, which communicates with the "DULCOnneX platform" via a Wi-Fi internet connection provided by the customer.

	Devices	Order no.
DULCOnneX gateway AGIb	AEGIS II	1098723
DULCOnneX gateway DACb	DULCOMETER® diaLog DACb	1098756
DULCOnneX gateway DLT, GMX, GXL	gamma/ X, gamma/ XL, delta®, DULCO®flex DF4a, DULCO flex Control DFXa, DULCO flex Control DFYa, I- and M-Module (DULCOMARIN® II), Frenzel+Berg Module (CIO50, CIO57, CIO58, CIO60, CIO300), Sigma X	1098754
DULCOnneX gateway DF4, SXCB	gamma/ X, Sigma X, DULCO®flex DF4a	1098755
DULCOnneX gateway UVCb	Dulcodes LP/MP, gamma/ X, Sigma X	1098757

DULCOnneX – the total solution for your digital fluid management

1.0 Overview of Sensor Technology DULCOTEST®

1.0.1 Selection Guide

Selection Guide for pH Sensors DULCOTEST®

Medium	Temperature / pressure	Sensor type	Typical application
clear, pH 3 – 14	max. 100 °C / 3 bar max. 25 °C / 6 bar	PHEP-H	Chemical processes
Clear, pH 2 – 12	max. 80 °C / no overpressure	PHEN	Chemically contaminated water, low-conductivity water ≥ 50 µS/cm
	max. 60 °C / 3 bar	PHES	Swimming pool water, potable water, glass stem
		PHEK	Swimming pool, aquarium, plastic shaft
	max. 80 °C / 6 bar	PHEP/PHEPT	Process water
	max. 80 °C / 8 bar	PHED	Chemically contaminated water, e.g. Cr^{6+}, CN^-
Solid residues, turbidity	max. 80 °C / 6 bar	PHER/PHEI	Cooling water, waste water
Solid matter, non-translucent	max. 100 °C / 16 bar	PHEX	Suspensions, sludge, emulsions
Clear to turbid, containing fluoride, pH 0 - 7	max. 50 °C / 7 bar	PHEF	Exhaust air scrubber, semiconductor industry, electroplating

DULCOTEST® ORP sensor selection guide

Medium	Temperature / pressure	Sensor type	Typical application
clear, pH 2 – 12	max. 80 °C/no overpressure	RHEN	Chemically contaminated water, low-conductivity water ≥ 50 µS/cm
	max. 60 °C/3 bar	RHES	Swimming pool water, potable water, glass stem
		RHEK	Swimming pools, aquaria, synthetic stem
	max. 80 °C/6 bar	RHEP-Pt	Process water
		RHEP-Au	chemically contaminated water, e.g. CN-, ozone treatment
solid residues, turbidity	max. 80 °C/6 bar	RHER/RHEIC	Cooling water, waste water
solid matter, non-translucent	max. 100 °C/16 bar	RHEX	Suspensions, sludge, emulsions

Note: All DULCOTEST® pH and ORP sensors are made using lead-free glass (RoHS-compliant)

1.0 Overview of Sensor Technology DULCOTEST®

Selection guide for DULCOTEST® amperometric sensors

Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type	See page
Free chlorine	Potable water, swimming pools	0.01–100 mg/l	D1C, DAC	CLE 3-mA-xppm, CLE 3.1-mA-xppm	→ 1-7
Free chlorine	Process and waste water	10 - 200 mg/l	D1C, DAC	CLR 1-mA	→ 1-19
Free chlorine	Potable water, swimming pool water	0.01 - 10 mg/l	DULCOMARIN®	CLE 3-CAN-P-xppm, CLE 3.1-CAN-P-xppm	→ 1-10
Free chlorine	Swimming pool, unpolluted potable and industrial process water, in situ electrolysis (without diaphragm), in the event of film formation with hydrodynamic cleaning	0.02-10 mg/l	D1C, DAC, AEGIS II	CLO 1-mA-xppm	→ 1-12
Free chlorine	Swimming pool, unpolluted potable and industrial process water, in situ electrolysis (without diaphragm), in the event of film formation together with hydrodynamic cleaning	0.01-10 mg/l	DULCOMARIN®	CLO 1-CAN-P-xppm	→ 1-13
Free chlorine	Hot water up to 70 °C (legionella), in situ electrolysis, in the event of film formation together with hydrodynamic cleaning	0.02-2 mg/l	D1C, DAC, AEGIS II	CLO 2-mA-2ppm	→ 1-14
Free chlorine	Potable water, swimming pools	0.01–50 mg/l	DMT	CLE 3-DMT-xppm	→ 1-9
Free chlorine	Potable water, swimming pools	0.05-5 mg/l	COMPACT	CLB 2-µA-xppm	→ 1-15
Free chlorine	Potable water, swimming pool water	0.05-5 mg/l	COMPACT	CLB 3-µA-xppm	→ 1-16
Free chlorine	Cooling, industrial and waste water, water with higher pH values (stable); seawater (free chlorine exists as bromine)	0.01-10 mg/l	D1C, DAC, AEGIS II	CBR 1-mA-xppm	→ 1-17
Total available chlorine / Free chlorine	Swimming pool water with organic chlorine disinfectants, in situ electrolysis (without diaphragm)	0.02 - 10 mg/l	D1C, DAC, AEGIS II	CGE 3-mA-ppm	→ 1-20
Total available chlorine / Free chlorine	Swimming pool water with organic chlorine disinfectants, in situ electrolysis (without diaphragm)	0.01–10 mg/l	DULCOMARIN®	CGE 3-CAN-P-xppm	→ 1-21
Total chlorine	Potable, industrial, process and waste water	0.01–10 mg/l	D1C, DAC, AEGIS II	CTE 1-mA-xppm	→ 1-22
Total chlorine	Potable, industrial, process and waste water	0.01–10 mg/l	DMT	CTE 1-DMT-xppm	→ 1-23
Total chlorine	Potable, industrial, process and waste water	0.01–10 mg/l	DULCOMARIN®	CTE 1-CAN-P-xppm	→ 1-24
Combined chlorine	Swimming pool water	0.02–2 mg/l	DAC	CTE 1-mA-2 ppm + CLE 3.1-mA-2 ppm	→ 1-24
Combined chlorine	Swimming pool water	0.01–10 mg/l	DULCOMARIN®	CTE 1-CAN-P-xppm + CLE 3.1-CAN-xppm	→ 1-24
Total available bromine	Cooling water, waste water, swimming pool water, whirlpool water, bromine with BCDMH	0.01-10 mg/l	D1C, DAC	BCR 1-mA (replaces earlier type BRE 1)	→ 1-26
Total available bromine	Cooling water, swimming pool water, whirlpool water with organic or inorganic bromine compounds	0.02-10 mg/l	DULCOMARIN®	BRE 3-CAN-10ppm	→ 1-27
Free and bound bromine	Cooling, industrial, waste water, water with higher pH values (stable); seawater	0.02-20 mg/l	D1C, DAC, AEGIS II	CBR 1-mA-xppm	→ 1-17
Free + combined bromine	Cooling, industrial, waste water, water with higher pH values (stable); sea water	0.02-20 mg/l	DULCOMARIN®	CBR 1-CAN-P-10ppm	→ 1-18
Chlorine dioxide	Potable water	0.01–10 mg/l	D1C, DAC	CDE 2-mA-xppm	→ 1-30
Chlorine dioxide	Bottle washer systems	0.02–2 mg/l	D1C, DAC	CDP 1-mA-xppm	→ 1-31

1.0 Overview of Sensor Technology DULCOTEST®

Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type	See page
Chlorine dioxide	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01-10 mg/l	D1C, DAC, DULCOMARIN®	CDP 1-mA-xppm, CDR 1-CAN-xppm	→ 1-32
Chlorite	Potable, wash water	0.02–2 mg/l	D1C, DAC, DULCOMARIN®	CLT 1-mA-xppm, CLT 1-CAN-xppm	→ 1-34
Ozone	Potable water, swimming pool water	0.02–2 mg/l	D1C, DAC	OZE 3-mA	→ 1-36
Ozone	Process, service or cooling water	0.02–2 mg/l	D1C, DAC	OZR 1-mA-2 ppm*	→ 1-37
Dissolved oxygen	Aeration tanks, clarification plants, fish farming, potable water, surface water	0.1–20 mg/l	D1C, DAC	DO 3-mA-xppm	→ 1-38
Dissolved oxygen	Activated sludge tank, sewage treatment plants	0.1–10 mg/l	D1C, DAC	DO 2-mA-xppm	→ 1-39
Peracetic acid	CIP, antiseptic food filling process	1–2,000 mg/l	D1C, DAC, AEGIS II	PAA 1-mA-xppm	→ 1-40
Hydrogen peroxide	Clear water, fast control	1–2,000 mg/l	DAC	H_2O_2 sensor PEROX-H2.10 P	→ 1-42
Hydrogen peroxide	Process, swimming pool water	0.5–2,000 mg/l	D1C, DAC	PER1-mA-xppm	→ 1-42

Conductivity sensor selection guide

Conductivity > 20 mS/cm and/or film-forming medium and/or chemically aggressive medium

yes ↓ — ↓ **no**

inductive conductivity measurement — **conductive conductivity measurement**

↓ — ↓

Compact controller can be used in the application? — **Further selection according to summary table:**

- **Measuring range**
- **Material (chemical compatibility)**
- **Temperature**
- **hydraulic process connection**
- **electrical connection**
- **Compatibility of measuring and control units**

yes ↓ — ↓ **no**

Do the following conditions exist?
aggressive chemicals,
with the exception of lyes and/or
Temperatures > 80 °C and/or
measured value < 200 µS/cm

Type ICT 8
for installation in pipes with adapter accessory, for immersion with immersion fitting accessory

yes ↓ — ↓ **no**

Series ICT 2
Installation in pipes with stainless steel flange accessory

For immersion with accessory: immersion fitting IMA - ICT 2

Type ICT 5
for installation in pipes

Type ICT 5-
for immersion

↓

Product ranges LF, LMP, CK, CCT

1.1 Amperometric Sensors DULCOTEST®

1.1.1 Amperometric Sensors for Chlorine, Bromine, Chlorine Dioxide, Chlorite, Ozone, Dissolved Oxygen, Peracetic Acid and Hydrogen Peroxide

The advantages at a glance:

- 12 measuring parameters available with analogue construction, each for simple installation to the same fittings and controllers
- Application-specific sensor models permit optimum operation with varying process conditions
- Efficient process management by precise measurement in real-time
- Amperometric measuring principle means no interference by turbidity or discolouration
- Diaphragm-covered measuring electrodes ensure reliable operation and long service life even under adverse and variable process conditions

Note the following points for optimum operation of amperometric sensors:

- Use of DULCOMETER® controllers
- Installation only in ProMinent fittings type DGM or DLG III
- Specified flow between 30…60 l/h
- Chlorine measurement only with stable pH
- Regular calibration with a photometer (e.g. type DT)

Important:

No amperometric sensors are galvanically isolated. When using with external devices (e.g. PLC Programmable Logic Controller), ensure that the supply voltage and analogue input signal are galvanically isolated.

1.1 Amperometric Sensors DULCOTEST®

1.1.2 Sensors for Chlorine

Different forms of dissolved chlorine are present in water:

free (effective) chlorine:	Cl_2, HOCl (hypochlorous acid), OCl^- (hypochlorite) recommended sensors: **Types CLE, CLO, CLB, CBR, CGE 3, reference method: DPD1**
Combined chlorine:	mono-, di-, trichloroamine. The measuring result of the type for free chlorine is subtracted from the measurement result of type CTE (total chlorine). Reference method: DPD4 minus DPD1
Total chlorine:	Total of free and combined chlorine; recommended sensor: **Type CTE, reference method DPD4**
Total available chlorine (organic combined chlorine):	Chlorine bound to (iso)cyanic acid/isocyanurate and the free (effective) chlorine resulting from it; recommended sensor: **Type CGE, reference method DPD1**
Applications:	Chlorine measurement in potable, swimming pool, cooling, service, process and waste water or water of comparable quality, as well as salt water/seawater with up to 15% chloride content. For chlorine measurements at high pH values (8...9.5), we recommend chlorine sensors CGE and CTE for total chlorine and total available chlorine. We recommend sensor types CBR, CGE 3, CLO and CLB for the measurement of free chlorine with high pH values
Unit connection:	Do not use sensors CLE CLO, CLB and CBR in the presence of isocyanuric acid/chlorine stabilisers! Types CLE 3.1, CBR, CTE and CGE 2 operate incorrectly when chlorinating using electrolysis processes without diaphragm. Sensors with the designation -mA are used for controllers D1Cb, DAC and DULCOMARIN®. Selection of the mA sensors is also compatible with the AEGIS II device. Sensors with the type designation -4P are used for the earlier WS controllers and for metering pumps with integral chlorine controllers. Sensors with the designation DMT are used for DMT transducers. Sensors with the designation CAN are used with the swimming pool controller DULCOMARIN®. Sensors CLB 1 and CLB 2 with the designation -µA do not have a signal transformer and function solely with the Compact Controller.

1.1 Amperometric Sensors DULCOTEST®

Selection Guide

		CLE 3/ [CLR 1]	CLE 3.1	CLO 1	CLO 2	CLB 2/ CLB 3	CBR 1	CGE 3	CTE 1	BCR 1
Measured variable	Free chlorine	x, [x]	x	x	x	x	x [1)]	x		
	Total available chlorine (cyanuric acid derivatives)							x		
	Total chlorine								x	x [2)]
Selectivity of free chlorine	Raised		x							
	Yes	x, [x]		x	x	x		x		
	No								x	x
Application	Public swimming pools	x	x	x		(x)	x	x	x [3)]	
	Private swimming pools	x	x	x		x		x	x [3)]	x [4)]
	Potable water	x	x		x	x	x	x	x	
	Cooling water						x		x	x
	Waste water	[x]					x		x	x
Disinfectant	Chlorine gas, hypochlorite, electrolysis (with diaphragm)	x, [x]	x	x	x	x	x	x	x	
	Electrolysis (without membrane)	x, [x]		x	x	x		x		
	Chlorine-containing cyanuric acid derivatives							x		
	BCDMH									x
Specifications	Measuring range [ppm]	0.01-100, [10-200]	0.01-10	0.02-10	0.02-2	0.02-10	0.01-10	0.02-10	0.01-10	0.01 - 10
	pH range	5.5-8.0	5.5-8.0	5.0-9.0	5.0-9.0	5.0-9.0	5.0-9.5	5.5-9.5	5.5-9.5	5.0 - 9.5
	Temperature [°C]	5-45	5-45	5-45	5-70	5-45	5-9.5	5 - 45	5-45	5 - 45
	Max. pressure [bar]	1	1	8	8	3	1	3	3	1
Installation	Open outlet	x	x	x	x	x	x	x	x	x
Installation	Direct installation in the circuit			x	x	x				

1) as well as free and combined bromine (see Chap. 1.3.6: “Bromine Sensors”)

2) as well as total available bromine (see Chap. 1.3.6: “Bromine Sensors”)

3) in combination with the Sensor for Free Chlorine type CBR 1 for determining combined chlorine

4) and pools on cruise ships

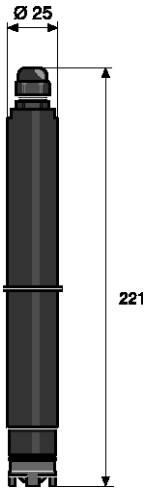
1.1.3 DULCOTEST® Sensors for Free Chlorine

Sensor for Free Chlorine CLE 3-mA

Standard sensor for measuring free chlorine in clear water. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: free chlorine, no significant cross sensitivity to combined chlorine (chloramines)
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water



pk_6_039

Measured variable	free chlorine
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine, even if there is not an excess of it
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, disinfectants with organic chlorine, e. g. based on cyanuric acid, are unsuitable
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	CLE 3-mA-0,5 ppm: potable water; CLE 3-mA-2.0/10 ppm: swimming pools (surfactant-free).
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLE 3-mA-0.5 ppm	0.01…0.5 mg/l	792927
CLE 3-mA-2 ppm	0.02…2.0 mg/l	792920
CLE 3-mA-5 ppm	0.05…5.0 mg/l	1033392
CLE 3-mA-10 ppm	0.10…10.0 mg/l	792919
CLE 3-mA-20 ppm	0.20…20.0 mg/l	1002964
CLE 3-mA-50 ppm	0.50…50.0 mg/l	1020531
CLE 3-mA-100 ppm	1.00…100.0 mg/l	1022786

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

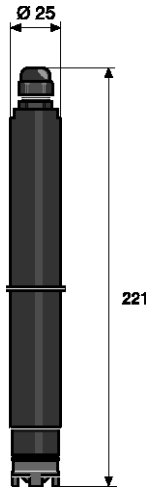
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLE 3.1-mA

Sensor for the measurement of free chlorine in clear water with higher selectivity towards combined chlorine. For use on controllers with 4-20 mA input

Your benefits

- Measured variable: free chlorine, no cross sensitivity to combined chlorine (chloramines), even if there is an excess of it
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water



pk_6_039

Measured variable	Free chlorine (hypochlorous acid HOCl) with high levels of combined chlorine; for determining the combined chlorine with a DAC controller and sensor for total chlorine type CTE 1-mA
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine, even if there is an excess of it
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, disinfectants with organic chlorine, e. g. based on cyanuric acid, are unsuitable
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Potable water with higher volumes of combined chlorine, swimming pools. To determine the combined chlorine from the difference: Total chlorine minus free chlorine in the controller DAC.
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLE 3.1-mA-0.5 ppm	0.01…0.5 mg/l	1020530
CLE 3.1-mA-2 ppm	0.02…2.0 mg/l	1018369
CLE 3.1-mA-5 ppm	0.05…5.0 mg/l	1019398
CLE 3.1-mA-10 ppm	0.10…10.0 mg/l	1018368

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

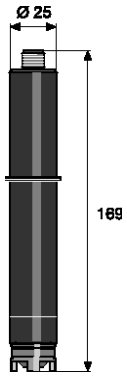
Signal leads see Sensor Accessories, p. → 1-113

Sensor for Free Chlorine CLE 3-DMT

Standard sensor for measuring free chlorine in clear water. For operation on ProMinent transmitters type DMT

Your benefits

- Measured variable: free chlorine, no significant cross sensitivity to combined chlorine (chloramines)
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water



pk_6_038

Measured variable	free chlorine
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	3.3 V DC (5 P)
Output signal	0...1 V DC, uncalibrated, not temperature compensated, not electrically isolated
Temperature measurement	About the integrated Pt 1000. The temperature compensation is carried out in DMT.
Selectivity	Free chlorine as against combined chlorine, even if there is not an excess of it
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, disinfectants with organic chlorine, e. g. based on cyanuric acid, are unsuitable
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DMT
Typical applications	CLE 3-mA-0,5 ppm: potable water; CLE 3-mA-2.0/10 ppm: swimming pools (surfactant-free).
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLE 3-DMT-5 ppm	0.01…5.0 mg/l	1005511
CLE 3-DMT-50 ppm	0.10…50.0 mg/l	1005512

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

Signal leads see Sensor Accessories, p. → 1-113

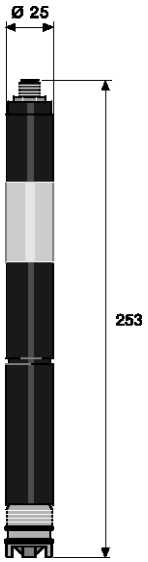
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLE 3-CAN-P

Standard sensor for measuring free chlorine in clear water. For use on controllers with CAN-bus connection

Your benefits

- Measured variable: free chlorine, no significant cross sensitivity to combined chlorine (chloramines)
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water
- Operation on the CAN-bus with all the associated benefits



pk_6_096

Measured variable	free chlorine
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in the DGM or DLG III)
Supply voltage	Via CAN interface (11 - 30 V)
Output signal	Uncalibrated, temperature compensated, electrically isolated
Selectivity	Free chlorine as against combined chlorine, even if there is not an excess of it
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, disinfectants with organic chlorine, e. g. based on cyanuric acid, are unsuitable
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN®
Typical applications	Potable water, swimming pool water.
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLE 3-CAN-P-10 ppm	0.01…10.0 mg/l	1083209

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

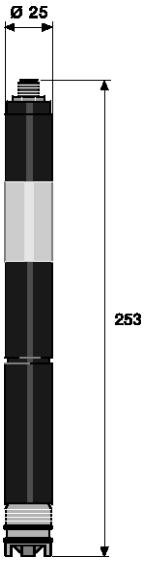
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLE 3.1-CAN-P

Sensor for the measurement of free chlorine in clear water with higher selectivity towards combined chlorine. For use on controllers with CAN-bus connection

Your benefits

- Measured variable: free chlorine, no cross sensitivity to combined chlorine (chloramines) even if there is an excess of it
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water
- Operation on the CAN-bus with all the associated benefits



pk_6_096

Measured variable	free chlorine with high levels of combined chlorine; for determining the combined chlorine with a DULCOMARIN® and sensor for total chlorine type CTE 1-CAN
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGMa or DLG III)
Supply voltage	Via CAN interface (11 – 30 V)
Output signal	Uncalibrated, temperature compensated, electrically isolated
Selectivity	Free chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, disinfectants with organic chlorine, e. g. based on cyanuric acid, are unsuitable
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN®
Typical applications	Potable water with higher percentages of combined chlorine;Swimming pool. To determine the combined chlorine from the difference: Total chlorine minus free chlorine in the controller DULCOMARIN®.
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLE 3.1-CAN-P-10 ppm	0.01…10.0 mg/l	1083584

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

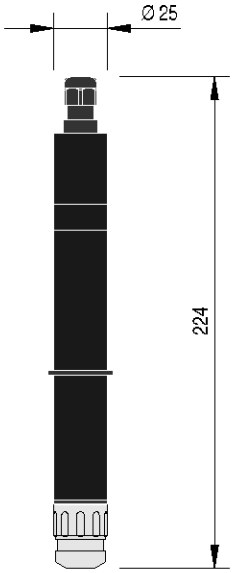
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLO 1-mA

Sensor for the measurement of free chlorine in clear water even when using electrolysis processes for disinfection, up to 45 °C (1 bar) or 8 bar (25 °C). For operation with controllers with 4-20 mA input. Also suitable for use in film-forming water with optional “hydrodynamic cleaning”.

Your benefits

- Measured variable: free chlorine, no significant cross-sensitivity to combined chlorine (chloramines)
- Use with return of the sample water to the process line
- Use at higher pressures
- Minimisation of faults by electrolysis systems in which the electrodes are immersed directly into the sample water (without diaphragm) by open sensor (no diaphragm) and gold electrodes
- Measurement of free chlorine up to pH 9
- Also suitable for use in film-forming water with optional “hydrodynamic cleaning”.



P_DT_0072_SW1

Measured variable	free chlorine
Reference method	DPD1
pH range	5.0 … 9.0
Temperature	5 … 45 °C
Max. pressure	8.0 bar (25 °C)
Intake flow	30…60 l/h (in DGM or DLG III), constant flow as flow-dependent signal
Supply voltage	16...24 V DC (2-wire)
Output signal	4…20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, electrolysis without diaphragm with electrodes in the process
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the tubes with the INLI fitting
Sensor fitting	DLG up to 1 bar/55 °C; DGM up to 6 bar/30 °C; INLI up to 7 bar/40 °C
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Swimming pools, uncontaminated potable water and process water, and can also be used together with diaphragm-free electrolysis processes. Can also be used in conjunction with hydrodynamic cleaning even in biofilm-forming water, or water containing lime, iron or manganese.
Resistance to	Surfactants, films with using hydrodynamic cleaning
Measuring principle, technology	Amperometric, 3 electrodes, without diaphragm

	Measuring range	Order no.
CLO 1-mA-2 ppm	0.02…2.0 mg/l	1033871
CLO 1-mA-10 ppm	0.10…10.0 mg/l	1033870

Accessories for hydrodynamic cleaning

	Order no.
Cleaning set CLO/DGMa with flow nozzle CLO for DGMa and cleaning balls (approx. 100)	1104286
Flow nozzle CLO	1104264
Cleaning balls (approx. 100)	1104267

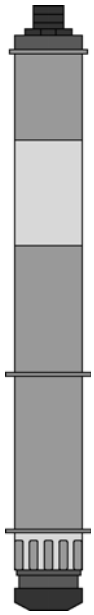
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLO 1-CAN-P

Sensor for the measurement of free chlorine in clear water even when using electrolysis processes for disinfection, up to 45 °C (1 bar) or 8 bar (25 °C). For use on controllers with CAN-bus connection. Also suitable for use in film-forming water with optional “hydrodynamic cleaning”.

Your benefits

- Measured variable: free chlorine, no significant cross-sensitivity to combined chlorine (chloramines)
- Use with return of the sample water to the process line
- Use at higher pressures
- Minimisation of faults by electrolysis systems in which the electrodes are immersed directly into the sample water (without diaphragm) by open sensor (no diaphragm) and gold electrodes
- Measurement of free chlorine up to pH 9
- Also suitable for use in film-forming water with optional “hydrodynamic cleaning”.



P_DT_0077_SW

Measured variable	Free chlorine
Reference method	DPD1
pH range	5.0 … 9.0
Temperature	5 … 45 °C
Max. pressure	8.0 bar (25 °C)
Intake flow	30…60 l/h (in DGM or DLG III), constant flow as flow-dependent signal
Supply voltage	11…30 V (via CAN interface)
Output signal	digital (CANopen), uncalibrated, temperature-compensated, galvanically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, electrolysis without diaphragm with electrodes in the process
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the tubes with the INLI fitting
Sensor fitting	DLG up to 1 bar/55 °C; DGM up to 6 bar/30 °C; INLI up to 7 bar/40 °C
Measuring and control equipment	DULCOMARIN® 3, DULCOMARIN® II only with hardware after 06.02.2014 from software version 3035 or later
Typical applications	Swimming pools, uncontaminated potable water and process water, and can also be used together with diaphragm-free electrolysis processes. Can also be used in conjunction with hydrodynamic cleaning even in water that forms biofilms, or containing lime, iron or manganese.
Resistance to	Salts, acids, lyes, surfactants, films of dirt, films when using hydrodynamic cleaning
Measuring principle, technology	Amperometric, 3 electrodes, without diaphragm

	Measuring range	Order no.
CLO 1-CAN-P-10 ppm	0.10…10.0 mg/l	1083134

Accessories for hydrodynamic cleaning

	Order no.
Cleaning set CLO/DGMa with flow nozzle CLO for DGMa and cleaning balls (approx. 100)	1104286
Flow nozzle CLO	1104264
Cleaning balls (approx. 100)	1104267

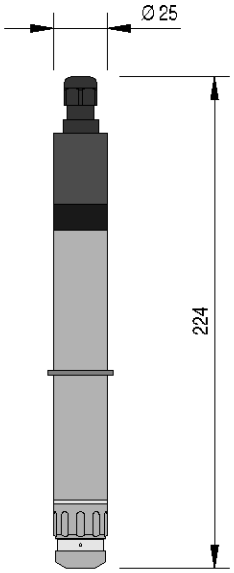
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLO 2-mA

Sensor for the measurement of free chlorine in clear water even when using electrolysis processes for disinfection, up to 70 °C or 8 bar (25 °C). For operation with controllers with 4-20 mA input. Also suitable for use in film-forming water with optional “hydrodynamic cleaning”.

Your benefits

- Measured variable: free chlorine, no significant cross-sensitivity to combined chlorine (chloramines)
- Use with return of the sample water to the process line
- Use at higher pressures/temperatures
- Minimisation of faults by electrolysis systems in which the electrodes are immersed directly into the sample water (without diaphragm) by open sensor (no diaphragm) and gold electrodes
- Measurement of free chlorine up to pH 9
- Also suitable for use in film-forming water with optional “hydrodynamic cleaning”



P_DT_0073_SW1

Measured variable	free chlorine
Reference method	DPD1
pH range	5.0 … 9.0
Temperature	5 … 70 °C
Max. pressure	8.0 bar (25 °C)
Intake flow	30…60 l/h (in DGM or DLG III), constant flow as flow-dependent signal
Supply voltage	16...24 V DC (2-wire)
Output signal	4…20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, electrolysis without diaphragm with electrodes in the process
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the tubes with the INLI fitting
Sensor fitting	DLG up to 1 bar/55 °C; DGM up to 1 bar/60 °C; INLI up to 2 bar/70 °C. Prerequisite: constant flow
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Hot water up to 70 °C, combating legionella, uncontaminated potable water and industrial service water, can also be used together with diaphragm-free electrolysis processes.
Resistance to	Surfactants, films with using hydrodynamic cleaning
Measuring principle, technology	Amperometric, 3 electrodes, without diaphragm

	Measuring range	Order no.
CLO 2-mA-2 ppm	0.02…2.0 mg/l	1033878

Accessories for hydrodynamic cleaning

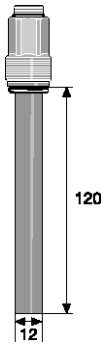
	Order no.
Cleaning set CLO/DGMa with flow nozzle CLO for DGMa and cleaning balls (approx. 100)	1104286
Flow nozzle CLO	1104264
Cleaning balls (approx. 100)	1104267

Sensor for Free Chlorine CLB 2-µA

Cost-effective, simple sensor for the measurement of free chlorine in clear water, even with a changing media temperature. Use even when electrolysis processes are used for disinfection at up to 45 °C/3 bar. For operation with the Compact controller DCCa

Your benefits

- Measured variable: free chlorine, no significant cross sensitivity to combined chlorine (chloramines)
- Cost-effective due to its simple construction without separate wear parts
- Simple, cost-effective maintenance without handling of the diaphragm caps
- Minimisation of faults by electrolysis systems without diaphragm in which the electrodes are immersed directly into the sample water by an open sensor (no diaphragm)
- Measurement of free chlorine up to pH 9 and use at high pressure of up to 8 bar by the absence of a diaphragm



pk_6_095

Measured variable	free chlorine
Measuring range	0.05 – 5.0 mg/l, can be used for short-term shock chlorination up to 10 mg/l
Reference method	DPD1
pH range	5.0 … 9.0
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGMA), constant flow needed as flow-dependent signal
Supply voltage	Only for compact controllers
Output signal	Non-amplified primary current signal, not temperature-compensated, uncalibrated, not electrically isolated
Temperature measurement	Pt 1000, integrated, calculation in the compact controller
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, electrolysis without diaphragm with electrodes in the process
Installation	Bypass: open sample water outlet, inline: direct installation into the pipework
Sensor fitting	DGM, DLG III
Electrical connection	Fixed cable, 1 m, 6 wires with cable end sleeves
Measuring and control equipment	Compact controller
Typical applications	Swimming pools, potable water, can also be used with membrane-free chlorine production electrolysis processes, even with varying media temperatures.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 3 electrodes, without diaphragm

	Measuring range	Order no.
CLB 2-µA-5 ppm	0.05…5.0 mg/l	1038902

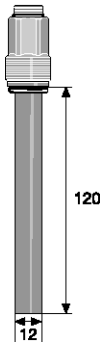
1.1 Amperometric Sensors DULCOTEST®

Sensor for Free Chlorine CLB 3-µA

Cost-effective, simple sensor for the measurement of free chlorine in clear water when the media temperature is constant. Use even when electrolysis processes are used for disinfection at up to 45 °C/ 3 bar. For operation with the Compact controller DCCa

Your benefits

- Measured variable: free chlorine, no significant cross sensitivity to combined chlorine (chloramines)
- Cost-effective due to its simple construction without separate wear parts
- Simple, cost-effective maintenance without handling of the diaphragm caps
- Minimisation of faults by electrolysis systems without diaphragm in which the electrodes are immersed directly into the sample water by an open sensor (no diaphragm)
- Measurement of free chlorine up to pH 9 and use at high pressure of up to 8 bar by the absence of a diaphragm



pk_6_095

Measured variable	free chlorine
Measuring range	0.05 - 5.0 mg/l: linear, can be used for shock chlorination up to 10.0 mg/l
Reference method	DPD1
pH range	5.0 … 9.0
Temperature	5 … 45 °C constant temperature needed, as temperature-dependent signal
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGMA), constant flow necessary, as flow-dependent signal
Supply voltage	Only for compact controllers
Output signal	Non-amplified primary current signal, not temperature-compensated, uncalibrated, not electrically isolated
Temperature measurement	None
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, electrolysis without diaphragm with electrodes in the process
Installation	Bypass: open sample water outlet, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting)
Sensor fitting	DGM, DLG III
Electrical connection	Fixed cable, 1 m, 4 wires with cable end sleeves
Measuring and control equipment	Compact controller
Typical applications	Swimming pools, potable water, can also be used with membrane-free chlorine production electrolysis processes.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 3 electrodes, without diaphragm

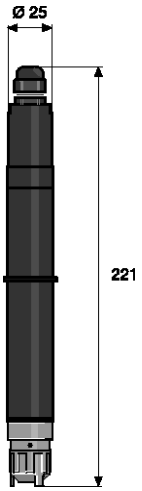
	Measuring range	Order no.
CLB 3-µA-5 ppm	0.05…5.0 mg/l	1041696

Sensor for Free Chlorine CBR 1-mA

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

Your benefits

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



pk_6_040

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

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

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

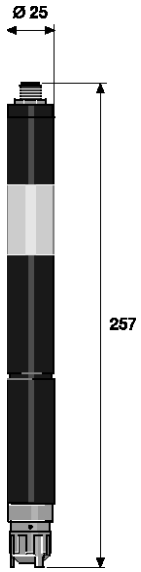
1.1 Amperometric Sensors DULCOTEST®

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

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

Your benefits

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



pk_6_084

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

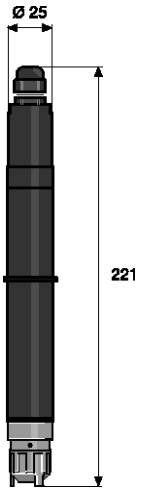
	Measuring range	Order no.
CBR 1-CAN-P-10ppm	0.01…10.0 mg/l	1083135

Sensor for Free Chlorine CLR 1-mA

Sensor for free chlorine above 10 ppm in contaminated washing water for use with controllers with 4-20 mA input

Your benefits

- Measured variable free chlorine for high concentrations of up to 1,000 ppm
- Diaphragm-covered sensor prevents faults caused by changing flow or ingredients in the water
- Resistance to films of dirt by pore-free diaphragm



pk_6_040

Measured variable	free chlorine
Reference method	DPD1
pH range	5.5 … 8.0
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM, DLG II)
Supply voltage	16...24 V DC (2-wire)
Output signal	4…20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Free chlorine as against combined chlorine
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm
Installation	Bypass: open sample water outlet
Sensor fitting	DLG III
Measuring and control equipment	D1C
Typical applications	Salad, vegetable and poultry washing water, contaminated process and waste water.
Resistance to	Salts, acids, alkalis, surfactants, dirt films
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLR 1-mA-200 ppm	10.0…200 mg/l	1047978

Important note: Measuring range from 10.0 ... 1,000 mg/l on request

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

1.1 Amperometric Sensors DULCOTEST®

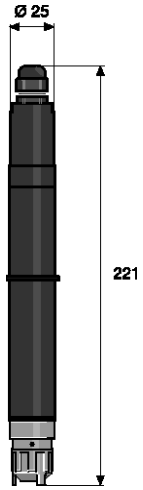
1.1.4 DULCOTEST® Sensors for Total Available Chlorine

Sensor for total available and free chlorine CGE 3-mA

Sensor for total available chlorine, such as derivatives of chloro(iso)cyanuric acid, without disturbance when used in swimming pools where disinfection is provided by electrolysis processes. Also suitable for use as a sensor for free chlorine. For operation with controllers with 4-20 mA input

Your benefits

- Measured variable: total available chlorine, for instance disinfectant with organic chlorine, such as derivatives of chloro(iso)cyanuric acid
- Measured variable: free chlorine without interference with the presence of cyanuric acid
- Gold electrode to prevent faults by products from electrolysis processes where the electrodes are immersed directly into the sample water (without diaphragm)
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or substances in the water
- Hydrophilic diaphragm guarantees the permeability of chloro(iso)cyanuric acid derivatives towards the measuring electrodes
- The special reaction system of the electrolyte allows the total available chlorine to be determined and use at a high pH of up to 9.5



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Measured variable	Free chlorine and total available chlorine: Total of organically bound chlorine (e.g. bound to cyanuric acid) and free chlorine
Reference method	DPD1
pH range	5.5 … 9.5
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (2-wire system)
Output signal	4-20 mA ≈ Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	total available chlorine and free chlorine as against combined chlorine (chloramines)
Disinfection process	Disinfectants with organic chlorine, e.g. based on cyanuric acid, chlorine gas, hypochlorite, electrolysis
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Swimming pool water; combined disinfection processes with chloro(iso)cyanuric acid derivatives and electrolysis. Water of a similar quality to potable water with a higher pH of up to 9.5.
Resistance to	Surfactants, cyanuric acid
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CGE 3-mA-2 ppm	0.02…2.0 mg/l	1047959
CGE 3-mA-10 ppm	0.10…10.0 mg/l	1047975

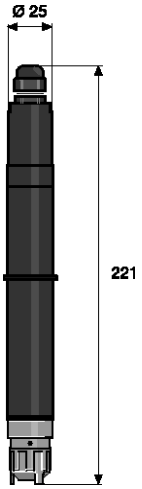
A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

Sensor for total available and free chlorine CGE 3-CAN-P

Sensor for total available chlorine, such as derivatives of chloro(iso)cyanuric acid when used in swimming pools. Also suitable for use as a sensor for free chlorine. For use on controllers with CAN-bus connection

Your benefits

- Measured variable: total available chlorine, for instance disinfectant with organic chlorine, such as derivatives of chloro(iso)cyanuric acid
- Measured variable: free chlorine without interference with the presence of cyanuric acid
- Gold electrode to prevent faults by products from electrolysis processes where the electrodes are immersed directly into the sample water (without diaphragm)
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or substances in the water
- Hydrophilic diaphragm guarantees the permeability of chloro(iso)cyanuric acid derivatives towards the measuring electrodes
- The special reaction system of the electrolyte allows the total available chlorine to be determined and use at a high pH of up to 9.5
- Operation on the CAN-bus with all the associated benefits



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Measured variable	Free chlorine and total available chlorine: Total of organically bound chlorine (e.g. bound to cyanuric acid) and free chlorine
Reference method	DPD1
pH range	5.5 … 9.5
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in the DGM or DLG III)
Supply voltage	Via CAN interface (11 – 30 V DC)
Output signal	Uncalibrated, temperature-compensated, electrically isolated
Selectivity	total available chlorine and free chlorine as against combined chlorine (chloramines)
Disinfection process	Disinfectants with organic chlorine, e.g. based on cyanuric acid, chlorine gas, hypochlorite, electrolysis
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN® 3, DULCOMARIN® II only with hardware after 06.02.2014 from software version 3027 or later, with hardware after 06.02.2014 from software version 3033 or later
Typical applications	Swimming pool water, disinfection processes with chloro(iso)cyanuric acid derivatives and electrolysis. Water of a similar quality to potable water with a higher pH of up to 9.5.
Resistance to	Surfactants, cyanuric acid
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CGE 3-CAN-P-10 ppm	0.01…10.0 mg/l	1083211

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

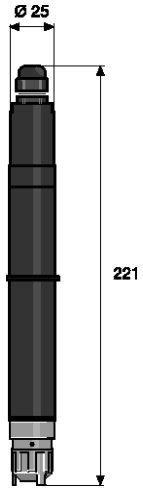
1.1.5 DULCOTEST® Sensors for Total Chlorine

Sensor for Total Chlorine CTE 1-mA

Sensor for total chlorine, including, for example, free chlorine, chloramines etc. even with high pH values in different kinds of water. For use on controllers with mA input

Your benefits

- Measured variable: Total chlorine, chlorine compounds, in which chlorine acts as an oxidising agent, e.g. free chlorine (HOCl and OCl^-), chloramines etc.
- Diaphragm-covered sensor (encapsulated) prevents faults caused by changing flow or ingredients in the water
- Hydrophilic diaphragm guarantees permeability for different water-soluble oxidising agents towards the measuring electrodes
- The special reaction system of the electrolyte allows components containing oxidising chlorine to be determined and used at a high pH of up to 9.5



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Measured variable	Total chlorine
Reference method	DPD4
pH range	5.5 … 9.5
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Non-selective, cross-sensitive towards many oxidation agents
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, monochloramine
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	CTE 1-mA-0.5 ppm: Potable water; CTE 1-mA-2/5/10 ppm: Potable, industrial, process, waste water. In swimming pools combined with CLE 3.1 to detect combined chlorine.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CTE 1-mA-0.5 ppm	0.01…0.5 mg/l	740686
CTE 1-mA-2 ppm	0.02…2.0 mg/l	740685
CTE 1-mA-10 ppm	0.10…10.0 mg/l	740684

Chlorine sensors complete with 50 ml of electrolyte

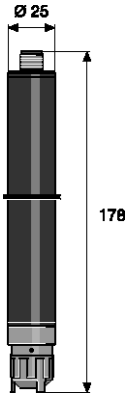
A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

Sensor for Total Chlorine CTE 1-DMT

Sensor for total chlorine, including, for example, free chlorine, chloramines etc. even with high pH values in different kinds of water. For operation with the transmitter DMT

Your benefits

- Measured variable: Total chlorine, chlorine compounds, in which chlorine acts as an oxidising agent, e.g. free chlorine (HOCl and OCl^-), chloramines etc.
- Diaphragm-covered sensor (encapsulated) prevents faults caused by changing flow or ingredients in the water
- Hydrophilic diaphragm guarantees permeability for different water-soluble oxidising agents towards the measuring electrodes
- The special reaction system of the electrolyte allows components containing oxidising chlorine to be determined and used at a high pH of up to 9.5



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Measured variable	Total chlorine
Reference method	DPD4
pH range	5.5 … 9.5
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	3.3 V DC (5 P)
Output signal	Uncalibrated, not temperature-compensated, not electrically isolated
Selectivity	Non-selective, cross-sensitive towards many oxidation agents
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, monochloramine
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DMT
Typical applications	Potable, industrial, process, waste water.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CTE 1-DMT-10 ppm	0.01…10.0 mg/l	1007540

Chlorine sensors complete with 50 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

Signal leads see Sensor Accessories, p. → 1-113

1.1 Amperometric Sensors DULCOTEST®

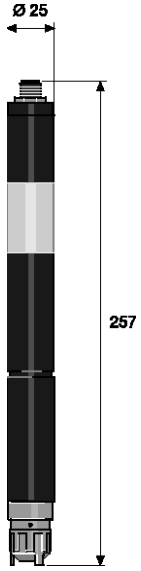
Sensor for total chlorine CTE 1-CAN-P

Sensor for total chlorine, including, for example, free chlorine, chloramines etc. even with high pH values in different kinds of water. For use on controllers with CAN-bus connection

Your benefits

- Measured variable: Total chlorine, chlorine compounds, in which chlorine acts as an oxidising agent, e.g. free chlorine (HOCl and OCl^-), chloramines etc.
- Diaphragm-covered sensor (encapsulated) prevents faults caused by changing flow or ingredients in the water
- Hydrophilic diaphragm guarantees permeability for different water-soluble oxidising agents towards the measuring electrodes
- The special reaction system of the electrolyte allows components containing oxidising chlorine to be determined and used at a high pH of up to 9.5
- Operation on the CAN-bus with all the associated benefits

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



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Measured variable	Total chlorine
Reference method	DPD4
pH range	5.5 … 9.5
Temperature	5 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h (in DGMa or DLG III)
Supply voltage	Via CAN interface (11 - 30 V)
Output signal	Uncalibrated, temperature-compensated, electrically isolated
Selectivity	Non-selective, cross-sensitive towards many oxidation agents
Disinfection process	Chlorine gas, hypochlorite, electrolysis with diaphragm, monochloramine
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN® 3, DULCOMARIN® II only with hardware after 06.02.2014 from software version 3035 or later
Typical applications	Potable, industrial, process, waste water. In swimming pools combined with CLE 3.1 to detect combined chlorine.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CTE 1-CAN-P-10 ppm	0.01…10.0 mg/l	1083210

Chlorine sensors complete with 100 ml of electrolyte

A mounting kit, order no. 815079, is required for initial fitting of the chlorine sensors in the in-line probe housing DLG III.

1.1.6 DULCOTEST® Sensors for Bromine

Bromination agents

The following stabilised bromination agents are frequently used for disinfection during water treatment:

- BCDMH (1-**B**romo-3-**C**hloro-5,5-**Dim**ethyl-**H**ydantoin), marketed under trade names such as Brom-Sticks®
- DBDMH (1,3-**Dib**romo-5,5-**Dim**ethyl-**H**ydantoin) marketed under trade names such as Albrom 100®
- N-bromamide sulfonate

These bromination agents are initially available as solids (tablets, sticks, pellets) and are transferred via "bromine chutes" into a saturated aqueous solution, that contains the free bromine (HOBr, OBr^-) and the carrier molecule. The free bromine and the halogen (bromine, chlorine) still available in the carrier molecule is jointly referred to as "Total available bromine". This solution is metered during the process.

Free bromine is generated directly without a carrier by metering of sodium-calcium hypochlorite + acid + sodium bromide, e.g. the Acti-Brom® process (Nalco company) or through the metering of sodium-calcium hypochlorite into seawater (bromide containing).

Bromamines are designated as combined bromine, which are more reactive when compared with chloramines (combined chlorine).

Applications

Typical applications are in swimming pools, whirlpools, seawater and cooling circuits. Particular attention must be paid to the quality of the sample water in cooling circuits and, where necessary, compatibility with other chemicals used (e.g. corrosion inhibitors) must be checked.

The photometric DPD measurement method recommends itself as a comparison method (e.g. with DT 1B), calculated and displayed as bromine. If the photometric DPD measurement for "chlorine" is used, the measured value must be multiplied by a factor of 2.25 for conversion into "bromine".

Sensor selection

- The sensor type BCR 1 and its calibration/checking using the DPD4 method, is recommended for the measurement of stabilised bromination agents, such as BCDMH and N-bromamide sulfonate.
- The sensor type CBR 1 and its calibration/checking using the DPD1 method, is recommended for the measurement of free bromine from sodium-calcium hypochlorite and bromide or of free bromine from DBDMH (solely splits off free bromine), or of bromine compounds, which are produced during disinfection (using sodium-calcium hypochlorite or ozone) of seawater. The CBR 1 can likewise be used to measure combined bromine (bromamines), calibrated and checked using the DPD1 method.
- It is essential that the sensor type BRE 3-CAN, calibrated and checked using the DPD4 method, is used to measure bromination agents using the measuring and control system DULCOMARIN® II.

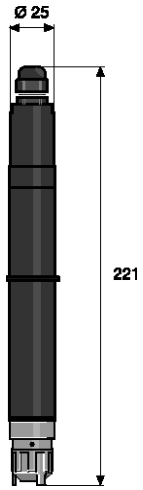
1.1 Amperometric Sensors DULCOTEST®

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

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

Your benefits

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



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

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

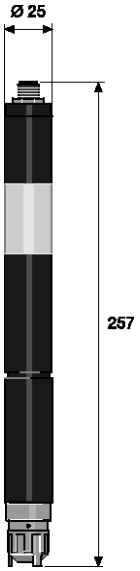
Sensor for Total Available Bromine BRE 3-CAN-P

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

Your benefits

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

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



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

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

Note: a mounting kit (order no. 815079) is required for initial fitting of the bromine sensors in the in-line probe housing DLG III.

Signal leads see Sensor Accessories, page → 1-113

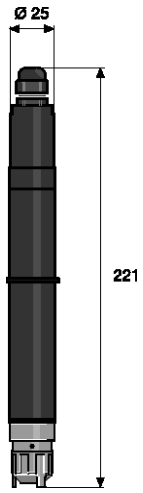
1.1 Amperometric Sensors DULCOTEST®

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

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

Your benefits

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



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

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

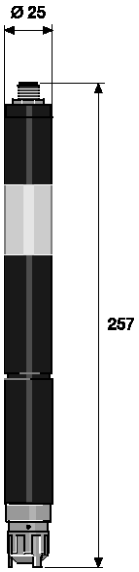
* Measuring range based on chlorine. When measuring bromine, the lower and upper limit of the measuring range are increased by the factor 2.25, therefore for example CBR 1-mA-0.5ppm: 0.02 ...1.1 ppm.

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

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

Your benefits

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



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

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

1.1 Amperometric Sensors DULCOTEST®

1.1.7 DULCOTEST® Sensors for Chlorine Dioxide

Selection Guide

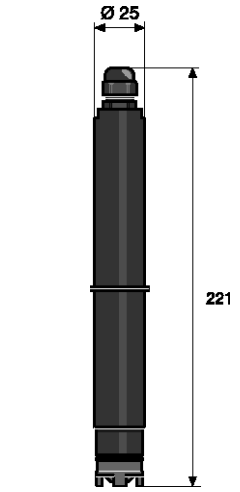
Sensor type		CDE 2-mA	CDP 1-mA	CDP 1-mA
Application		Potable water	Bottle washer system	Cooling water, waste water, agriculture, hot water
Measuring range		0.01-10.0	0.02-2.00	0.01-10.0
Temperature	°C	5 … 45	10 … 45	1 … 55
Temperature compensation		internal	external	internal
Max. pressure	bar	1.0	3.0	3.0
pH range		4.0 … 11.0	5.5 … 10.5	1.0 … 10.0
Response time	s	120	60	180
Run-in time	h	2-6	4-12	2-6
Surfactant-resistance		no	yes	yes
Contamination resistance		no	under certain conditions	yes
Cross sensitivity		Ozone	Ozone, chlorine	Ozone

Chlorine Dioxide Sensor CDE 2-mA

Standard sensor for the measurement of chlorine dioxide without cross-sensitivity by free chlorine. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Chlorine dioxide, no cross-sensitivity towards free chlorine
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water



pk_6_039

Measured variable	Chlorine dioxide (ClO_2)
Reference method	DPD1
pH range	4.0 … 11.0 ClO_2 stability range
Cross sensitivity	Ozone
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Response time sensor t_{90}	120 s
Selectivity	Chlorine dioxide selective towards free chlorine, chlorite and chlorate
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Uncontaminated drinking water (surfactant-free).
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CDE 2-mA-0.5 ppm	0.01…0.5 mg/l	792930
CDE 2-mA-2 ppm	0.02…2.0 mg/l	792929
CDE 2-mA-10 ppm	0.10…10.0 mg/l	792928

Chlorine dioxide sensors complete with 100 ml of electrolyte

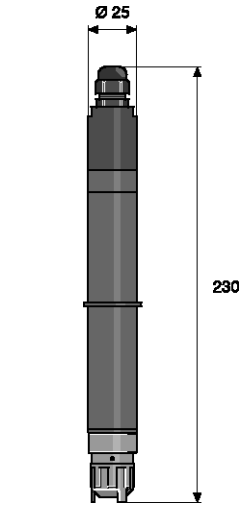
Note: a mounting kit (order no. 815079) is required for initial fitting of the chlorine dioxide sensors in the in-line probe housing DLG III.

Chlorine Dioxide Sensor CDP 1-mA

Sensor for the measurement of chlorine dioxide with a fast response time, for example in bottle-washing systems. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Chlorine dioxide without interference caused by surfactants
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Fast response time through open-pored diaphragm and external temperature measurement



pk_6_047

Measured variable	Chlorine dioxide (ClO_2)
Reference method	DPD1
pH range	5.5 … 10.5
Cross sensitivity	Ozone, chlorine
Temperature	10 … 45 °C
Max. pressure	3.0 bar
Intake flow	30…60 l/h
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, not temperature-compensated, uncalibrated, not electrically isolated
Temperature measurement	Separate temperature measurement needed for compensation
Response time sensor t_{90}	60 s
Selectivity	Chlorine dioxide as against chlorite and chlorate
Installation	Bypass: open sample water outlet
Sensor fitting	ProMinent recommends installing the sensor in the DLG II in-line probe fitting with upstream flow monitoring together with a Pt 100 temperature sensor
Measuring and control equipment	D1C and DAC with automatic temperature correction only
Typical applications	Process water containing surfactants (bottle washing machines).
Resistance to	Surfactants, slight films of dirt
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CDP 1-mA-2 ppm	0.02…2.0 mg/l	1002149

Chlorine dioxide sensors complete with 100 ml of electrolyte

Note: a mounting kit (order no. 815079) is required for initial fitting of the chlorine dioxide sensors in the in-line probe housing DLG III.

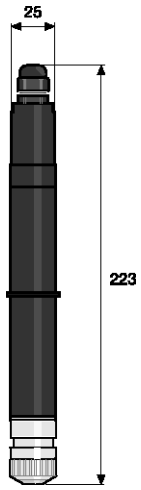
1.1 Amperometric Sensors DULCOTEST®

Chlorine Dioxide Sensor CDR 1-mA

Sensor for the measurement of chlorine dioxide for all kinds of water, including hot and contaminated water. Without cross-sensitivity by free chlorine. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Chlorine dioxide, without cross-sensitivity towards free chlorine
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt by pore-free diaphragm
- Operating temperature up to 60 °C (short term) by appropriate sensor materials



pk_6_083

Measured variable	Chlorine dioxide (ClO_2)
Reference method	DPD1
pH range	1.0 … 10.0
Cross sensitivity	Ozone
Temperature	1 … 55 °C (short-term period 60 °C)
Max. pressure	3.0 bar, (30°C, in the DGMa)
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC
Output signal	4…20 mA Temperature-compensated, uncalibrated, not electrically isolated
Response time sensor t_{90}	3 min.
Selectivity	Chlorite
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Contaminated industrial, process water, containing surfactants, cooling water, irrigation water, slightly contaminated waste water, warm water.
Resistance to	Surfactants, slight films of dirt, water-soluble chemicals, solids/dirt, biofilms
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CDR 1-mA-0.5 ppm	0.01…0.5 mg/l	1033762
CDR 1-mA-2 ppm	0.02…2.0 mg/l	1033393
CDR 1-mA-10 ppm	0.10…10.0 mg/l	1033404

Note: a mounting kit (order no. 815079) is required for initial fitting of the chlorine dioxide sensors in the in-line probe housing DLG III.

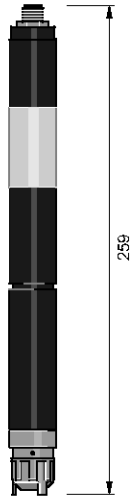
Chlorine Dioxide Sensor CDR 1-CAN

Sensor for the measurement of chlorine dioxide for all kinds of water, including hot and contaminated water. Without cross-sensitivity by free chlorine. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Chlorine dioxide, without cross sensitivity to free chlorine
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt by pore-free diaphragm
- Operating temperature up to 60 °C (short term) by appropriate sensor materials
- Operation on the CAN-bus with all the associated benefits

Sensors for connection to a CAN interface (e.g. Disinfection Controller)



P_DT_0071_SW1

Measured variable	Chlorine dioxide (ClO_2)
Reference method	DPD1
pH range	1.0 … 10.0
Cross sensitivity	Ozone
Temperature	5 … 45 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	Via CAN interface (11-30 V)
Output signal	Uncalibrated, temperature-compensated, electrically isolated
Response time sensor t_{90}	3 min.
Selectivity	Chlorite
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN®
Typical applications	Contaminated industrial, process water, containing surfactants, cooling water, irrigation water, slightly contaminated waste water.
Resistance to	Surfactants, water-soluble pollutants, solids/dirt, biofilms
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CDR 1-CAN-10 ppm	0.01…10.0 mg/l	1041155

* Complete with 100 ml of electrolyte, connecting cable - CAN M12 5-pin 0.5 m, T-distributor M12 5-pin CAN

1.1 Amperometric Sensors DULCOTEST®

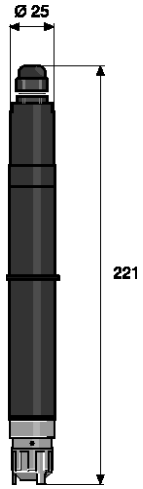
1.1.8 DULCOTEST® Sensors for Chlorite

Chlorite Sensor CLT 1-mA

Sensor for monitoring the disinfection by-product chlorite in compliance with potable water regulations. Without cross-sensitivity towards chlorine dioxide, chlorate and chlorine. For operation on controllers with 4-20 mA input

Your benefits

- Online monitoring of the disinfection by-product chlorite
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- No interference by chlorine dioxide/chlorine/chlorate
- Online monitoring improves process reliability
- Online monitoring replaces expensive laboratory analysis



pk_6_040

DVGW recommended

Measured variable	Chlorite anion (ClO_2^-)
Reference method	DPD method, chlorite in the presence of chlorine dioxide
pH range	6.5 … 9.5
Cross sensitivity	reducing chemicals, e. g. Fe^{2+}, Mn^{2+}
Temperature	1 … 40 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Chlorite selective towards chlorine dioxide, chlorate and free chlorine
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Monitoring of chlorine dioxide treated potable water or similar water. The selective measurement of chlorite alongside chlorine dioxide, chlorine and chlorate is possible.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLT 1-mA-0.5 ppm	0.02…0.5 mg/l	1021596
CLT 1-mA-2 ppm	0.10…2.0 mg/l	1021595

Chlorite sensors complete with 50 ml of electrolyte.

Note: A mounting kit (order no. 815079) is required for initial fitting of the chlorite sensors in the in-line probe housing DLG III.

The DT4 photometer is recommended for calibration of the chlorite sensor.

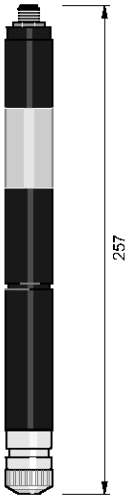
Chlorite Sensor CLT 1-CAN

Sensor for monitoring the disinfection by-product chlorite in compliance with potable water regulations. Without cross-sensitivity towards chlorine dioxide, chlorate and chlorine. For use on controllers with CAN-bus connection

Your benefits

- Online monitoring of the disinfection by-product chlorite
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- No interference by chlorine dioxide/chlorine/chlorate
- Online monitoring improves process reliability
- Online monitoring replaces expensive laboratory analysis
- Operation on the CAN-bus with all the associated benefits

Sensors for connection to a CAN interface (e.g. Disinfection Controller)



P_DT_0070_SW1

Measured variable	Chlorite anion (ClO_2^-)
Reference method	DPD method, chlorite together with chlorine dioxide
pH range	6.5 … 9.5
Cross sensitivity	reducing chemicals, e. g. Fe^{2+}, Mn^{2+}
Temperature	1 … 40 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	Via CAN interface (11-30 V)
Output signal	Uncalibrated, temperature-compensated, electrically isolated
Response time sensor t_{90}	3 min.
Selectivity	Chlorite selective towards chlorine dioxide, chlorate and free chlorine
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	DULCOMARIN®
Typical applications	Monitoring of potable water or similar water treated with chlorine dioxide. Selective measurement of chlorite and chlorine dioxide, chlorine and chlorate is also possible.
Resistance to	surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
CLT 1-CAN-2 ppm	0.05…2.0 mg/l	1041156

* Complete with 100 ml of electrolyte, connecting cable - CAN M12 5-pin 0.5 m, T-distributor M12 5-pin CAN

1.1 Amperometric Sensors DULCOTEST®

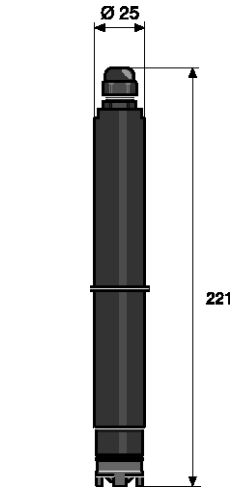
1.1.9 DULCOTEST® Sensors for Ozone

Ozone sensor OZE 3-mA

Standard sensor for measuring ozone in clear water. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Ozone, without cross sensitivity to chlorine, hydrogen peroxide
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water



pk_6_039

Measured variable	Ozone (O_3)
Reference method	DPD4
pH range	4.0 … 11.0 Ozone stability range
Cross sensitivity	Chlorine dioxide
Temperature	5 … 40 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC(two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Ozone as against free chlorine, combined chlorine, hydrogen peroxide
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Potable water and swimming pool water.
Resistance to	Salts, acids, alkalis. Not surfactants
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
OZE 3-mA-2 ppm	0.02…2.0 mg/l	792957

Ozone sensor complete with 100 ml of electrolyte.

Note: A mounting kit (order no. 815079) is required for initial fitting of the ozone sensors in the in-line probe housing DLG III.

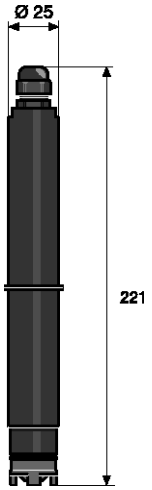
1.1 Amperometric Sensors DULCOTEST®

Ozone sensor OZR 1-mA

Sensor for measuring and monitoring the absence of ozone, also suitable for use in contaminated water. For operation on controllers with 4-20 mA input

Your benefits

- Measured variable: Ozone, without cross sensitivity to chlorine, hydrogen peroxide
- Diaphragm-covered sensor (encapsulated) minimises faults caused by changing flow or ingredients in the water
- Suitable also for monitoring the absence of ozone (rupture monitoring on filters) and for discontinuous ozone treatment processes
- Resistance to films of dirt by pore-free diaphragm



pk_6_039

Measured variable	Ozone (O_3)
Reference method	DPD4
pH range	4.0 … 11.0 Stability range of ozone
Cross sensitivity	chlorine dioxide, peracetic acid, bromine, bromamine
Temperature	5 … 40 °C
Max. pressure	1.0 bar
Intake flow	30…60 l/h (in the DGM or DLG III)
Supply voltage	16...24 V DC (two-wire system)
Output signal	4…20 mA ≈ Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Response time t_{90} after 1 month with 0.00 ppm ozone	<210s
Selectivity	Non-selective
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Potable water, swimming pool water, process, service or cooling water, monitoring the ozone breakdown of filters.
Resistance to	Salts, acids, alkalis, surfactants, dirt films
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
OZR 1-mA-2 ppm	0.02…2.0 mg/l	1051647

Important note: A mounting kit (order no. 815079) is required for initial fitting of the ozone sensors in the in-line probe housing DLG III.

1.1 Amperometric Sensors DULCOTEST®

1.1.10 DULCOTEST® sensors for dissolved oxygen

The measured variable "Dissolved oxygen" indicates the volume of gaseous oxygen physically dissolved in the aqueous phase in mg/l (ppm).

"Dissolved oxygen" is therefore an important parameter for assessing the quality of surface water and water that has to be treated for the breeding of livestock with the addition of oxygen. Dissolved oxygen is also used for controlling processes in clarification plants and waterworks.

The following sensors are assigned to the different applications and can be offered separately as 4 - 20 mA encoders to central controls or as a decentralised solution along with D1C and DAC (measured variable: "Dissolved oxygen": X).

Dissolved oxygen sensor DO 3-mA

Widely used sensor for the measurement of oxygen dissolved in water above 0.1 ppm to oxygen saturation. For installation in standard immersion pipes or in the bypass line of the process flow. Use in aeration tanks of clarification plants, waterworks, in fish breeding or to monitor surface water. Minimal maintenance due to visual measuring principle.

P_MSVZ_021_SW1

Your benefits

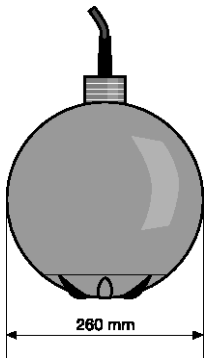
- Measured variable: Dissolved oxygen, minimal maintenance in contaminated water due to visual measuring principle
- Factory calibration stable for a long time. Calibration only needed following replacement of the visual sensor cap
- Rod-shaped construction for simple installation into standard immersion pipes and ProMinent bypass fittings
- No flow dependence and minimised faults due to ingredients in the water due to the visual measuring principle of quenching
- Long lifetime of fluorescence dye and simple replacement by replacement of the sensor cap

Measured variable	Dissolved oxygen
Calibration	On atmospheric oxygen or by reference measurement in the process water
Measuring accuracy	±0.1 mg/l
Response time sensor t_{90}	< 60 s at 25 °C from air to nitrogen
Temperature	0 … 50 °C
Temperature correction	integrated Pt1000, fed to the outside
Max. pressure	2.0 bar
Intake flow	Measurement even possible without flow
Supply voltage	18...30 V DC
Electrical connection	Fixed cable, 10 m
Output signal	4…20 mA assigned to the measuring range, temperature-corrected, calibrated and galvanically isolated
Enclosure rating	IP 68
Process integration	a) Immersion by immersion pipe (PVC, d40/DN 32, provided by the customer). The connection is possible using the immersion pipe adapter (reducing nipple, order no. 356924) and the 45° angle (order no. 356335). Both parts are included in the scope of delivery: and can be ordered as an accessory (also see Accessories). b) Installation into ProMinent bypass fittings, type DGMa with mounting kit 791818 and type DLG III with mounting kit 815079
Measuring and control equipment	DACb as of firmware 02.01.01.02 with complete calibration functionality and all correction variables (temperature, salinity, air pressure, height above sea level). Displayed units: [ppm] and [% oxygen saturation] DACa, AEGIS II, D1C: calibration only possible by the input of a reference concentration determined from the process water. Only temperature correction variable. Displayed unit: [ppm]
Typical applications	Control of oxygen input into the aeration tank (clarification plant), control of oxygen input in water works, breeding of fish and shrimps, conditioning of the water of large aquaria in zoos, assessment of the biological condition of surface water.
Resistance to	Contaminated water and the following chemical compounds: carbon dioxide, hydrogen sulfide, sulfur dioxide, ethylene oxide and against gamma sterilisation.
Interference by	Oxidant (e.g. chlorine, chlorine dioxide, ozone) and many organic solvents (e.g. chloroform, toluene, acetone)
Measuring principle, technology	optical: Measurement of the relaxation time of a pulsed fluorescence beam

	Measuring range	Order no.
DO 3-mA-20 ppm	0.10…20.0 mg/l	1094609

1.1 Amperometric Sensors DULCOTEST®

Dissolved oxygen sensor DO 2-mA



pk_6_051

Sensor for the measurement of dissolved oxygen, specifically optimised for control of oxygen concentrations in the aeration tank of clarification plants. Integrated in a floating ball with a Venturi cleaning function.

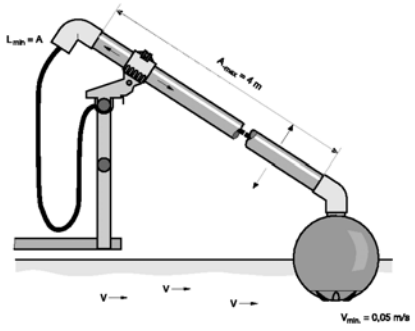
Your benefits

- Measured variable: Dissolved oxygen, no interference by turbidity or discolouration by the amperometric measuring principle
- Integration of the encapsulated transducer into a specially shaped float ball, creating a Venturi flow, which helps to clean the sensor membrane
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Minimal maintenance and long service life due to encapsulated transducer (easily replaceable thanks to bayonet fitting)
- Measuring electrodes protected by pore-free, dirt-repellent diaphragm
- Long service life of the electrolyte at low to medium oxygen concentrations, as occur in the aeration tanks of clarification plants, by means of optimised membrane thickness
- Stable zero point by means of large diaphragm-covered electrodes

Measured variable	Dissolved oxygen
Calibration	either on oxygen or by reference measurement in the process water
Measuring accuracy	±0.05 mg/l
Response time sensor t_{90}	22 s
Temperature	0 … 50 °C
Max. pressure	1.0 bar
Intake flow	Minimum: 0.05 m/s
Supply voltage	12...30 V DC
Electrical connection	Fixed lead, 10 m
Output signal	4…20 mA measuring range calibrated, temperature-corrected and electrically isolated
Enclosure rating	IP 68
Process integration	As a 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: 50 mm and railing bracket, also for PVC pipes with outside diameter: 50 mm (see accessories). The customer must provide the straight PVC tube and a 45 ° standard elbow for gluing to PVC pipes (outside diameter 50 mm).
Measuring and control equipment	D1C
Typical applications	Control of oxygen input into the aeration tank (clarification plant).
Resistance to	Contaminated water
Interference by	Oxidant (e.g. chlorine, chlorine dioxide, ozone) and many organic solvents (e.g. chloroform, toluene, acetone) and hydrogen sulfide
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered, encapsulated transducer integrated in ball float

For further information: Installation Fittings / Adapters see page → 1-126

	Measuring range	Order no.
DO 2-mA-10 ppm	0.05…10.0 mg/l	1020533



pk_6_012

1.1 Amperometric Sensors DULCOTEST®

1.1.11 DULCOTEST® Sensors for Peracetic Acid

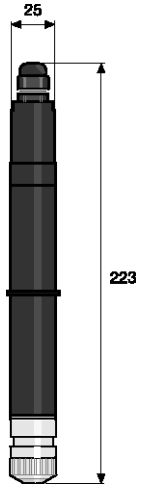
DULCOTEST® sensors of type PAA 1 are diaphragm-covered, amperometric 2-electrode sensors for the selective measurement of peracetic acid. Peracetic acid is particularly used in the food and beverage industry, but also for disinfection in the cosmetics, pharmaceutical and medical sectors. The continuous measurement and control of peracetic acid is therefore required when there are high demands in terms of disinfection and quality assurance. Commissioning and maintenance are significantly simplified. The sensor can also be used where there are surfactants.

Peracetic Acid Sensor PAA 1-mA

Sensor for the measurement of peracetic acid without cross-sensitivity towards hydrogen peroxide. For use in contaminated washing and waste water

Your benefits

- Measured variable: Peracetic acid, without cross-sensitivity towards the accompanying chemical, hydrogen peroxide
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt by pore-free diaphragm



pk_6_083

Measured variable	Peracetic acid
Reference method	Titration
pH range	1.0 … 9.0 (peracetic acid stability range)
Cross sensitivity	Ozone, chlorine dioxide, chlorine, bromine
Temperature	1 … 45 °C
Admissible temperature fluctuation	0.3 °C/min
Response time sensor t_{90}	≈ 3 min
Max. pressure	3.0 bar, (30 °C, in DGM)
Intake flow	30…60 l/h (in in-line probe housing DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4…20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Peracetic acid selective towards hydrogen peroxide
Installation	Bypass: open sample water outlet
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C, DAC, AEGIS II
Typical applications	Scouring in Cleaning in Place (CIP), rinsers, also suitable in the presence of cationic and anionic tensides. The selective measurement of peracetic acid and hydrogen peroxide is possible.
Resistance to	Salts, acids, alkalis, surfactants, dirt films
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
PAA 1-mA-200 ppm	1…200 mg/l	1022506
PAA 1-mA-2000 ppm	10…2,000 mg/l	1022507

Note: a mounting kit (order no. 815079) is required for initial fitting of the sensors in the in-line probe housing DLG III.

1.1 Amperometric Sensors DULCOTEST®

1.1.12 DULCOTEST® Sensors for Hydrogen Peroxide

The DULCOTEST® sensors PER 1, PEROX are diaphragm-covered, amperometric sensors for the online concentration measurement of hydrogen peroxide. Due to its complete biodegradability, hydrogen peroxide is a disinfectant and oxidising agent frequently used in water treatment and production:

- Chemical bleach in the wood, paper, textile and mineral compounds industry
- organic synthesis in the chemical, pharmaceutical and cosmetics industries,
- oxidation of potable water, landfill seepage water, contaminated ground water,
- Disinfection of cooling, process and production water in the pharmaceutical, food and beverage industries as well as in swimming pools,
- deodorisation (gas scrubbers) in municipal and industrial clarification plants,
- Dechlorination in chemical processes

Sensors are selected according to the following decision-making table:

Requirement	Type PER1	PEROX
Sample matrix loaded with dirt and chemicals	Very suitable due to water-impermeable hydrophobic diaphragm/ separate electrolyte, however sensitive to the presence of hydrogen sulfide (H_2S), oxidant	The process water is more failure-prone due to stronger water-permeable hydrophilic diaphragm/ electrolyte. But no cross-sensitivity towards free chlorine
Electrical influence due to interference potential in the measurement medium	Insensitive because the counter electrode is separated from the process	More sensitive because the counter electrode is in the medium
Temperature range	Up to 50 °C	Up to 40 °C
Simple handling during installation and maintenance	Suitable due to temperature compensation and transmitters integrated in the sensor	Separate temperature sensor for fast processes. Separate clip-on transducer
Response time as t_{90}	480 s	20 s
Quick temperature changes	Slow due to integrated temperature sensor	Fast due to separate temperature sensor
Measuring intervals in the absence of H_2O_2 (> 1 week)	Unsuitable	Suitable due to pulsed polarisation technology
Measuring range can vary in phased approach due to orders of magnitude or is not clear in the order	Selection of a suitable sensor is necessary	Suitable because the measuring range can be manually switched on the sensor transducer
Measuring range (different sensors/settings)	20...100,000 mg/l	1...2,000 mg/l
pH-range	1.0...11.0	2.5...10.0
Measuring sensors	2 electrodes	2 electrodes
Typical application	Cooling water, waste water, bleaching process, plant irrigation water	Exhaust air scrubbers, potable water, swimming pools, chlorine elimination, pharmaceutical industry

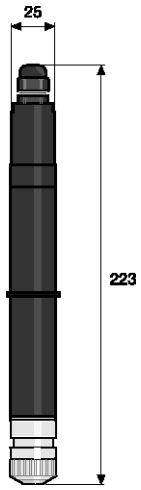
1.1 Amperometric Sensors DULCOTEST®

Hydrogen Peroxide Sensor PER1

Sensor for the measurement of hydrogen peroxide even in chemically contaminated and polluted water. Available with measuring ranges for medium to very high concentrations

Your benefits

- Measured variable hydrogen peroxide, with measuring ranges from 20 ppm to 100,000 ppm (10%) available
- Diaphragm-covered sensor minimises faults caused by changing flow or ingredients in the water
- Resistance to films of dirt by pore-free diaphragm
- Operating temperature up to 50 °C



pk_6_083

Measured variable	Hydrogen peroxide
Calibration	Photometric with manual DT3B photometer
pH range	1.0 … 11.0
Cross sensitivity	Ozone, chlorine dioxide, peracetic acid, chlorine, bromine
Temperature	0 … 50 °C
Admissible temperature fluctuation	< 0.3 °C/min
Response time sensor t_{90}	approx. 480 sec
Min. conductivity	0.05 mS/cm
Max. pressure	1.0 bar
Intake flow	20…100 l/h
Supply voltage	16...24 V DC (two-wire system)
Output signal	4…20 mA temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Hydrogen peroxide selective towards sulphite
Installation	Bypass: open outlet or return of the sample water into the process line
Sensor fitting	DGM, DLG III
Measuring and control equipment	D1C
Typical applications	Cooling and waste water treatment, plant irrigation water, bleaching processes, H_2O_2 product qualification, water with higher H_2O_2 concentrations of up to 100,000 ppm.
Resistance to	Salts, acids, alkalis, surfactants, dirt films, not against hydrogen sulphide (H_2S)
Measuring principle, technology	Amperometric, 2 electrodes, membrane-covered

	Measuring range	Order no.
PER 1-mA-2000 ppm	20.0…2,000.0 mg/l	1022510

Important note: Measuring ranges up to 100,000 ppm on request

Photometer→ 2-65

Accessories

		Order no.
Photometer DT3B hydrogen peroxide	(for calibration)	1039317
Polishing paste	(to electrode cleaning)	559810

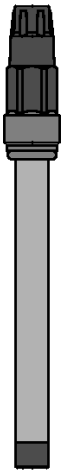
Note: a mounting kit (order no. 815079) is required for initial fitting of the sensors in the in-line probe housing DLG III.

Hydrogen Peroxide Sensor PEROX

Sensor for the measurement of hydrogen peroxide without cross-sensitivity to chlorine. It can also be used for fast control processes even with the temporary absence of hydrogen peroxide in clear water.

Your benefits

- Measured variable hydrogen peroxide without cross sensitivity to chlorine
- Diaphragm-covered sensor minimises faults caused by changing flow
- Control of fast processes through rapid response time by the sensor in conjunction with fast external temperature measurement for temperature correction
- Reliable measurement even after periods of absence of hydrogen peroxide by pulsed, self-regenerating measuring electrode



P_DT_0075_SW

Measured variable	Hydrogen peroxide
Calibration	Photometric with manual DT3B photometer
Measuring range	1...20, 10...200, 100...2000 mg/l, switchable
pH range	2.5 … 10.0
Temperature	0 … 40 °C
Admissible temperature fluctuation	< 1 °K/min (with external T measurement)
Response time sensor t_{90}	approx. 20 sec
Min. conductivity	With 20 mg/l range: 5 µS/cm With 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
Max. pressure	2.0 bar
Intake flow	30…60 l/h
Supply voltage	16...24 V DC(3-wire system)
Output signal	4…20 mA not temperature-compensated, uncalibrated, not electrically isolated
Selectivity	Hydrogen peroxide selective towards free chlorine
Installation	Bypass: open outlet or return of the sample water into the process line
Sensor fitting	DGM, DLG III
Measuring and control equipment	DAC
Typical applications	Exhaust air scrubbers, treatment of swimming pool water, potable water, controls with requisite very short response times.
Resistance to	Salts, acids, lyes, surfactants.
Measuring principle, technology	amperometric, 2 pulsing electrodes, diaphragm-covered

	Order no.
H_2O_2 sensor PEROX-H2.10 P	792976
PEROX transducer V1 for D1Ca	1034100
PEROX Transducer V2	1047979

Photometer→ 2-65

Accessories

		Order no.
Photometer DT3B hydrogen peroxide	(for calibration)	1039317
Polishing paste	(to electrode cleaning)	559810

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

1.2.1 Selection guide for pH sensors, ORP sensors

The following generally applicable points should be noted for optimum functioning of pH and ORP sensors:

- The sensors should never dry out
- The insertion angle must be > 15 ° from the horizontal (except with PHEK-L)
- Maximum flow < 0.8 m/s
- Use of suitable measuring lines
- Measuring lines should be as short as possible
- Use of suitable measuring devices/transducers (high resistance input)
- Calibration using quality buffer solutions
- Selection of electrode type according to the application
- The storage duration should be as short as possible

Signal leads for pH/ORP measurement see page → 1-113, pH quality buffer solutions see page → 1-116

DULCOTEST® pH sensor selection guide

Medium	Temperature / pressure	Sensor type	Typical application
clear, pH 3 – 14	max. 100 °C / 3 bar max. 25 °C / 6 bar	PHEP-H	Chemical processes
Clear, pH 2 – 12	max. 80 °C / no overpressure	PHEN	Chemically contaminated water, low-conductivity water ≥ 50 µS/cm
	max. 60 °C / 3 bar	PHES	Swimming pool water, potable water, glass stem
		PHEK	Swimming pool, aquarium, plastic shaft
	max. 80 °C / 6 bar	PHEP/PHEPT	Process water
	max. 80 °C / 8 bar	PHED	Chemically contaminated water, e.g. Cr^{6+}, CN^-
Solid residues, turbidity	max. 80 °C / 6 bar	PHER/PHEI	Cooling water, waste water
Solid matter, non-translucent	max. 100 °C / 16 bar	PHEX	Suspensions, sludge, emulsions
Clear to turbid, containing fluoride, pH 0 - 7	max. 50 °C / 7 bar	PHEF	Exhaust air scrubber, semiconductor industry, electroplating

Note: All DULCOTEST® pH and ORP sensors are made using lead-free glass (RoHS-compliant)

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

Selection guide for ORP sensors DULCOTEST®

Medium	Temperature / pressure	Sensor type	Typical application
clear, pH 2 – 12	max. 80 °C/no overpressure	RHEN	Chemically contaminated water, low-conductivity water ≥ 50 µS/cm
	max. 60 °C/3 bar	RHES	Swimming pool water, potable water, glass stem
		RHEK	Swimming pools, aquaria, synthetic stem
	max. 80 °C/6 bar	RHEP-Pt	Process water
		RHEP-Au	chemically contaminated water, e.g. CN-, ozone treatment
solid residues, turbidity	max. 80 °C/6 bar	RHER/RHEIC	Cooling water, waste water
solid matter, non-translucent	max. 100 °C/16 bar	RHEX	Suspensions, sludge, emulsions

Note: All DULCOTEST® pH and ORP sensors are made using lead-free glass (RoHS-compliant)

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

1.2.2 pH Sensors With SN6 or Vario Pin Plug-In Head

pH sensors with plug-in heads are connected to a shielded coaxial cable with the appropriate socket. The rotatable sensor head sleeve prevents the cable from twisting when inserting and dismantling the sensor (e.g. when calibrating). The cable can therefore remain connected. This avoids the penetration of troublesome water onto the plug-in contacts.

Series							
PHE	pH sensor						
	Properties						
	X	With solid electrolyte and circular gap diaphragm					
	K	With insensitive plastics shaft					
	N	KCl refillable sensor					
	E	Plug-in sensor					
	R	With PTFE circular diaphragm					
	P	Pressure-tight up to 6 bar					
	D	2 ceramics diaphragms (double junction)					
	S	Swimming pool sensor					
	F	Resistant to hydrofluoric acid					
	I	Robust sensor, plastic housing with NPT thread, double junction, Teflon diaphragm					
		Without specification: standard gel sensor					
		Special equipment					
		T	With integral temperature gauge				
		H	Temperature up to 100 °C, alkali-resistant				
		L	Vertical to horizontal installation				
			pH measuring range				
			012	pH measuring range: 0 – 12			
			112	pH measuring range: 1 - 12			
			314	pH measuring range: 3 – 14			
				Electrical connection at the sensor			
				S	Plug for coax connector SN6		
				V	Vario Pin plug		
					Internal thread		
					E	Internal thread PG 13.5 for installation	
					L	None, laboratory sensor refillable with KCl	
						Diaphragm	
						3D	3 ceramic diaphragms

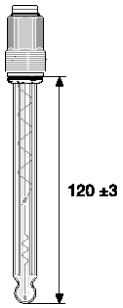
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHES 112 SE

pH sensor optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_016

pH range	1 … 12
Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, whirlpools, potable water.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Fitting length	Order no.
PHES-112-SE SLg100	100 ±3 mm	1051745
PHES 112 SE	120 ±3 mm	150702
PHES-112-SE SLg225	225 ±3 mm	150092

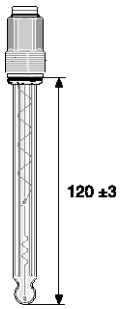
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHES 112 SE 3D

pH sensor optimised for use in potable water treatment, swimming pools/hot tubs and at low electrolytic conductivities of up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Three ceramic diaphragms optimised for low electrolytic conductivities
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_016

pH range	1 … 12
Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	50 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	3 Ceramic diaphragms
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Low conductivity water.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

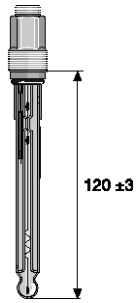
	Fitting length	Order no.
PHES 112 SE 3D	120 ±3 mm	1045759

pH Sensor PHEP 112 SE

pH sensor optimised for use with clear process water and conditions of up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for exacting process requirements
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system for high pressure/temperature requirements
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_019

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	15 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools during pressurisation for higher temperatures and pressures, potable and industrial water, electroplating, chemical industries.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Fitting length	Order no.
PHEP 112 SE	120 ±3 mm	150041

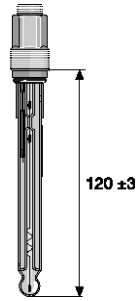
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHEP-H 314 SE

pH sensor optimised for use with clear process water, specifically for alkaline process solutions at high temperatures of up to 100 °C

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for exacting process requirements
- Optimised pH-sensitive glass for high alkali content and high temperatures
- Long service life / excellent precision: Measurement at a high pH value of up to 14
- Long service life: at high temperatures of up to 100 °C
- Stable reference system for high pressure / temperature requirements
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_019

pH range	3 … 14 (Note: use below pH 3 shortens the service life)
Temperature	0 … 100 °C
Max. pressure	6.0 bar up to 25 °C, 3.0 bar up to 100 °C
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	15 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Monitoring or control of chemical processes with neutral to highly-alkaline media and temperatures up to 100 °C.
Resistance to	Disinfectant, high alkalinity
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, highly alkaline tempered glass, ceramic diaphragm, gel electrolyte, separate temperature measurement for temperature compensation needed

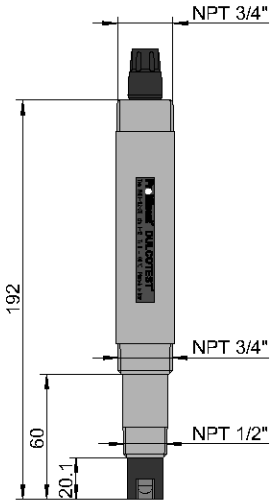
	Order no.
PHEP-H 314 SE	1024882

pH Sensor PHEI 112 SE

Reliable online measurement of pH values in industrial waste water/water – with DULCOTEST® sensors.

Your benefits

- Solid high-grade plastic housing with integrated process connection for direct installation in the process with ½" and ¾" NPT thread
- Large dirt-repellent Teflon diaphragm protects against unwanted blocking of the reference
- Double junction reference system for stability with chemically polluted water
- Large electrolyte reservoir for long service lives



P_DT_0076_SW1

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	50 µS/cm
Electrolyte	gel containing potassium chloride with a large KCl reservoir of gel
Diaphragm	PTFE ring diaphragm
Sensor shaft	Plastic
Sensor shaft Ø	17 ±0.2 mm (below the ½" NPT thread), 22 ±0.2 mm (below the ¾" thread)
Fitting length	20 ±0.2 mm (from the lower end of the ½" thread), 60 ±0.2 mm (from the lower end of the ¾" thread)
Fitting position	Vertical up to +25°
Thread	½" and ¾" NPT thread
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Municipal and industrial waste water Cooling water, process water, water in the chemical industry and paper making, generally for water with a solid matter fraction.
Resistance to	Disinfectant, solids content (turbid water), water-soluble chemicals
Measuring principle, technology	direct potentiometric measurement, 2 probes, double junction, gel electrolyte, large Teflon diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEI 112 SE	1076610

Accessories

	Order no.
Adapter for DGMa; M34x3/4" NPT PVDF natural	1077156

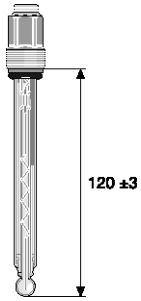
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHER 112 SE

pH sensor optimised for use in contaminated water containing solids and for low conductivity of > 50 µS/cm at up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- The large dirt-repellent Teflon® diaphragm prevents the reference system from becoming blocked up
- Long service life when solids are present
- High-viscosity electrolyte combined with a salt reservoir prevents the electrolyte from "bleeding"
- Long service life without drifts when there is clear water with low conductivity
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_018

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	50 µS/cm
Electrolyte	With KCl supply (salt rings in the reference electrolyte)
Diaphragm	PTFE ring diaphragm
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Municipal and industrial waste water, cooling water, industrial water, water in chemicals industry and paper production, generally for water with a solid matter fraction, water with low conductivity, e. g. from reverse osmosis.
Resistance to	Disinfectant, solids content (turbid types of water)
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, Teflon ring diaphragm, polymer electrolyte, separate temperature measurement for temperature compensation needed

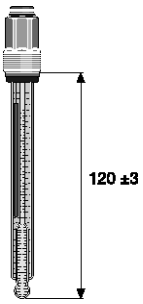
	Order no.
PHER 112 SE	1001586

pH Sensor PHEX 112 SE

pH sensor optimised for use with contaminated water with a high solids content at 6 bar/100 °C or 16 bar/25 °C

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for extremely high solids content
- The solid electrolyte makes the diaphragm redundant and prevents the reference system from becoming blocked up
- Long service life when sludge is present due to lack of a diaphragm
- Long service life as the solid electrolyte prevents the electrolyte from "bleeding"
- Stable reference system
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_017

pH range	1 … 12
Temperature	0 … 100 °C
Max. pressure	16.0 bar up to 25 °C, 6.0 bar up to 100 °C
Min. conductivity	500 µS/cm
Electrolyte	Polymer containing potassium chloride (solid)
Diaphragm	Circular gap diaphragm (solid electrolyte)
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Waste water, industrial water, process chemistry, emulsions, suspensions, protein-containing media, in general for water with a high solid fraction, not suitable for use in clear water. not suitable for media with oxidation agents.
Resistance to	Solids content (turbid types of water), sludge, emulsions
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, no diaphragm, polymer electrolyte, separate temperature measurement for temperature compensation needed

	Fitting length	Order no.
PHEX 112 SE	120 ±3 mm	305096
PHEX 112 SE	225 ±3 mm	150061

ex HD works

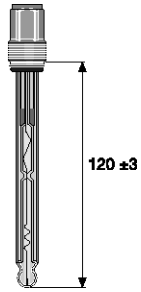
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHED 112 SE

pH sensor optimised for use with chemically contaminated but clear water at up to 80 °C/8 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in chemically contaminated but clear water
- Double junction: two coupled ceramic diaphragms protect the reference system
- Long service life when chemical pollutants are present
- Special construction permits a maximum pressure of 8 bar
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_022

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	8.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Double junction
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Chemically loaded waste water, industrial water, cooling water.
Resistance to	Disinfectants, water-soluble chemicals
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, double junction, gel electrolyte, separate temperature measurement for temperature compensation needed

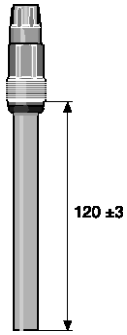
	Order no.
PHED 112 SE	741036

pH Sensor PHEF 012 SE

pH sensor optimised for use with acidic water containing fluoride and abrasive water containing solids at up to 50 °C/7 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Optimised pH glass for use in the presence of glass-corroding hydrofluoric acid (HF). HF is formed primarily in the presence of fluoride (F^-) at a pH of < 4. Glass corrosion is promoted by a constant concentration of fluoride, a falling pH value and a rising temperature. The glass composition and structure of the PHEF type reduce the release of SiF_4. Extended service life in the presence of fluoride (F^-) at a pH of < 7
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- The flat shape of the glass diaphragm and large ring diaphragm facilitate use in contaminated water, which also contains abrasive solids



pk_6_007

pH range	0 … 12
Temperature	0 … 50 °C
Max. pressure	7.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	HDPE ring diaphragm, flat (Double Junction)
Sensor shaft	Epoxy
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	A significantly longer service life can be achieved compared with standard pH sensors in media containing hydrofluoric acid, e. g. waste water from the semiconductor industry or electroplating applications and air scrubbers.
Resistance to	Disinfectant, solids content (turbid types of water), hydrofluoric acid (HF), abrasive particles
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, PE ring diaphragm, HF-compatible flat glass diaphragm, gel electrolyte, separate temperature measurement for temperature compensation needed

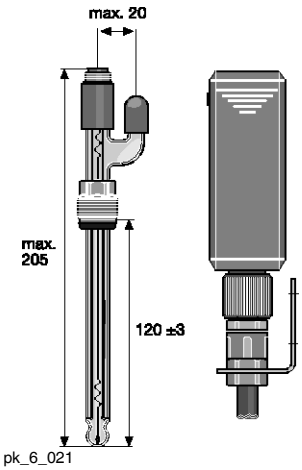
	Order no.
PHEF 012 SE	1010511

pH Sensor PHEN 112 SE

Refillable pH sensor optimised for use with chemically contaminated water at up to 80 °C/without excess pressure

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Renewable liquid electrolyte by continuous replenishment from an electrolyte bottle installed above the electrode
- 1 ceramic diaphragm made of special material and with an optimised size / with optimised pore diameter
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Long service life in the presence of chemicals dissolved in the water, which could contaminate the reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	150 µS/cm
Electrolyte	KCL electrolyte, refillable
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Waste water, cooling waterchemically contaminated water.
Resistance to	Disinfectant, only for clear types of water
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, liquid electrolyte, 1 ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEN 112 SE	305090

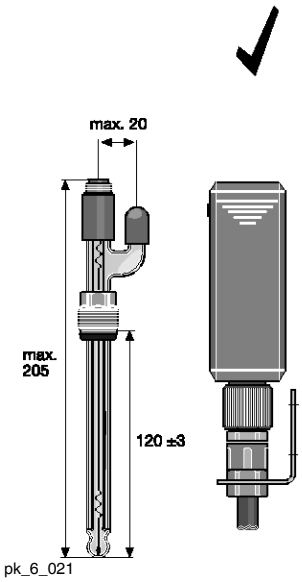
Supplied without PE storage tank and tube

Accessories

	Order no.
PE storage tank with connectors and tube	305058

We recommend installation approx. 0.5-1 m above the sample fluid level

	Capacity ml	Order no.
KCl solution, 3 molar	250	791440
KCl solution, 3 molar	1,000	791441



pH Sensor PHEN 112 SE 3D

Refillable pH sensor optimised for use in contaminated water containing solids and water with a low conductivity of > 50 µS/cm at up to 80 °C/without overpressure

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Renewable liquid electrolyte by continuous replenishment from an electrolyte bottle installed above the electrode
- 3 ceramic diaphragms made of special material, with optimised size and optimised pore diameter
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Long service life in water with low conductivity > 50 µS/cm and where solids are present
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	50 µS/cm
Electrolyte	3 molar potassium chloride solution, refillable
Diaphragm	3 ceramic diaphragms
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Waste water, water with low conductivity, e. g. from reverse osmosis.
Resistance to	Disinfectant, solids content (turbid types of water)
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, liquid electrolyte, 1 ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEN 112 SE 3D	150078

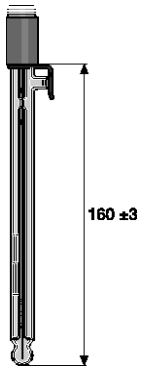
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHEN 012 SL

Refillable pH sensor for use with manual measuring instruments, optimised for clear and also chemically contaminated water at up to 80 °C/without overpressure

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Renewable liquid electrolyte by continuous replenishment from an electrolyte bottle installed above the electrode
- 1 ceramic diaphragm made of special material and with an optimised size / with optimised pore diameter
- Long service life in the presence of dissolved chemicals, which could contaminate the reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_020

pH range	0 … 12
Temperature	0 … 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	150 µS/cm
Electrolyte	KCl electrolyte, refillable
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	160 ±3 mm
Fitting position	Vertical up to +25°
Thread	None
Electrical connection	SN6 plug-in head
Enclosure rating	IP 65
Installation	Immersion by tripod or manually
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Manual measurements in laboratories.
Resistance to	Disinfectants, water-soluble chemicals
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, liquid electrolyte, 1 ceramic diaphragm, separate temperature measurement for temperature compensation needed

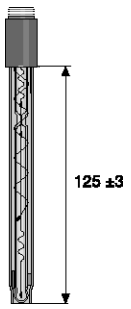
	Order no.
PHEN 012 SL	305078

pH Sensor PHEK 112 S

pH sensor for use with manual measuring instruments, with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs at up to 80 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_023

pH range	1 … 12
Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	None
Electrical connection	SN6 plug-in head
Enclosure rating	IP 65
Installation	Immersion by tripod or manually
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Hand-held measurement in swimming pools, potable water.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEK 112 S	305051

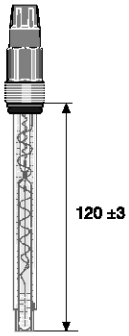
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHEK 112 SE

pH sensor with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_090

pH range	1 … 12
Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, potable water, aquaria.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEK 112 SE	1028457

ex HD works

pH Sensor PHEK-L 112 SE

pH sensor with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs, horizontal installation possible, at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- With plastic shaft to prevent glass breakage
- Horizontal (level) installation possible (90° angle) (usually limited to 0 - 75° angle)
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material and optimised size / optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system

pH range	1 … 12
Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertically to horizontally
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, potable water, aquaria. Horizontal installation possible.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
PHEK-L 112 SE	1034918

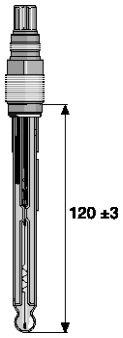
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHEPT 112 VE

pH sensor with integral temperature measurement, optimised for use with clear process water and changing process temperature of up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for exacting process requirements
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive chemicals
- Stable reference system for high pressure / temperature requirements
- Integrated Pt 100 temperature sensor for temperature compensation of the pH measurement in higher-order measuring instruments eliminates the need for an additional sensor housing and external temperature sensor
- Vario Pin plug-in head with IP 67 specification
- Twist protection for the sensor cable connected. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding troublesome moisture on the connector contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



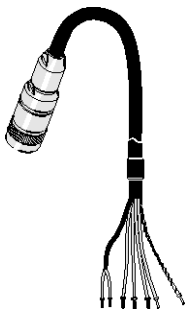
pk_6_068

pH range	1 … 12
Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Electrolyte	gel containing potassium chloride
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	15 mm
Fitting length	120 ±3 mm
Fitting position	vertical up to +25°
Thread	PG 13.5
Electrical connection	Vario Pin plug-in head
Enclosure rating	IP 67
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers (with the exception of DCCa pH)
Typical applications	Swimming pools during pressurisation for higher temperatures and pressures, potable and industrial water, electroplating, chemical industry, processes with a temperature change.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, integrated temperature measurement for temperature compensation

	Order no.
PHEPT 112 VE	1004571

Accessories: Measuring Line for Sensors with Vario Pin Plug-in Head

Ready-made 6-wire measuring line with Vario Pin plug for connection to sensor type PHEPT 112 VE.



pk_6_069

	Length	Order no.
Vario Pin signal lead VP 6-ST/ 2 m	2 m	1004694
Vario Pin signal lead VP 6-ST/ 5 m	5 m	1004695
Vario Pin signal lead VP 6-ST/10 m	10 m	1004696

1.2.3 pH Sensors with Fixed Cable

pH sensors with fixed cable contain a shielded coaxial cable, which is firmly connected to the sensor head by a rotating sleeve, thereby preventing the cable from twisting when inserting and dismantling the sensor.

Series									
PHE	pH sensor								
	Properties								
	X	with solid electrolyte and annular gap diaphragms							
	K	with insensitive plastic shaft							
	N	KCl refillable sensor							
	R	with PTFE ring diaphragms							
	P	pressure-tight up to 6 bar							
	D	with double diaphragm (double junction)							
	S	Swimming pool sensor							
	I	Robust sensor, plastic housing with NPT thread, double junction, Teflon diaphragm							
		Special equipment							
		T	with integral temperature gauge						
			pH measuring range						
			112	pH measuring range: 1...12					
				Electrical connection at the sensor					
				F	Fixed cable sensor				
					Internal thread				
					E	Internal thread			
					L	none, laboratory sensor refillable			
						Cable diameter			
						3	cable diameter 3 mm		
						5	cable diameter 5 mm		
							Cable length		
							01	cable length in metres	
								Electrical connection at device	
								S	SN6
								D	DIN
								B	BNC
								O	without connector
								M	SN6 male

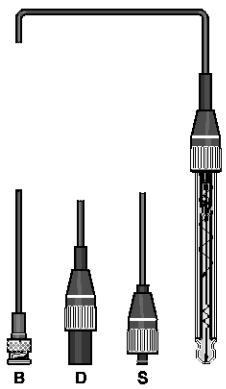
The technical data corresponds to pH sensors with SN6 plug-in head (see page → 1-63)

pH Sensor PHES 112 F

pH sensor for use with manual measuring instruments, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_024

pH sensor, gel-filled, with fixed coaxial cable and device plug, without screw-in thread.

	Cable length m	Device plug	Order no.
PHES 112 F 301 S	1	SN6	304976
PHES 112 F 301 B	1	BNC	304980
PHES 112 F 303 B	3	BNC	304981

Further types on request.

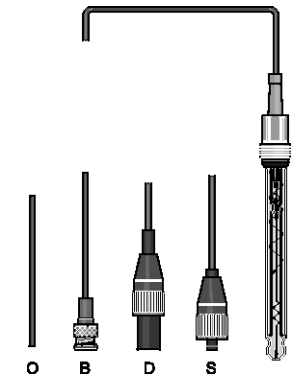
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHES 112 FE

pH sensor optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_028

	Cable length m	Device plug	Order no.
PHES 112 FE 303 S	3	SN6	304984
PHES 112 FE 310 S	10	SN6	304985
PHES 112 FE 503 D	3	DIN	304986
PHES 112 FE 303 B	3	BNC	304988
PHES 112 FE 310 O	10	without	304990
PHES 112 FE 301 B	1	BNC	150079
PHES 112 FE 301 S	1	SN6	150926
PHES 112 FE 303 O	1	without	150101

Further types on request.

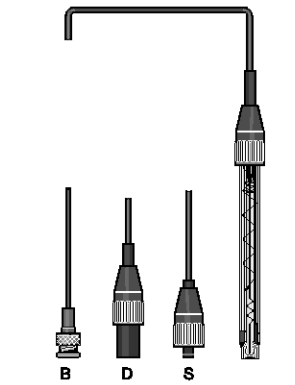
pH Sensor PHEK 112 F

pH sensor for use with manual measuring instruments, with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs at up to 80 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

pH sensor with polycarbonate plastic shaft, glass membrane protection, with fixed coaxial cable and device plug, without screw-in thread.



pk_6_027

	Cable length m	Device plug	Order no.
PHEK 112 F 301 S	1	SN6	304994
PHEK 112 F 501 D	1	DIN	304995
PHEK 112 F 301 B	1	BNC	304996

Further types on request.

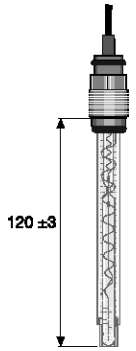
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHEK 112 FE

pH sensor with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_090_1

pH sensor with polycarbonate plastic shaft, glass membrane protection, with fixed coaxial cable and device plug, with screw-in thread.

	Cable length m	Device plug	Order no.
PHEK 112 FE 303 B	3	BNC	1028458

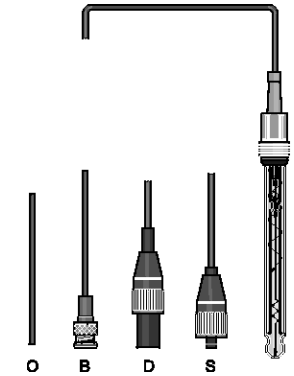
Other types on request.

pH Sensor PHEP 112 FE

pH sensor optimised for use with clear process water and conditions of up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for exacting process requirements
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system for high pressure/temperature requirements
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_028

	Cable length m	Device plug	Order no.
PHEP 112 FE 303 S	3	SN 6	150673
PHEP 112 FE 305 O	5	without	150689
PHEP 112 FE 510 O	10	without	150929

Further types on request.

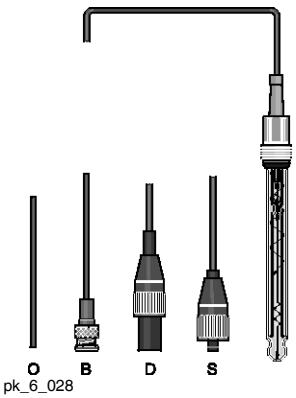
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

pH Sensor PHER 112 FE

pH sensor optimised for use in contaminated water containing solids and for low conductivity of > 50 µS/cm at up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- The large dirt-repellent Teflon® diaphragm prevents the reference system from becoming blocked up
- Long service life when solids are present
- High-viscosity electrolyte combined with a salt reservoir prevents the electrolyte from "bleeding"
- Long service life without drifts when there is clear water with low conductivity
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_028

	Cable length m	Device plug	Order no.
PHER 112 FE 510 O	10	without	150874

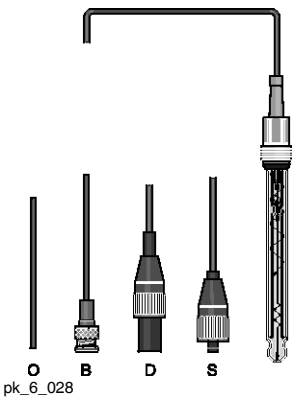
Other types on request.

pH Sensor PHEX 112 FE

pH sensor optimised for use with contaminated water with a high solids content at 6 bar/100 °C or 16 bar/25 °C

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for extremely high solids content
- The solid electrolyte makes the diaphragm redundant and prevents the reference system from becoming blocked up
- Long service life when sludge is present due to lack of a diaphragm
- Long service life as the solid electrolyte prevents the electrolyte from "bleeding"
- Stable reference system
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

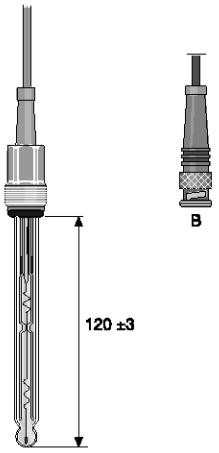


pk_6_028

	Cable length m	Device plug	Order no.
PHEX 112 FE 510 S	10	SN 6	150025
PHEX 112 FE 510 O	10	without	150084

Further types on request.

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®



pH Sensor PHED 112 FE

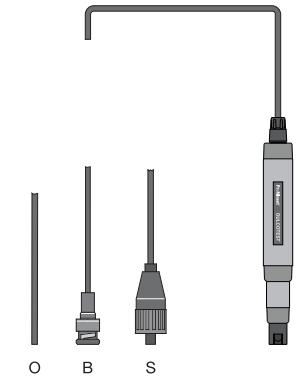
pH sensor optimised for use with chemically contaminated but clear water at up to 80 °C/8 bar

Your benefits

- Electrochemical combination electrode: pH and reference electrode integrated
- Diaphragm and reference system optimised for use in chemically contaminated but clear water
- Double junction: two coupled ceramic diaphragms protect the reference system
- Long service life when chemical pollutants are present
- Special construction permits a maximum pressure of 8 bar
- Rotating sensor head sleeve prevents the cable twisting when inserting and dismantling the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

	Cable length m	Device plug	Order no.
PHED 112 FE 303 B	3	BNC	741038

Further types on request.



P_DT_0083_SW

pH sensor PHEI 112 FE

Your benefits

- Solid high-grade plastic housing with integrated process connection for direct installation in the process with ½" and ¾" NPT thread
- Large dirt-repellent Teflon diaphragm protects against unwanted blockage of the reference
- Double junction reference system for stability with chemically polluted water
- Large electrolyte reservoir for long service lives

Important information:

PHEI fixed cable sensors have protection class IP68 on the fixed cable – sensor connection!

	Cable length m	Device plug	Order no.
PHEI 112 FE 501 S	1	SN6	1094721
PHEI 112 FE 505 S	5	SN6	1094724
PHEI 112 FE 510 S	10	SN6	1094723
PHEI 112 FE 505 O	5	Open cable end	1094720
PHEI 112 FE 510 O	10	Open cable end	1094722
PHEI 112 FE 505 B	5	BNC	1094726
PHEI 112 FE 510 B	10	BNC	1094725

1.2.4 ORP Sensors with SN6 Plug-in Head

ORP sensors with SN6 plug-in head are connected to a shielded coaxial cable with the appropriate socket. The rotating sensor head sleeve prevents the cable from twisting when inserting and dismantling the sensor. The cable can therefore remain connected. This avoids moisture from contacting the plug-in contacts.

Series						
RHE	ORP sensor					
	Properties					
	X	with solid electrolyte and circular gap diaphragm				
	K	with insensitive plastic shaft				
	P	pressure tight up to 6 bar				
	R	with PTFE circular diaphragm				
	N	KCl refillable sensor				
	S	swimming pool sensor				
	IC	Robust sensor, plastic housing with NPT thread, double junction, Teflon diaphragm				
		Special equipment				
		L	vertical to horizontal installation			
			Sensor material			
			Pt	Platinum (pin)		
			Au	Gold (pin)		
				Electrical connection at the sensor		
				S	Plug for coax connector SN6	
					Internal thread	
					E	PG 13.5

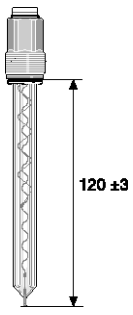
DULCOTEST® ORP sensor selection guide see page → 1-1

ORP Sensor RHES-Pt-SE

ORP sensor optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_031

Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, whirlpools, potable water.
Resistance to	Disinfectant

Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

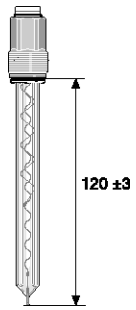
	Fitting length	Order no.
RHES-Pt-SE SLg100	100 ±3 mm	1051746
RHES-Pt-SE	120 ±3 mm	150703

ORP Sensor RHES-Au-SE

ORP sensor optimised for use in potable water treatment, swimming pools/hot tubs when electrolysis processes are used for disinfection and with ozone treatment at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Gold electrode to prevent faults by products from electrolysis processes where the electrodes are immersed directly into the sample water
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to material, which is inert to aggressive disinfectants
- Stable reference system
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_031

Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Gold
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, whirlpools, potable water, with disinfectants from electrolysis processes (electrodes directly in the process water).
Resistance to	Disinfectant, by-products from electrolysis process and from ozone treatment process
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

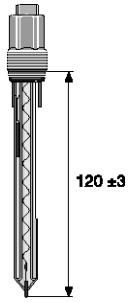
	Fitting length	Order no.
RHES-Au-SE	120 ±3 mm	1044544

ORP Sensor RHEP-Pt-SE

ORP sensor optimised for use with clear process water and conditions of up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for exacting process requirements
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to material, which is inert to aggressive chemicals
- Stable reference system for high pressure / temperature requirements
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_035

Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	15 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools during pressurisation for higher temperatures and pressures, potable and industrial water, electroplating.
Resistance to	Disinfectant, not suitable for media containing ozone, cyanides, electrolysis processes (electrodes directly in the sample water)
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

	Fitting length	Order no.
RHEP-Pt-SE	120 ±3 mm	150094

ORP Sensor RHEP-Au-SE

ORP sensor optimised for use with clear process water when electrolysis processes are used for disinfection and with ozone treatment and with cyanide detoxification at conditions of up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Gold electrode to prevent faults by products from electrolysis processes where the electrodes are immersed directly into the sample water
- Diaphragm and reference system optimised for exacting process requirements
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive chemicals
- Stable reference system for high pressure / temperature requirements
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Gold
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	15 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Cyanide detoxification, ozone monitoring.
Resistance to	Disinfectant, by-products from electrolysis process and from ozone treatment process, cyanides
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

	Fitting length	Order no.
RHEP-Au-SE	120 ±3 mm	1003875

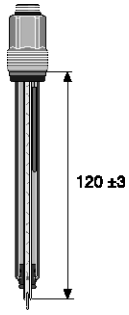
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

ORP Sensor RHER-Pt-SE

ORP sensor optimised for use in contaminated water containing solids and for low conductivity of > 50 µS/cm at up to 80 °C/6 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- The large dirt-repellent Teflon® diaphragm prevents the reference system from becoming blocked up
- Long service life when solids are present
- High-viscosity electrolyte combined with a salt reservoir prevents the electrolyte from "bleeding"
- Long service life without drifts when there is clear water with low conductivity
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_034

Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	50 µS/cm
Electrolyte	Electrolyte with KCl supplement (salt rings in the reference electrolyte)
ORP electrode	Platinum
Diaphragm	PTFE ring diaphragm
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head/other versions on request
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Municipal and industrial waste water, cooling water, process water, chemical applications, paper manufacturing. In general for water with a noticeable solid fraction.
Resistance to	Disinfectant, solids content (turbid types of water)
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, Teflon ring diaphragm, polymer electrolyte

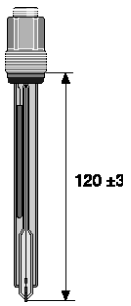
	Fitting length	Order no.
RHER-Pt-SE	120 ±3 mm	1002534

ORP Sensor RHEX-Pt-SE

ORP sensor optimised for use with contaminated water with a high solids content at 6 bar/100 °C or 16 bar/25 °C

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for extremely high solids content
- The solid electrolyte makes the diaphragm redundant and prevents the reference system from becoming blocked up
- Long service life when sludge is present due to lack of a diaphragm
- Long service life as the solid electrolyte prevents the electrolyte from "bleeding"
- Stable reference system
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_033

Temperature	0 … 100 °C
Max. pressure	16.0 bar up to 25 °C, 6.0 bar up to 100 °C
Min. conductivity	500 µS/cm
Electrolyte	Polymer containing potassium chloride (solid)
ORP electrode	Platinum
Diaphragm	Circular gap (solid electrolyte)
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head/other versions on request
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Waste water, industrial water, process chemistry, emulsions, suspensions, protein-containing media. In general for water with a high solid fraction. Not suitable for clear media. Not suitable for media with oxidation agents.
Resistance to	Solids content (turbid types of water), sludge, emulsions
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, no diaphragm, polymer electrolyte

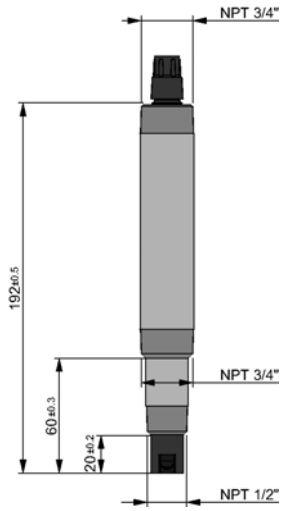
	Fitting length	Order no.
RHEX-Pt-SE	120 ±3 mm	305097

ORP Sensor RHEIC-Pt-SE

ORP sensor optimised for use in industrial waste water/water – with DULCOTEST® sensors.

Your benefits

- Mechanically resistant platinum dome permits lasting use even when exposed to abrasive particles
- Large dirt-repellent Teflon diaphragm protects against unwanted blockage of the reference
- Double junction reference system for stability with chemically polluted water
- Large electrolyte reservoir for long service lives
- Solid high-grade plastic housing with integrated process connection for direct installation in the process with ½" and ¾" NPT thread



P_DT_0072_1_SW

Temperature	0 … 80 °C
Max. pressure	6.0 bar
Min. conductivity	50 µS/cm
Electrolyte	gel containing potassium chloride with a large KCl reservoir of gel
Diaphragm	PTFE ring diaphragm
Sensor shaft	Plastic
Sensor shaft Ø	17 ±0.2 mm (below the ½" NPT thread), 22 ±0.2 mm (below the ¾" thread)
Fitting length	20 ±0.2 mm (from the lower end of the ½" thread), 60 ±0.2 mm (from the lower end of the ¾" thread)
Fitting position	Vertical up to +25°
Thread	½" and ¾" NPT thread
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Municipal and industrial waste water, cooling water, process water, water in the chemical industry and paper making, general use for water with solid fractions.
Resistance to	Disinfectant, solids content (turbid water), water-soluble chemicals
Measuring principle, technology	direct potentiometric measurement, 2 probes, double junction, gel electrolyte, large Teflon diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
RHEIC-Pt-SE	1082281

Accessories

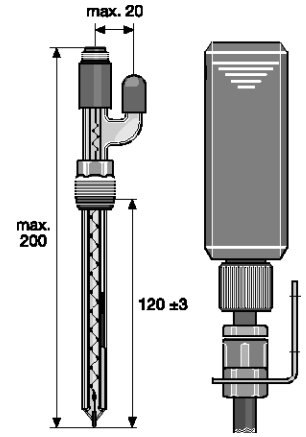
	Order no.
Adapter for DGMa; M34x3/4" NPT PVDF natural	1077156

ORP Sensor RHEN-Pt-SE

Refillable ORP sensor optimised for use with chemically contaminated water at up to 80 °C/without excess pressure

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Renewable liquid electrolyte by continuous replenishment from an electrolyte bottle installed above the electrode
- 1 ceramic diaphragm made of special material, with an optimised size and with optimised pore diameter
- Long service life in the presence of chemicals dissolved in the water, which could contaminate the reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_032

Temperature	0 … 80 °C
Max. pressure	Operation at atmospheric pressure
Min. conductivity	150 µS/cm
Electrolyte	KCl electrolyte, refillable
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Glass
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head/other versions on request
Enclosure rating	IP 65
Installation	By tripod or manually
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Waste water, cooling water, chemically contaminated water, only clear types of water.
Resistance to	Disinfectant, chemicals dissolved in water
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, liquid electrolyte, 1 ceramic diaphragm

	Fitting length	Order no.
RHEN-Pt-SE	120 ±3 mm	305091

Supplied without PE storage tank and tube

Accessories

	Capacity ml	Order no.
PE storage tank with connectors and tube	–	305058
KCl solution, 3 molar	250	791440
KCl solution, 3 molar	1,000	791441

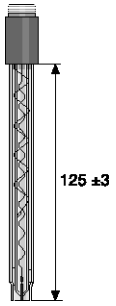
We recommend installation approx. 0.5-1 m above the sample fluid level.

ORP Sensor RHEK-Pt-S

ORP sensor with plastic shaft for use with manual measuring instruments, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_036

Temperature	0 … 60 °C
Max. pressure	Operation at atmospheric pressure
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	125 ±3 mm
Fitting position	Vertical up to +25°
Thread	None
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	By tripod or manually
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Manual measurement e. g. swimming pools, potable water, aquarium water.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

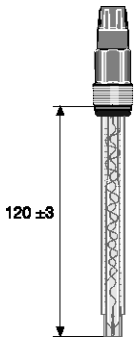
	Fitting length	Order no.
RHEK-Pt-S	125 ±3 mm	305052

ORP Sensor RHEK-Pt-SE

ORP sensor with plastic shaft, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)



pk_6_091

Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	Vertical up to +25°
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pool, potable water, aquariums.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

	Fitting length	Order no.
RHEK-Pt-SE	120 ±3 mm	1028459

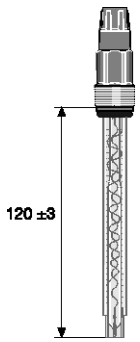
1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

ORP Sensor RHEK-L Pt-SE

ORP sensor with plastic shaft, optimised for vertical to horizontal installation position for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- With plastic shaft to prevent glass breakage
- Horizontal (level) installation possible (90° angle) (usually limited to 0 - 75° angle)
- Diaphragm and reference system optimised for use in swimming pools and for potable water
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Rotating sensor head sleeve. This means that the cables can remain connected during installation and dismantling of the sensor, avoiding moisture on the plug-in contacts
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system



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Temperature	0 … 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Electrolyte	Gel containing potassium chloride
ORP electrode	Platinum
Diaphragm	Ceramic
Sensor shaft	Polycarbonate
Shaft diameter	12 mm
Fitting length	120 ±3 mm
Fitting position	vertical to horizontal
Thread	PG 13.5
Electrical connection	SN6 plug-in head, rotatable with a ProMinent cable
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Measuring and control equipment	all DULCOMETER® controllers
Typical applications	Swimming pools, potable water, aquariums, horizontal installation possible.
Resistance to	Disinfectant
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm

	Fitting length	Order no.
RHEK-L Pt-SE	120 ±3 mm	1034919

1.2.5 ORP Sensors with Fixed Cable

All ORP sensors with fixed cable contain a shielded coaxial cable, which is firmly connected to the sensor head by a rotating sleeve. This prevents the cable from twisting when inserting and dismantling the sensor.

Series								
RHE	ORP sensor							
	Properties							
	K	Plastic shaft						
	S	Swimming pool sensor						
	IC	Robust sensor, plastic housing with NPT thread, double junction, Teflon diaphragm						
		Sensor material						
		Pt	Platinum					
			Electrical connection at the sensor					
			F	Fixed cable sensor				
				Internal thread				
				E	internal thread PG 13.5			
					Cable diameter			
					3	cable diameter 3 mm		
					5	cable diameter 5 mm		
						Cable length		
						01	cable length in metres	
							Electrical connection at device	
							S	SN6
							D	DIN
							B	BNC

The technical data corresponds to pH sensors with SN6 plug-in head (see page → 1-68)

ORP Sensor RHES-Pt-FE

ORP sensor optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

Your benefits

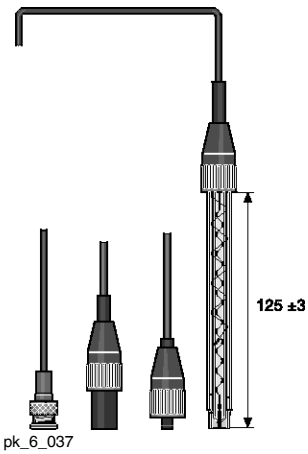
- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Anti-twist mechanism on the fixed cable prevents the cable from twisting when inserting and removing the sensor
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

	Cable length m	Device plug	Order no.
RHES-Pt-FE 301 B	1	BNC	150758
RHES-Pt-FE 303 B	3	BNC	150038
RHES-Pt-FE 301 S	3	SN6	304949

Other types on request.

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

ORP Sensor RHES-Pt-F



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ORP sensor for use with manual measuring instruments, optimised for use in swimming pools / hot tubs at up to 60 °C / 3 bar

Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

	Cable length m	Device plug	Order no.
RHES-Pt-F 303 B	3	BNC	304983

Other types on request.

ORP Sensor RHEK-Pt-F

ORP sensor with plastic shaft for use with manual measuring instruments, optimised for use in potable water treatment, swimming pools/hot tubs at up to 60 °C/3 bar

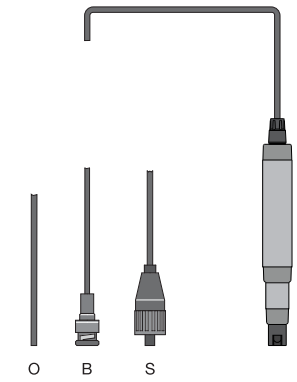
Your benefits

- Electrochemical combination electrode: ORP and reference electrode integrated
- Diaphragm and reference system optimised for use in swimming pools
- With plastic shaft to prevent glass breakage
- Mechanical protection of the glass diaphragm
- Ceramic diaphragm with special material, optimised size and optimised pore diameter
- Long service life due to reduced diffusion ("bleeding") of the electrolyte
- Long service life due to the material, which is inert to aggressive disinfectants
- Stable reference system
- Lead-free glass for advanced and environmentally-friendly production, use and disposal (RoHS-compliant)

	Cable length m	Device plug	Order no.
RHEK-Pt-F 301 S	1	SN 6	304997
RHEK-Pt-F 501 D	1	DIN	304998

Further types on request.

ORP sensor RHEIC-Pt-FE



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Your benefits

- Mechanically resistant platinum dome permits lasting use even when exposed to abrasive particles
- Large dirt-repellent Teflon diaphragm protects against unwanted blockage of the reference
- Double junction reference system for stability with chemically polluted water
- Large electrolyte reservoir for long service lives
- Solid high-grade plastic housing with integrated process connection for direct installation in the process with ½" and ¾" NPT thread

	Cable length m	Device plug	Order no.
RHEIC-PT-FE 501 S	1	SN6	1096788
RHEIC-PT-FE 505 S	5	SN6	1096782
RHEIC-PT-FE 510 S	10	SN6	1096793
RHEIC-PT-FE 505 O	5	Open cable end	1096775
RHEIC-PT-FE 510 O	10	Open cable end	1096784
RHEIC-PT-FE 505 B	5	BNC	1096774
RHEIC-PT-FE 510 B	10	BNC	1096778

Other types on request.

1.2.6 DULCOTEST® Fluoride Sensors

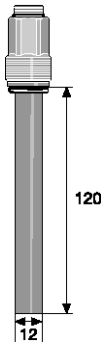
DULCOTEST® fluoride sensors are ion selective sensors, which function according to the potentiometric measuring principle and are suitable for determining the concentration of fluoride anions in aqueous solutions. The measuring point with the FPV1 type measuring transducer was optimised for use in monitoring the fluoridation of potable water in waterworks (measurement range up to 10 ppm). The measuring point with the measuring transducer FP 100 V1 with a measurement range up to 100 ppm is used for clear waste water free of solid material.

Fluoride Sensor FLEP 010-SE / FLEP 0100-SE

Highly selective, online fluoride sensor, optimised for the fluoridation of potable water and monitoring of waste water with a pH of up to 9.5

Your benefits

- Highly selective measurement of fluoride by LaF_3 single crystal silicon
- Unique pH range of up to pH 9.5 by optimisation of the electrolyte
- Two measuring ranges available: 0.05 -10 ppm for potable water; 0.5 -100 ppm for waste water



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Technical Details

A 4-20 mA measuring transducer, a reference electrode and a temperature sensor for temperature compensation are required as well as the fluoride sensor.

Measured variable	Fluoride ion concentration
Reference method	Photometrically (Photometer DT2C)
Measuring range	**With measuring transducer FPV1:** 0.05...10 mg/l **With measuring transducer FP100V1:** 0.5...100 mg/l
pH range	5.5 … 9.5
Temperature	1 … 35 °C
Max. pressure	7.0 bar, (no pressure surges)
Min. conductivity	100 µS/cm
Shaft diameter	12.0 mm
Fitting length	120 mm
Thread	PG 13.5
Electrical connection	SN6 plug-in head
Enclosure rating	IP 65
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Intake flow	10…200 l/h
Flow	20 l/h (recommended)
Response time T95 max.	30 s (for conc. > 0.5 ppm)
Shelf life	6 months
Sensor fitting	Bypass fitting DLG IV
Measuring and control equipment	D1C, DAC, DULCOMARIN®
Typical applications	Monitoring the fluoridation of potable water in waterworks, waste water.
Resistance to	Disinfectant, solids content (turbid types of water)
Measuring principle, technology	Direct potentiometric measurement, 2 electrodes, gel electrolyte, ceramic diaphragm, separate temperature measurement for temperature compensation needed

	Order no.
FLEP 010-SE / FLEP 0100-SE	1028279

Note: Measuring ranges from 5 … 1,000 mg/l and 50 … 10,000 mg/l available on request.

1.2 pH, ORP, Fluoride and Temperature Sensors DULCOTEST®

Accessories

	Order no.
Measuring transducer 4-20 mA FPV1	1028280
Measuring transducer 4-20 mA FP 100 V1	1031331
Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122
Reference electrode REFP-SE	1018458
Pt 100 SE temperature sensor	305063
Polishing paste	559810

Panel-mounted fluoride measuring station

The panel-mounted measuring stations that could be ordered to date with part no.1010602 (230 V) and 1010603 (115 V) can now be ordered as measuring stations of the DULCOTROL® DWCa product line.

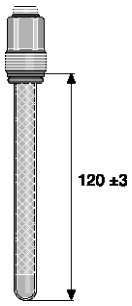
Overview of DULCOTROL® DWCa_Potable Water/F&B See page → 3-3

1.2.7 DULCOTEST® Temperature Sensors

Temperature measurement with DULCOTEST® sensors: Can be used for direct temperature measurement or temperature compensation during measurement of pH, fluoride, conductivity, chlorine dioxide or hydrogen peroxide.

Your benefits

- Select Pt 100 or Pt 1000, depending on measuring range and accuracy required.
- Sturdy design with dimensions of a standard pH sensor; the sensor element is integrated in a chemically inert glass sleeve.
- Easily installed in a similar way to standard pH sensors with a PG 13.5 thread in existing fittings.
- Transmitter with display/operation and without display/operation for transmission/conversion of the primary signal into a 4-20 mA signal and for transmission to a central control unit (PLC).



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Temperature	0 … 100 °C
Max. pressure	10.0 bar
Thread	PG 13.5
Electrical connection	SN6
Typical applications	Temperature measurement and pH temperature correction.

	Order no.
Pt 100 SE temperature sensor	305063
Pt 1000 SE	1002856

1.3 DULCOTEST® Conductivity Sensors

1.3.1 Conductivity Sensors

The advantages at a glance:

- Large range of sensor types tailored to meet different requirements offering excellent value for money.
- Precise and reliable online measurement enables efficient processes and outstanding process reliability.
- Long service lives and short maintenance intervals reduce downtime and increase the availability of the measured information.
- Complete pre-assembled sets containing fittings and sensors for simple, fast and trouble-free installation.

Note the following points for optimum functioning of conductivity sensors:

- Install the sensors so that the electrodes are always covered by the measuring liquid.
- Keep measuring lines as short as possible
- Temperature compensation with fluctuating temperatures
- Regular cleaning depending on the application
- Ensure that the cell constant and measuring range match each other

Conductivity sensor selection guide

Conductivity > 20 mS/cm and/or film-forming medium and/or chemically aggressive medium

yes ↓ | ↓ **no**

inductive conductivity measurement

↓

Compact controller can be used in the application?

yes ↓ | ↓ **no**

Do the following conditions exist?
aggressive chemicals,
with the exception of lyes and/or
Temperatures > 80 °C and/or
measured value < 200 µS/cm

yes ↓ | ↓ **no**

Series ICT 2
Installation in pipes with stainless steel flange accessory

For immersion with accessory: immersion fitting IMA - ICT 2

Type ICT 5
for installation in pipes

Type ICT 5-

for immersion

Type ICT 8
for installation in pipes with adapter accessory, for immersion with immersion fitting accessory

conductive conductivity measurement

↓

Further selection according to summary table:

- **Measuring range**
- **Material (chemical compatibility)**
- **Temperature**
- **hydraulic process connection**
- **electrical connection**
- **Compatibility of measuring and control units**

↓

Product ranges LF, LMP, CK, CCT

1.3 DULCOTEST® Conductivity Sensors

Overview Table for Conductivity Sensors

Type	Measuring range	Cell constant k	Medium temperature max.	Max. pressure	Shaft material	Temperature compensation	Process integration	Electrical connection sensor-side	Compatible controllers
	mS/cm	cm^{-1}	°C	bar					
LMP 001 → 1-86	0.01…50 µS/cm	0.01 ±5%	70	16	PP	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca
LMP 001-HT → 1-87	0.01…50 µS/cm	0.01 ±5%	120	16	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca
LMP 01 → 1-88	0.1…500 µS/cm	0.1 ±5%	70	16	PP	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca
LMP 01-HT → 1-90	0.1…500 µS/cm	0.1 ±5%	120	16	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca
LMP 01-TA → 1-89	0.1…500 µS/cm	0.1 ±5%	70	16	PP	Pt 100	Immersion, including immersion fitting 1 m	5 m fixed cable	DCCa, DACb, DMTa, D1Ca
LFT 1FE → 1-91	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable (4 x 0.5 mm^2)	DMTa, DACb, D1Ca
LFTK 1 FE-5m-shd → 1-92	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable (4 x 0.25 mm^2), screened	DCCa, DACb, DMTa, D1Ca, AEGIS II
LFTK 1 FE-3m-shd → 1-93	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	3 m fixed cable (4 x 0.25 mm^2), screened	DCCa, DACb, DMTa, D1Ca, AEGIS II
LF 1 DE → 1-94	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	None, only for applications with constant temperature	PG 13.5, flow (length: 120 mm) or immersion	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
LFT 1 DE → 1-95	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
LFTK 1 DE → 1-96	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	DIN 4-pin angle plug	DCCa, DACb, DMTa, AEGIS II
LFT 1 1/2" → 1-97	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 100	1/2 inch male thread, flow (length: 120 mm) or immersion	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
LFTK 1 1/2" → 1-98	0.01… 20 mS/cm	1 ±5%	80	16	Epoxy	Pt 1000	1/2 inch male thread, flow (length: 120 mm) or immersion	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
CK 1 → 1-99	0.01… 20 mS/cm	1 ±5%	150	16	PES	none, only for applications with constant temperature	Flow, 1" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
CKPt 1 → 1-100	0.01… 20 mS/cm	1 ±5%	150	16	PES	Pt 100	Flow, 1" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, AEGIS II
LM 1 → 1-101	0.1…20 mS/cm	1 ±5%	70	16	PP	–	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, AEGIS II
LM 1-TA → 1-102	0.1…20 mS/cm	1 ±5%	70	16	PP	–	Immersion, including immersion fitting 1 m	5 m fixed cable, screened	DCCa, DACb, DMTa, D1Ca, AEGIS II
LMP 1 → 1-103	0.1…20 mS/cm	1 ±5%	70	16	PP	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II

1.3 DULCOTEST® Conductivity Sensors

Type	Measuring range mS/cm	Cell constant k cm^{-1}	Medium temperature max. °C	Max. pressure bar	Shaft material	Temperature compensation	Process integration	Electrical connection sensor-side	Compatible controllers
LMP 1-HT → 1-105	0.1…20 mS/cm	1 ±5%	120	16	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4-pin angle plug	DCCa, DACb, DMTa, D1Ca, AEGIS II
LMP 1-TA → 1-104	0.1…20 mS/cm	1 ±5%	70	16	PP	Pt 100	Immersion, including immersion fitting 1 m	5 m fixed cable, screened	DCCa, DACb, DMTa, D1Ca, AEGIS II
CCT 1-mA-20 mS/cm → 1-106	0.2…20 mS/cm		50	8	PVC	NTC	Bypass (DGM, DLGIII fitting), flow (INLI fitting)	4-wire cable, 0.25 mm^2, cable diameter 5.7	DAC, AEGIS II, DULCO-MARIN®
CTFS→ 2-57	0.1…10 mS/cm	10 ±5%	50	7	PP	Semi-conductor	Flow, 3/4" external thread, bypass (DGM, DLGIII fitting)	3 m fixed cable, extendible to 50 m, with cable type: 0.5 mm^2 or AWG 22.	AEGIS® II cooling tower controller
ICT 5 → 1-107	0.2… 2,000 mS/cm	6.25 ±5%	80	10	PP	Pt 1000	Flow DN 40	10 m fixed cable, 7x 0.35 mm^2 via a terminal,	DCCa
ICT 5-IMA → 1-108	0.2… 2,000 mS/cm	6.25 ±5%	60	0	PP	Pt 1000	Immersion, sensor integrated in 1 m immersion fitting	10 m fixed cable, 7x 0.35 mm^2 via a terminal,	DCCa
ICT 2 → 1-109	0.02… 2,000 mS/cm	1.98	125	16	PFA	Pt 100, class A, completely extrusion-coated	Installation with SS flange, immersion with immersion pipe fixed cable (Accessories)	5 m fixed cable, 6x 0.35 mm^2 via a terminal, On Compact	DCCa
ICT 8 → 1-110	0.2… 200 mS/cm		50	6	PP	Semi-conductor	1/2 " male thread (BSP) for flow, immersion	2 + 10 m Fixed cable(6 x 0,25 mm^2),	DAC, D1Cb, D1Cc, AEGIS II, DULCO-MARIN®

General information:

1 The DMTa transducer is available for conversion of the measurement signal into a temperature-compensated 4 – 20 mA signal (see Chapter 8).

2 Connections for the DIN-4 pole angle plug:
- Electrodes: Earth and 2
- Pt 100/1000: 1 and 3

3 With DIN-4-pin angle plugs, the cable must be screened if the sensor is connected to measuring instrument types DCCa, DMTa, DACa or AEGIS II.

4 An adapter set PG 13.5/1" (order no. 1002190) is needed for installation in the in-line probe housing type DLG III (1" hole).

Measuring line for conductive conductivity sensors see page → 1-114

1.3 DULCOTEST® Conductivity Sensors

1.3.2 2-Electrode Conductivity Sensors

Conductive conductivity sensors measure the electrolytic conductivity indirectly via the charge transfer between two probes immersed in the medium to be measured. The sensor types with cell constants k = 0.01 and k = 0.1 cm^{-1} are especially suitable for the measurement of the lowest electrolytic conductivities of < 1 µS/cm in pure and ultra-pure water.

The sensor types with cell constants k=1 cm^{-1} are used in numerous kinds of water without film-forming ingredients up to 20 mS/cm. The cost-effective sensor range LF(T) is used in clear, chemically uncontaminated water.

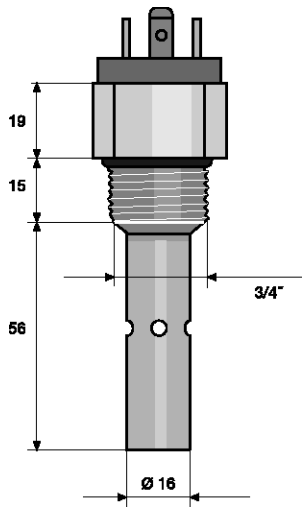
The sensor ranges LM(P), CK and CKPt can also be used in chemically contaminated kinds of water and a high temperatures.

Conductivity Sensor LMP 001

Sensor for the measurement of the lowest electrolytic conductivities for clear and also chemically contaminated water. With integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.01 µS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



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Measuring range	0.01…50 µS/cm
Cell constant k	0.01 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0...70 °C
Max. pressure	16.0 bar up to 50 °C,
Sensors	Stainless steel 1.4571
Shaft material	PP
Thread	3/4"
Length when fitted	71 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Clean water applications, monitoring ion exchangers and reverse osmosis systems.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 001	1020508

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

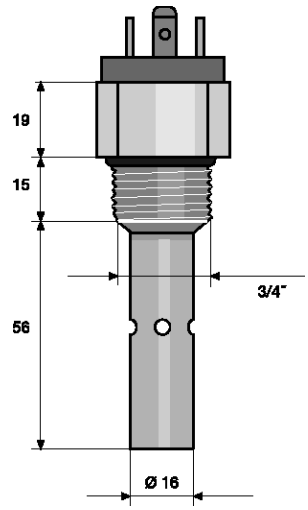
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LMP 001-HT

Sensor for the measurement of the lowest electrolytic conductivity for clear and also chemically contaminated water. For high temperatures, with integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.01 µS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- Temperature resistance up to 100 °C



pk_6_048

Measuring range	0.01…50 µS/cm
Cell constant k	0.01 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0...120 °C
Max. pressure	16.0 bar up to 100 °C,
Sensors	Stainless steel 1.4571
Shaft material	PVDF
Thread	3/4"
Length when fitted	71 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	General applications at higher temperatures, clean water applications, condensate.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 001-HT	1020509

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

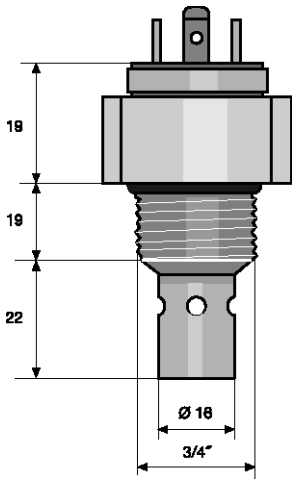
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LMP 01

Sensor for the measurement of low electrolytic conductivities for clear and also chemically contaminated water. With integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 µS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



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Measuring range	0.1…500 µS/cm
Cell constant k	0.10 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 70 °C
Max. pressure	16.0 bar up to 50 °C,
Sensors	Stainless steel 1.4571
Shaft material	PP
Thread	3/4″
Length when fitted	46 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Monitoring ion exchangers, reverse osmosis systems and desalination systems.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 01	1020510

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

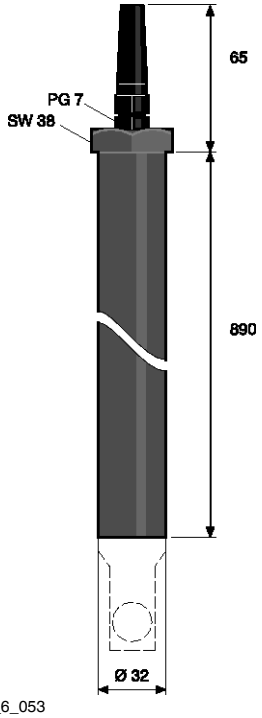
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LMP 01-TA

Sensor for the measurement of low electrolytic conductivities for clear and also chemically contaminated water. With integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 µS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Simple installation in tanks and containers by sensor ready mounted in the immersion tube
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



pk_6_053

Measuring range	0.1…500 µS/cm
Cell constant k	0.10 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 70 °C
Max. pressure	16.0 bar up to 50 °C,
Sensors	Stainless steel 1.4571
Shaft material	PP
Thread	M 28 x 1.5 for immersion assembly TA-LM
Fitting length	Max. 1 m
Installation	Immersion through an immersion tube
Electrical connection	5 m fixed cable
Enclosure rating	IP 65
Typical applications	Monitoring ion exchangers, reverse osmosis systems and desalination systems.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

		Order no.
LMP 01-TA	Sensor integrated in immersion fitting	1020512
LMP 01-FE	Replacement sensor for LMP 01-TA with 5 m fixed cable	1020626

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

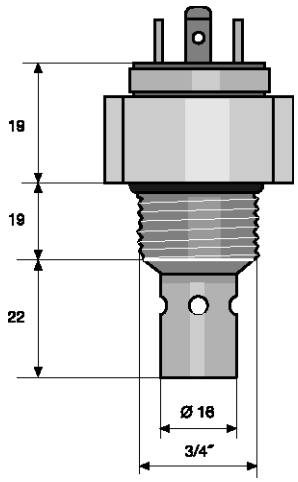
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LMP 01-HT

Sensor for the measurement of low electrolytic conductivities for clear and also chemically contaminated water. For high temperatures, with integrated temperature measurement and DIN 4-pin plug. For operation with the controllers DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 µm/cm
- Cost-effective sensor for clear, chemically contaminated water
- Temperature resistance up to 100 °C
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



pk_6_049

Measuring range	0.1…500 µS/cm
Cell constant k	0.10 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 120 °C
Max. pressure	16.0 bar up to 100 °C,
Sensors	Stainless steel 1.4571
Shaft material	PVDF
Thread	3/4"
Length when fitted	46 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	General applications at higher temperatures: industrial, process water, condensate.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 01-HT	1020511

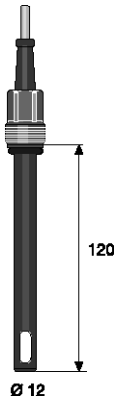
Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

Conductivity Sensor LFT 1 FE

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and fixed cable connector. For operation with controllers Compact D1Ca and DMTa

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear uncontaminated water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- Fixed cable on the sensor head for difficult ambient conditions



pk_6_085

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 80 °C
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: open outlet or return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	5 m fixed cable (4 x 0.5 mm^2)
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	D1Ca, DMTa
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFT 1 FE	1001374

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

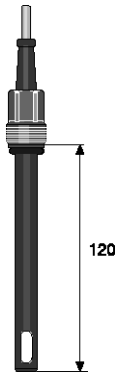
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LFTK 1 FE-5m-shd

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and fixed cable connector (5 m). For operation with controllers Compact DCCa, DMTa

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear uncontaminated water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 1000 for precise temperature compensation in limited temperature ranges replaces separate temperature sensor and the corresponding sensor fitting
- Fixed cable on the sensor head for difficult ambient conditions



pk_6_085

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 1000
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	5 m fixed cable (4 x 0.25 mm^2), screened
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFTK 1 FE-5m-shd	1046132

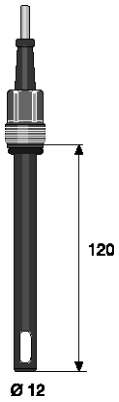
Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

Conductivity Sensor LFTK 1 FE-3m-shd

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and fixed cable connector (3 m). For operation with controllers Compact DCCa, DMTa

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear uncontaminated water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 1000 for precise temperature compensation in limited temperature ranges replaces separate temperature sensor and the corresponding sensor fitting
- Fixed cable on the sensor head for difficult ambient conditions



pk_6_085

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 1000
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	3 m fixed cable (4 x 0.25 mm^2), screened
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFTK 1 FE-3m-shd	1046010

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

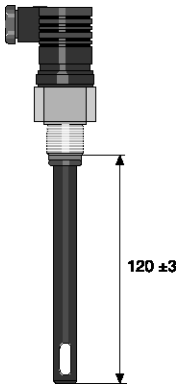
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LF 1 DE

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. For applications with a constant temperature, with DIN 4-pin plug. For operation with controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear uncontaminated water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Cost-effective version without integral temperature measurement with constant temperature of the medium to be measured
- DIN 4-pin plug for simple installation



pk_6_086

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	None, only for applications with constant temperature
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes

	Order no.
LF 1 DE	1001375

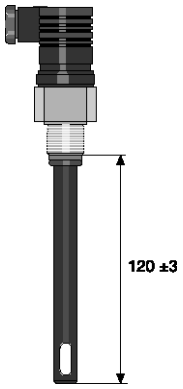
Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

Conductivity Sensor LFT 1 DE

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and DIN 4-pin plug. For operation with controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear, uncontaminated types of water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- DIN 4-pin plug for simple installation



pk_6_086

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable water, cooling water, industrial process water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFT 1 DE	1001376

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

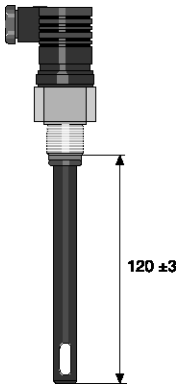
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LFTK 1 DE

Cost-effective sensor for the measurement of the electrolytic conductivity in clear, uncontaminated water with integral temperature measurement and DIN 4-pin plug. For operation with controllers Compact DCCa, DMTa

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear uncontaminated water
- Flexible process connection by the use of sensor fittings for standard pH sensors
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- DIN 4-pin plug for simple installation



pk_6_086

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 1000
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	PG 13.5
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFTK 1 DE	1002822

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

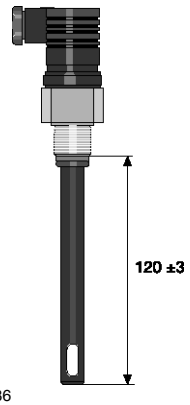
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LFT 1 1/2"

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and DIN 4-pin plug and 1/2-inch screw thread. For operation with controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Cost-effective sensor for all clear, uncontaminated types of water
- Hydraulic connector with 1/2″ thread as an alternative to the corresponding standard design with PG 13.5 thread
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- DIN 4-pin plug for simple installation



pk_6_086

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	1/2"
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFT 1 1/2"	1001378

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

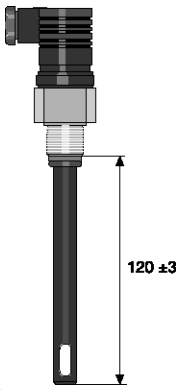
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LFTK 1 1/2"

Cost-effective sensor for the measurement of electrolytic conductivity in clear, uncontaminated water. With integrated temperature measurement and DIN 4-pin plug and 1/2-inch screw thread. For operation with controllers Compact DCCa, DMTa

Your benefits

- Measured variable: electrolytic conductivity above 10 µC/cm
- Cost-effective sensor for all clear, uncontaminated types of water
- Hydraulic connector with 1/2″ thread as an alternative to the corresponding standard design with PG 13.5 thread
- Special graphite electrodes, optimised for a highly dynamic measuring range: 0.01-20 mS/cm
- Integrated Pt 1000 for precise compensation in limited temperature ranges and with longer cables. Replaces separate temperature sensor and the corresponding sensor fitting
- DIN 4-pin plug for simple installation



pk_6_086

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 1000
Medium temperature	0 … 80 °C (at 1 bar)
Max. pressure	16.0 bar, (at 25 °C)
Sensors	Special graphite
Shaft material	Epoxy
Thread	1/2"
Fitting length	120 mm ±3 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial water. Sensors of the LF series have only limited applicability for taking measurements in cleaning solutions containing surfactants and media containing solvents.
Resistance to	Unsuitable for chemically contaminated water and water containing film-forming ingredients
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LFTK 1 1/2"	1002823

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

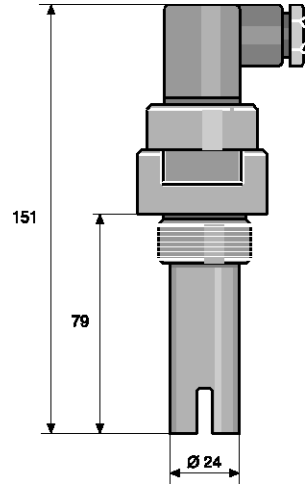
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor CK 1

Sensor for the measurement of the electrolytic conductivity in clear, chemically contaminated water with high but constant temperature with DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Resistant to water ingredients in target applications thanks to injection-moulded design without adhesive or seals
- High temperature resistance up to 150 °C



pk_6_046

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	None, only for applications with constant temperature
Medium temperature	0 … 150 °C (at 1 bar)
Max. pressure	16.0 bar, (at 20 °C)
Sensors	Special graphite
Shaft material	PES
Thread	R 1"
Length when fitted	79 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Cooling, industrial, process water, tank and pipe, cleaning systems in breweries, dairies, media separation.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes

	Order no.
CK 1	305605

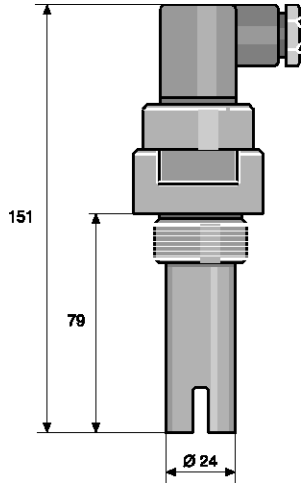
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor CKPt 1

Sensor for the measurement of the electrolytic conductivity for clear, chemically contaminated water and higher temperatures. With integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 10 µS/cm
- Resistant to water ingredients in target applications thanks to injection-moulded design without adhesive or seals
- High temperature resistance up to 150 °C
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



pk_6_046

Measuring range	0.01…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 150 °C (at 1 bar)
Max. pressure	16.0 bar, (at 20 °C)
Sensors	Special graphite
Shaft material	PES
Thread	R 1"
Length when fitted	79 mm
Installation	Bypass: with or without return of the sample water into the process line, inline: direct installation into the pipework; fixed or replaceable (replaceable fitting), tank, channel: Immersion in the immersion tube
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Cooling, industrial, process water, tank and pipe cleaning systems in breweries and dairies, separation of media.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
CKPt 1	305606

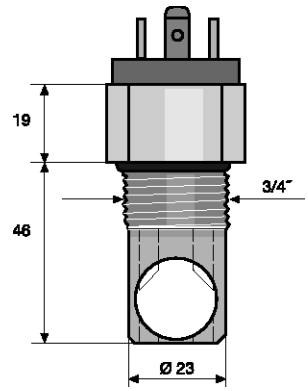
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LM 1

Sensor for the measurement of the electrolytic conductivity for clear and also chemically contaminated water. With DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 mS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Resistant to the constituents in the water of the target application



pk_6_052

Measuring range	0.1…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	None, only for applications with constant temperature
Medium temperature	0 … 70 °C (at 1 bar)
Max. pressure	16.0 bar, (at 50 °C)
Sensors	Graphite
Shaft material	PP
Thread	3/4"
Length when fitted	46 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial, process water, feed chemical separation.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes

	Order no.
LM 1	740433

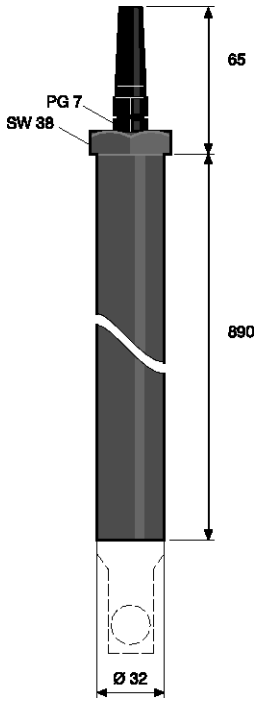
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LM 1-TA

Sensor for the measurement of the electrolytic conductivity for clear and also chemically contaminated water. Completely mounted in an immersion fitting. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 mS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Resistant to the ingredients in the water of the target applications
- Simple installation in tanks, containers etc. by sensor ready mounted in the immersion tube



pk_6_053

Measuring range	0.1…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	None, only for applications with constant temperature
Medium temperature	0 … 70 °C (at 1 bar)
Max. pressure	16.0 bar, (at 50 °C)
Sensors	Graphite
Shaft material	PP
Thread	M 28 x 1.5 for TA-LM in-line probe fitting
Fitting length	Max. 1 m
Installation	Tank, channel: Immersion through an immersion tube
Electrical connection	5 m fixed cable, screened
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial, process water, media separation.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes

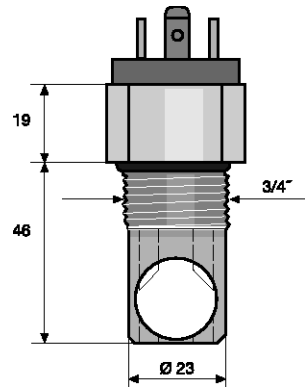
		Order no.
LM 1-TA	Sensor integrated in immersion fitting	1020528
LM 1-FE	Replacement sensor for LM 1-TA	1020627

Conductivity Sensor LMP 1

Sensor for the measurement of the electrolytic conductivity for clear and also chemically contaminated water. With integrated temperature measurement with DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 mS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Resistant to the ingredients in the water of the target applications
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting



pk_6_052

Measuring range	0.1…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 70 °C (at 1 bar)
Max. pressure	16.0 bar, (at 50 °C)
Sensors	Graphite
Shaft material	PP
Thread	3/4"
Length when fitted	46 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial, process water, media separation.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 1	1020513

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor LMP 1-TA

Sensor for the measurement of the electrolytic conductivity for clear and also chemically contaminated water. With integrated temperature measurement, ready mounted in an immersion fitting. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 mS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Resistant to the ingredients in the water of the target applications
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- Simple installation in tanks, containers etc. by sensor ready mounted in the immersion tube

Measuring range	0.1…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 70 °C (at 1 bar)
Max. pressure	16.0 bar, (at 50 °C)
Sensors	Graphite
Shaft material	PP
Thread	M 28 x 1.5 for TA-LM in-line probe fitting
Length when fitted	1 m
Installation	Tank, channel: Immersion through an immersion tube
Electrical connection	5 m fixed cable, screened
Enclosure rating	IP 65
Typical applications	Potable, cooling, industrial, process water, media separation.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes

		Order no.
LMP 1-TA	sensor integrated in immersion fitting	1020525
LMP 1-FE	Replacement sensor for LMP 1-TA	1020727

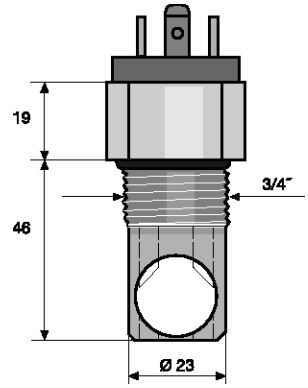
Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

Conductivity Sensor LMP 1-HT

Sensor for the measurement of the electrolytic conductivity for clear and also chemically contaminated water. For high temperatures, with integrated temperature measurement and DIN 4-pin plug. For operation with the controllers Compact DCCa, DMTa, D1Ca

Your benefits

- Measured variable: electrolytic conductivity above 0.1 mS/cm
- Cost-effective sensor for clear, chemically contaminated water
- Resistant to the ingredients in the water of the target applications
- Integrated Pt 100 for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- Temperature resistance up to 100 °C



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Measuring range	0.1…20 mS/cm
Cell constant k	1.00 cm^{-1} ±5%
Temperature measurement	Pt 100
Medium temperature	0 … 120 °C (at 1 bar)
Max. pressure	16.0 bar, (at 100 °C)
Sensors	Graphite
Shaft material	PVDF
Thread	3/4"
Length when fitted	46 mm
Installation	Inline: direct installation into the pipework, bypass: with or without return of the sample water into the process line
Electrical connection	DIN 4-pin angle plug
Enclosure rating	IP 65
Typical applications	General applications at higher temperaturesprocess water, process water from electroplating, media separation, with CIP (cleaning in place).
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	Compact DCCa, DACb, DMTa, D1Ca, AEGIS II
Measuring principle, technology	Conductive, 2 electrodes. Integrated temperature measurement

	Order no.
LMP 1-HT	1020524

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

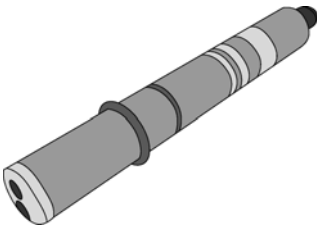
1.3 DULCOTEST® Conductivity Sensors

Conductivity sensor CCT 1-mA

Sensor for the measurement of electrolytic conductivities for clear and also chemically contaminated water. With integrated temperature measurement and factory-calibrated 4...20 mA output signal. For operation with the controllers diaLog DAC, AEGIS® II, DULCOMARIN®.

Your benefits

- Measured variable: electrolytic conductivity up to 20 mS/cm
- Fail-safe 4-20 mA output signal for flexible connection to measuring equipment with standard 4..20 mA input
- Integrated temperature sensor for temperature compensation replaces separate temperature sensor and the corresponding sensor fitting
- Simple connection to a process with the ProMinent bypass fittings DGM, DLGIII and INLI



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Measuring range	0.2…20 mS/cm
Temperature measurement	NTC, integrated
Medium temperature	0 … 50 °C(at 1 bar)
Max. pressure	8.0 bar, (at 25 °C)
Sensor head	PMMA
Sensors	Special graphite
Shaft material	PVC
Fitting length	51 mm / 71 mm
Installation	Bypass via sensor fittings DGM, DLGIII or installation into G1" PP pipe via INLI sensor fitting
Electrical connection	4-wire cable, 0.25 mm^2, cable diameter 5.7
Power supply DC	12...36 V DC
Voltage 4 ... 20 mA loop	4... 20 mA loop + 7.5 V
Output signal	4 ... 20 mA, temperature-compensated, factory-calibrated, galvanically isolated
Enclosure rating	IP 65
Typical applications	Cooling, industrial, process water, general water with higher salt content up to 20 mS/cm.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	diaLog DAC, D1Cb, D1Cc, AEGIS II, DULCOMARIN®
Measuring principle	Conductive, 2 electrodes. Integrated temperature measurement, integrated 4...20 mA transducer

	Order no.
CCT 1-mA-20 mS/cm	1081545

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

1.3.3 Inductive Conductivity Sensors

Inductive conductivity sensors consist of a transducer, encapsulated in an inert material. The electrolytic conductivity is measured inductively without direct contact with the medium.

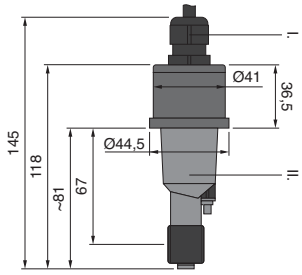
The sensors are used to measure electrolytic conductivity over a wide measuring range, even in heavily contaminated and/or aggressive media and, as such, offer particularly low maintenance operation. The sensors are particularly suitable for measuring high conductivities, as no electrode polarisation occurs. The inductive conductivity sensors are operated using the Compact controller DCCa xx L6 ... The controller includes the testing and calibration kit (Order no. 1026958).

Conductivity sensor ICT 5

Cost-effective inductive conductivity sensor, suitable for high electrolytic conductivities above 200 µS/cm. Also suitable for chemically contaminated water and film-forming media. For installation in pipework

Your benefits

- Measured variable: electrolytic conductivity. The inductive (non-contact) measuring principle permits applications in chemically contaminated types of water and in film-forming media
- Complete with injection moulded PP sensor head, no apparent bonds, seals
- Measurements at high conductivity values of up to 2,000 mS/cm are possible without interfering polarisation by means of the high measuring range dynamics of the inductive measuring principle
- Simple installation in PVC pipework by bonding the DN 40 adhesive connector supplied into a standard T-piece and screwing in the sensor using the union nut supplied.
- A DN 40 welded connector is optionally available for use in PP pipework



P_AC_0282_SW1

Measuring range	0.2…2,000 mS/cm
Cell constant k	6.25 cm^{-1}
Measuring accuracy	±1% based on the measured value, below 3 mS/cm: ±30 µS/cm
Temperature sensor	Pt 1000, wetted material Stainless steel 1.4301
Process chemical temperature	-10…80 °C-10…60°C for installation in PVC pipes, -10...80 °C for installation in PP pipes
Max. pressure	10.0 bar up to 20 °C, 6.0 bar up to 60 °C, 0.0 bar at 80 °C
Min. pressure	-0,1 bar (-10 … 80 °C)
Sensor material	PP
Seals	EPDM
Electrical connection	10 m fixed cable, 7x 0.35 mm^2 via a terminal
Enclosure rating	IP 65
Typical applications	Contaminated waste water, blowdown control in cooling towers, control of electroplating and rinsing baths, cleaning in Place (CIP), product monitoring, sea water, brine swimming pools.
Resistance to	Ingredients in the water of the target application, taking into account compatibility to PP/EPDM, deposit-forming media
Installation	With union nut, PVC, 1 1/2 inch female thread, including DN 40 bonded nozzle with 1 1/2 inch external thread for fitting in DN 40 PVC standard pipes (included in the scope of delivery). The corresponding set-in nozzle for fitting in PP standard pipe is available as an accessory
Measuring and control equipment	Compact controller DCCa
Measuring principle, technology	Inductive, 2 coils. Integrated temperature measurement

	Order no.
ICT 5	1095248

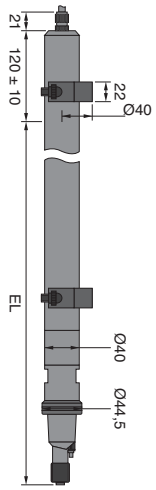
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor ICT 5-IMA

Cost-effective inductive conductivity sensor, suitable for high electrolytic conductivities above 200 µS/cm. Also suitable for chemically contaminated water and film-forming media. Completely integrated in an immersion pipe

Your benefits

- Measured variable: electrolytic conductivity. The inductive (non-contact) measuring principle permits applications in chemically contaminated types of water and in film-forming media
- Complete with injection moulded PP sensor head, no apparent bonds, seals
- Measurements at high conductivity values of up to 2,000 mS/cm are possible without interfering polarisation by means of the high measuring range dynamics of the inductive measuring principle
- Simple installation in tanks, containers etc. thanks to sensor ready mounted in the immersion tube



P_AC_0278_SW1

Measuring range	0.2…2,000 mS/cm
Cell constant k	6.25 cm^{-1}
Measuring accuracy	±2% based on the measured value ±30 µS/cm
Temperature sensor	Pt 1000, wetted material Stainless steel 1.4301
Process chemical temperature	-10…60 °C
Max. pressure	0.0 bar
Min. pressure	-0,1 bar (-10 … 60 °C)
Sensor material	PP
Immersion pipe material	PP
Sensor guard material	SS 1.4301, AISI 304
Seals	EPDM
Electrical connection	10 m fixed cable, 7x 0.35 mm^2 via a terminal
Enclosure rating	IP 65
Typical applications	Contaminated waste water, blowdown control in cooling towers, control of electroplating and rinsing baths, cleaning in Place (CIP), product monitoring, sea water, brine swimming pools.
Resistance to	Ingredients in the water of the target application, taking into account compatibility to PP/EPDM, deposit-forming media
Installation	Immersion with immersion length 1 m
Measuring and control equipment	Compact controller DCCa
Measuring principle, technology	Inductive, 2 coils. Integrated temperature measurement

	Order no.
ICT 5-IMA	on request

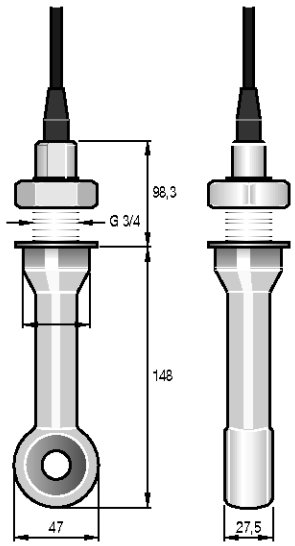
1.3 DULCOTEST® Conductivity Sensors

Conductivity Sensor ICT 2

High-performance inductive conductivity sensor with high dynamic measuring range. Also suitable for types of water with aggressive chemicals and film-forming components. Permitted temperatures up to 125 °C. For installation in pipework, tanks and for immersion in storage tanks

Your benefits

- Measured variable: electrolytic conductivity. The inductive (non-contact) measuring principle permits applications in chemically contaminated types of water and in film-forming media
- There is no need for adhesive or seals as the sensor is fully embedded in PFA
- Measurements at high conductivity values of up to 2,000 mS/cm are possible without interfering polarisation by means of the high measuring range dynamics of the inductive measuring principle
- Flexible connection to the processes is possible via a flange or immersion pipe with optional accessories



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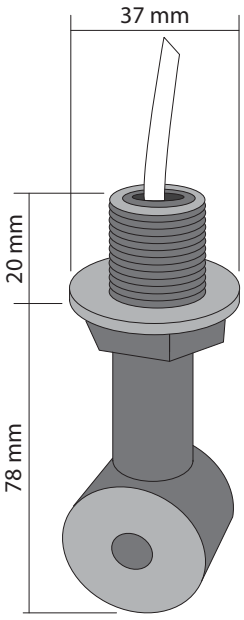
Measuring range	0.02…2,000 mS/cm
Cell constant k	1.98 cm^{-1}
Measuring accuracy	± (5 µS/cm + 0.5% of the measured value) at T < 100 °C) ± (10 µS/cm + 0.5% of the measured value) at T > 100 °C)
Temperature compensation	Pt 100, class A, completely extrusion-coated
Process chemical temperature	0…125 °C for use together with D1C, temperature compensation is limited to 100 °C
Max. pressure	16.0 bar
Material	PFA, completely extrusion-coated
Electrical connection	5 m fixed cable, 6x 0.35 mm^2 via a terminal
Enclosure rating	IP 67
Typical applications	Production processes in the chemical industry, phase separation of product mixtures, determination of concentrations of aggressive chemicals.
Resistance to	Electrolytic conductivity > 20 mS/cm, PFA-compatible aggressive chemicals (no concentrated lyes), deposit-forming media
Installation	Fitting in pipes, tanks (sideways): G 3/4 stainless steel thread (1.4571) or flange fitting: With the accessories: Stainless steel flange ANSI 2 inch 300 lbs, SS 316L (adaptable to DIN counter flange DN 50 PN 16).
Measuring and control equipment	Compact controller DCCa
Measuring principle, technology	Inductive, 2 coils. Integrated temperature measurement

Installation kit for type ICT 2 sensors → 1-127

	Order no.
ICT 2	1023352

1.3 DULCOTEST® Conductivity Sensors

Conductivity sensor ICT 8-mA



P_DCT_0085_SW1

Inductive sensor for the measurement of electrolytic conductivity. Suitable for contaminated water. With integrated temperature correction and factory-calibrated 4...20 mA output signal. For operation with the controllers diaLog DAC, D1Cb, D1Cc, AEGIS® II, DULCOMARIN®.

Your benefits

- Measured variable: electrolytic conductivity up to 200 mS/cm without polarisation effect
- The inductive (non-contact) measuring principle permits applications in water with solids content and in film-forming media
- Fail-safe 4-20 mA output signal for flexible connection to measuring equipment with standard 4...20 mA input
- Integrated temperature correction replaces separate temperature sensor and sensor fitting

Measuring range	three configurable measuring ranges 0.2...2.0 mS/cm / 0.5...20 mS/cm / 1...200 mS/cm
Temperature correction	integrated in the sensor electronics, temperature co-efficient: 1.7%/K
Medium temperature / pressure	max. 50 °C at 1 bar
Sensor material	PP
Seals	EPDM
Installation length	75
Electrical connection	Fixed cable, 6-wire (6x0.25 mm^2). The cable length is: 2 m cable between the sensor and 4-20 mA cable transmitter and 10 m between the cable transmitter and monitor.
Typical applications	Desalination control in cooling towers, contaminated waste water, control of electroplating and rinsing baths, salt water desalination, adjustment of the salt content in swimming pool water
Resistance to	Water ingredients in the target application, taking into account compatibility to PP/EPDM and combating film-forming media
Installation	1/2" male thread (BSP) for mounting by flange, installation in PVC pipes, DN 50 by means of installation adapter ICT8, DN 50, PVC, order no. 1106570, immersion using an immersion pipe, 1 m, order no. 1105964
Measuring and control equipment	diaLog DAC, D1Cb, D1Cc, AEGIS II
Measuring principle, technology	Inductive, 2 coils. Integrated temperature measurement, integrated 4...20mA transducer

	Order no.
ICT 8 -mA-200 mS/cm	1098530

NEW

1.4 Turbidity Measuring Points DULCOTEST®

1.4.1 Turbidity Measuring Point DULCOTEST® DULCO® turb C

Reliable on-line measurement of turbidity with DULCOTEST® DULCO® turb C measuring points

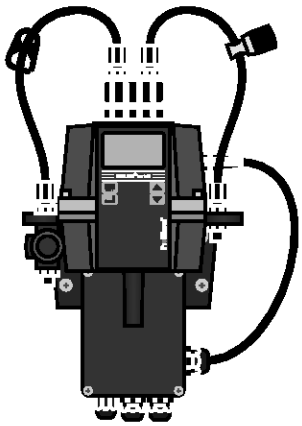
Measuring range 0 – 1,000 NTU

Turbidity measurements with DULCOTEST® DULCO® turb C: Compact measuring instrument that uses light scatter to measure turbidity, with a large measuring range and different designs to comply with ISO and EPA standards. Available with or without automatic cleaning.

The DULCOTEST® measuring points for turbidity in the DULCO® turb C range with versions TUC 1, TUC 2, TUC 3 and TUC 4, 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 sampel medium.

The intended application is the treatment of potable water, with the DULCO® turb C able to be used in all treatment stages of raw water, from filter monitoring to measurement of fine turbidity in dispensed potable 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 TUC 3 / TUC 4 measuring stations 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 TUC 1/TUC 3 (infrared light) corresponds to the globally applicable standard ISO 7027 and the European Standard DIN EN 27027. The measuring process of types TUC 2/TUC 4 (white light) corresponds to the US American standard USEPA 180.1.



P_DMZ_0002_SW

Your benefits

- Compact turbidity measuring station with integrated sensor, flow cuvette and measuring instrument saves space and is simple to install and operate.
- High dynamic measuring range between 0.02 and 1,000 NTU permits broad-based use in all stages of potable water treatment. Also ideal for monitoring waste water from clarification plants and for monitoring ruptures with filters.
- Short response times thanks to small-volume measuring cuvette.
- Long-term stable measurements, even in contaminated water, by the optional ultrasonic cleaning of the measuring cuvette.
- Fast and simple calibration on site by optionally available, pre-assembled and time-stable calibration standards.

Technical Details

- The measuring process in types TUC 1/TUC 3 (infrared light) corresponds to the global standard ISO 7027 and the European standard DIN EN 27027.
- The measuring process in types TUC 2/TUC 4 (white light) corresponds to the US standard USEPA 180.1.

Field of application

- Potable water treatment, for all treatment steps: from raw water and filter monitoring to measuring fine turbidity in the potable water that is to be discharged
- Monitoring of turbidity in slightly polluted industrial water, waste water and water requiring treatment in the food and beverage industry up to a turbidity value of 1,000 NTU

1.4 Turbidity Measuring Points DULCOTEST®

Technical Data

Measurement range	0 … 1,000 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	6 – 60 l/h
Temperature	1 … 50 °C
Materials in contact with the medium	Polyamide (PA), silicone, polypropylene (PP), stainless steel, borosilicate glass
Voltage supply	100 – 240 VAC, 47 – 63 Hz, 80 VA
Hydraulic connector	Black hose, inside 4.75 mm, outside 8 mm, installation in the bypass for the process main line
Ambient conditions	Not suitable for operation outdoors. Maximum operating altitude 2000 m above sea level. Maximum 95% relative air humidity (non-condensing).
Enclosure rating	IP 66, NEMA 4x
Standard	ISO 7027 or DIN EN 27027 with the "Infrared" version, USEPA 180.1 with the "Achromatic light" version
Dimensions H x W x D	35 x 30 x 30 cm
Shipping weight	2.5 kg

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

Spare Parts

	Order no.
Drying agent	1037701
TUC 1/TUC 2 cuvette (set with 3 no.)	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

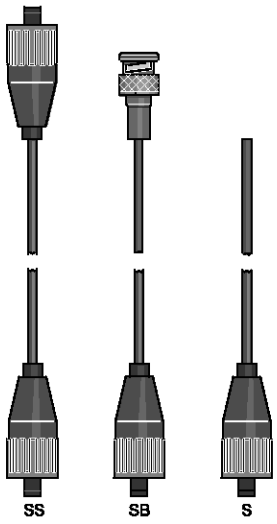
	Order no.
Calibration set	1037699
Flow control	1037880
Air bubble trap	1037700

1.5 Accessories Sensor Technology

1.5.1 Sensor Accessories

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.



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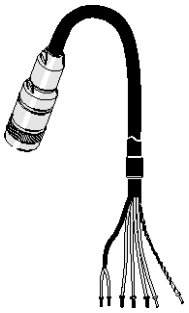
Measuring Lines for pH and ORP Measurement

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

Type	Description	Order no.
2 x SN6	Coaxial cable, Ø 5 mm, 0.8 m – SS	305077
2 x SN6	Coaxial cable, Ø 5 mm, 2 m – SS	304955
2 x SN6	Coaxial cable, Ø 5 mm, 5 m – SS	304956
2 x SN6	Coaxial cable Ø 5 mm, 10.0 m - SS	304957
SN6 - open end	Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 - pre-assembled	1024105
SN6 - open end	Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled	1024106
SN6 - open end	Cable combination, coaxial, Ø 5 mm 5 m - SN6 - pre-assembled	1024107
SN6 - open end	Coaxial cable, Ø 5 mm, 10.0 m	305040
SN6 - BNC	Coaxial cable Ø 3 mm, 10.0 m - SB	305099
SN6 - BNC	Coaxial cable Ø 3 mm, 0.8 m – SN6/BNC	1033988
SN6 - BNC	Coaxial cable, Ø 3 mm, 2.0 m – SB	1033011
SN6 - DIN	Coaxial cable Ø 5 mm, 0.8 m - SD	305098
SN6 - DIN	Coaxial cable Ø 5 mm, 2.0 m - SD	304810
SN6 - open end d5 (DSR)	Cable combination coax 2.0 m - S	1005672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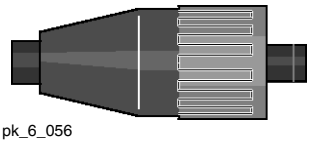
Measuring Line for Sensors with Vario Pin Plug-In Heads

Ready-made 6-conductor measuring line with Vario Pin plug for connection to sensor type PHEPT 112 VE.

	Length m	Order no.
Vario Pin signal lead VP 6-ST/ 2 m	2	1004694
Vario Pin signal lead VP 6-ST/ 5 m	5	1004695
Vario Pin signal lead VP 6-ST/10 m	10	1004696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SN6 Coax Connector

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

	Order no.
SN6 coaxial plug for 5 mm Ø coaxial signal lead	304974
SN6 coaxial plug for 3 mm Ø coaxial signal lead	304975


pk_6_055

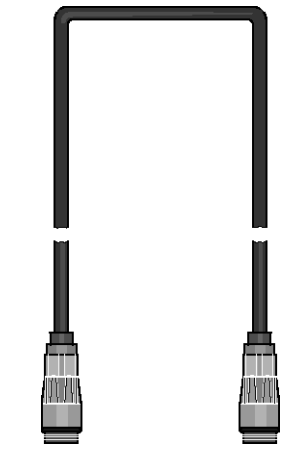
LK Coaxial Signal Cable

For pH and ORP measurements.

	Order no.
Coax low noise Ø 5 mm, black	723717
Coax low noise Ø 3 mm, black	723718

Please specify length with order.

1.5 Accessories Sensor Technology



pk_6_057

pk_1_085

Measuring lines for 4P type chlorine sensors

The measuring line is necessary for the connection of -4P sensors to the measuring/control device D_4a.

- Simple installation, as no self-assembly is required
- High operational safety due to factory functional testing
- IP 65

	Length m	Order no.
Measuring line for 4P type chlorine sensors	2	818455
Measuring line for 4P type chlorine sensors	5	818456
Measuring line for 4P type chlorine sensors	10	818470

Measuring Lines for DMT Type Chlorine Sensors

The measuring line is needed for connection of DMT type sensors to the DMT transducer.

	Length m	Order no.
Universal cable, 5-pin round plug	2	1001300
Universal cable, 5-pin round plug	5	1001301
Universal cable, 5-pin round plug	10	1001302

Cabling Accessories for CAN Type Chlorine Sensors

	Order no.
T-distributor M12 5 pole CAN	1022155
Termination resistor M12 coupling	1022154
Termination resistor 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 by the metre	1022160
Plug-CAN M12 5-pole screw terminal	1022156
Coupling-CAN M12 5-pole screw terminal	1022157

Measuring Lines for Pt 100 and Pt 1000

Measuring line: 2-core, conductor: 0.5 mm^2.

	Length m	Order no.
SN6 - open-ended	5	1003208
SN6 - open-ended	10	1003209
SN6 - open-ended	20	1003210

Measuring Line for Conductive Conductivity Sensors

4-core, conductor: 0.25 mm^2, cable diameter: 5.7 mm, screened

Type	Length m	Order no.
Measuring line for conductive conductivity sensors	1	1046024
	3	1046025
	5	1046026
	10	1046027

1.5 Accessories Sensor Technology

2-Wire Measuring Line

2-core, conductor: 0.25 mm², cable diameter: 4 mm

For amperometric sensors and transformers, each with 4-20 mA output.

	Order no.
Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122

Connector cable

For fluid voltage comparison in-line probe housing DLG III, DLG IV and DGMA with connector, 5 m.

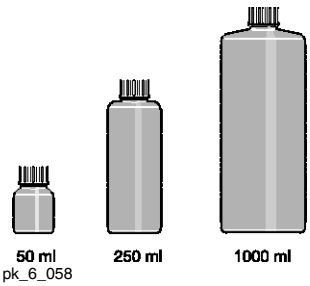
	Length m	Order no.
Connector cable	5	818438

Test and Calibration Kit for Inductive Conductivity

	Order no.
Test and calibration kit	1026958

1.5 Accessories Sensor Technology

1.5.2 Consumable Items for Sensors

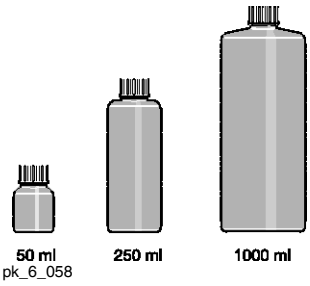


pH Quality Buffer Solutions

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 a maximum of three months after opening. The solution contains a biocide to prevent bacteria forming.

	Capacity ml	Order no.
Buffer pH 4.0 – red	50	506251
Buffer pH 4.0 – red	250	791436
Buffer pH 4.0 – red	1,000	506256
Buffer pH 5.0 – red	50	506252
Buffer pH 7.0 – green	50	506253
Buffer pH 7.0 – green	250	791437
Buffer pH 7.0 – green	1,000	506258
Buffer pH 9.0 – colourless	50	506254
Buffer pH 9.0 – colourless	1,000	506259
Buffer pH 10.0 – blue	50	506255
Buffer pH 10.0 – blue	250	791438
Buffer pH 10.0 – blue	1,000	506260



ORP Quality Buffer Solutions

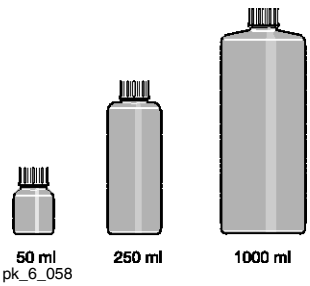
Accuracy to ±5 mV. Shelf life depends upon frequency of use and the strength of the chemicals in sample solutions.

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

Warning: The 465 mV ORP buffer solution is an irritant!

	Capacity ml	Order no.
ORP buffer 465 mV	50	506240
ORP buffer 465 mV	250	791439
ORP buffer 465 mV	1,000	506241
Buffer solution ORP 220 mV, 50 ml	50	506244
ORP buffer 220 mV	1,000	506245

DPD-reagents for calibration of amperometric sensors s. p. → 2-66

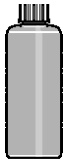


3 Molar KCl Solutions

3-molar KCl solution is most suited for the storage of pH and ORP sensors (e.g. in sensor quills) and as an electrolyte for refillable sensors (e.g. PHEN, RHEN). We only recommend using the KCl solution saturated with AgCl for the old design of refillable sensors with reference electrodes without a large AgCl reservoir.

	Capacity ml	Order no.
KCl solution, 3 molar	50	505533
KCl solution, 3 molar	250	791440
KCl solution, 3 molar	1,000	791441
KCl solution, 3 molar, AgCl saturated	250	791442
KCl solution, 3 molar, AgCl saturated	1,000	505534

1.5 Accessories Sensor Technology



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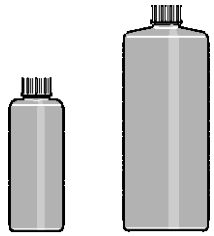
Cleaning Solutions

Cleaning solution pepsin/hydrochloric acid:

for cleaning pH sensors, the membranes of which have been contaminated with protein.

Capacity	Order no.
250 ml	791443



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Conductivity Calibration Solution

For the precise calibration of conductivity sensors.

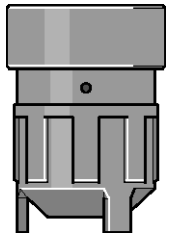
	Capacity ml	Order no.
Conductivity calibration 1413 µS/cm	250	1027655
Conductivity calibration 1413 µS/cm	1,000	1027656
Conductivity calibration 12.88 mS/cm	250	1027657
Conductivity calibration 12.88 mS/cm	1,000	1027658


pk_6_061

Electrolyte for Amperometric Sensors

	Capacity ml	Order no.
Electrolyte for chlorine sensors type CLE, CLR 1	100	506270
Electrolyte for CDM 1 and CDE 3 type chlorine dioxide sensors	100	506271
Electrolyte for CDE 2 and CDR 1 type chlorine dioxide sensors	100	506272
Electrolyte for OZE type ozone sensors	100	506273
Electrolyte for CGE/CTE/BRE type sensors	50	792892
Electrolyte for CDP type chlorine dioxide sensors	100	1002712
Electrolyte for peracetic acid, ozone sensors type PAA 1, OZR 1	100	1023896
Electrolyte for CLT 1 type chlorite sensors	50	1022015
Electrolyte for PER 1 type hydrogen peroxide sensors	50	1025774
Electrolyte for CLO 1 type chlorine sensor	100	1035191
Electrolyte for CLO 2 type chlorine sensor	100	1035480
Electrolyte for CBR 1 type chlorine/bromine sensor	100	1038017
Electrolyte for BCR 1 type bromine sensor	50	1044843

1.5 Accessories Sensor Technology



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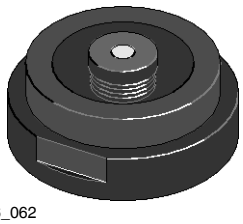
Spare Membrane Caps, Accessory Sets for Amperometric Sensors

	Capacity ml	Order 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	–	790488
Sensor cap for CLO 1	–	1035197
Sensor cap for CLO 2	–	1035198
Diaphragm cap for CGE 3, CGE 2, CTE 1 (2/5/10 ppm) and BRE 1 (10 ppm), BRE 2	–	792862
Membrane cap for CTE 1 (0.5 ppm), CBR 1, BCR 1	–	741274
Membrane cap for CDP 1, BRE 1 (0.5 / 2 ppm), CLT	–	1002710
Membrane cap for CDE 3	–	1026578
Diaphragm cap for PAA 1, CDR 1, CLR 1, OZR 1	–	1023895
Membrane cap for PER 1	–	1025776
Membrane cap for H2.10 P	–	792978
Accessory set for CGE 3, CGE 2, CTE 1 (2/5/10 ppm) and BRE 1 (10 ppm), BRE 2 (2 diaphragm caps + electrolyte)	50	740048
Accessory set for CTE 1 (0.5 ppm) (2 membrane caps + electrolyte)	50	741277
Accessory set for CLE (2 membrane caps + electrolyte)	100	1024611
Accessory set for CDP 1 (2 membrane caps + electrolyte), BRE 1 (0.5 / 2 ppm), CLT	100	1002744
Accessory set for PAA 1 and OZR 1 (2 diaphragm caps + electrolyte)	100	1024022
Accessory kit for PER 1 (2 membrane cap + electrolyte)	50	1025881
Accessory set for CDE 3 (2 membrane caps + electrolyte)	100	1026361
Accessory set for CLO 1 (electrolyte, grinding disc, plug)	100	1035482
Accessory set for CLO 2 (electrolyte, grinding disc, plug)	100	1035483
Accessory set for CBR 1 (2 membrane caps + electrolyte)	100	1038984
Accessory set BCR 1 (2 membrane caps + electrolyte)	50	1044844



pk_6_062

Spare Parts for Dissolved Oxygen Sensors

	Measuring range	Order no.
Sensor insert for type DO 1-mA-20 ppm: Diaphragm thickness 125 µm	2.00…20.0 mg/l	1020534
Sensor insert for type DO 2-mA-10 ppm: Diaphragm thickness 50 µm	0.10…10.0 mg/l	1020535
Bracket of sensor insert for type DO 1-mA-20 ppm (with diaphragm protection for fish farming)		1020540
Bracket of sensor insert for type DO 2-mA-10 ppm		1020541
Sensor cap for type DO 3-mA-20 ppm		1096350
Protective cap for type DO 3-mA-20 ppm		1096352

1.5.3 Bypass Fittings for Sensors

P_DTZ_0030_SW

P_DTZ_0031_SW

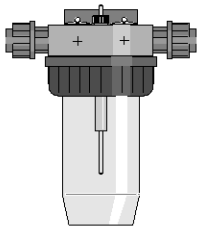
DLG III Type In-Line Probe Housing

To hold 2 sensors (conductivity, Pt 100, pH or ORP sensors) with PG 13.5 screw-in thread plus one sensor with R 1" screw-in thread (amperometric sensors) with integrated stainless steel pin as liquid reference potential.

On the inlet side the DLG III is equipped with a plastic ball valve for blocking and adjusting the sample water flow.

Material	Material: Rigid PVC Transparent housing cup: Polyamide Ball valve material: Rigid PVC
Max. pressure	1.0 bar
Max. temperature	55 °C
Typical applications	Cooling water, slightly contaminated waste water, turbid water, no sludge.

	Type	Max. temperature °C	Order no.
DLG III A with PVC hose connectors	for PE line Ø 8/5 mm	55	914955
DLG III A with flushing connector and PVC hose connection	for PE line Ø 8/5 mm	55	1029096
DLG III B with PVC adhesive connectors	for pipe connection Ø 16 DN 10	55	914956
Assembly kit for fitting amperometric sensors	–	55	815079



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DLG IV Type In-Line Probe Housing

To hold 4 sensors (pH, ORP, Pt 100, conductivity) with PG 13.5 screw-in thread. With integrated stainless steel rod as liquid reference potential. Angle for wall mounting.

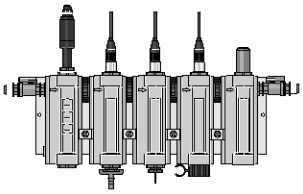
Material	Material: Hard PVC or PP Transparent housing cup: Polyamide
Max. pressure	1.0 bar
Connection for sample water line	Union with d 16/DN 10 insert

	Type	Max. temperature °C	Order no.
DLG IV PP	for Ø 16/DN 10 pipe work connector	80	1005331
DLG IV PVC	for Ø 16/DN 10 pipe work connector	55	1005332

DLG Sampling Water Cup

	Order no.
DLG III sampling water cup with back flush device	1029095

1.5 Accessories Sensor Technology



pk_6_066

DGM Modular In-Line Probe Housing

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

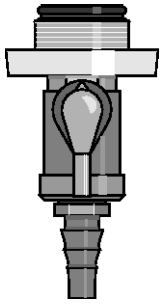
Advantages:

- Simple installation (completely ready-mounted on a panel); max. 7 modules on a panel
- Simple retrofit extension option (see extension modules)
- Module for sample water flow control
- Quick measurement recording due to low volume of sample water
- Each completely assembled DGM is equipped with a simple sampling tap

Ball valves on both sides for shutting off the flow and for flow adjustment

Material	All modules: Transparent PVC Seals: FKM Calibration cup: PP Mounting panel: PVC white
Max. temperature	60 °C
Max. pressure	6.0 bar up to 30 °C, 1.0 bar up to 60 °C
Max. flow rate	80 l/h
Recommended Flow volume	40 l/h
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
Switching hysteresis	20%
Enclosure rating	IP 65
Typical applications	Potable water, 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.

FKM = Fluorine Rubber



pk_6_071

Sampling Tap for DGM

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

	Order no.
PG 13.5 sampling tap	1004737
25 mm sampling tap	1004739

Expansion Modules for DGM

For simple retrofit to an existing DGM.

	Order 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
Expansion module for PG 13.5 sensors	1023975
Expansion module for 25 mm sensors	1023976

Connecting Lead

For fluid voltage comparison in-line probe housing DLG III, DLG IV and DGMA with connector, 5 m.

	Order no.
Connector cable	818438

1.5 Accessories Sensor Technology

Isolation Ball Valve for DGM

To isolate the bypass from the process flow

	Order no.
Stopcock	1010380

Mounting Kit for Sensor/DGM

For mounting amperometric sensors with R 10 connection

	Order no.
Mounting kit for sensor/DGM	791818

Identity Code Ordering System for In-Line Probe Housing Modules

DGM	Series								
	A	Series Version							
		Flow monitor module							
		1	with l/h scale						
		2	with gph scale (US)						
		3	With flow monitor, l/h scale						
		4	with flow monitor, gph scale (US)						
			Number of PG 13.5 modules						
			0	without PG 13.5 modules					
			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	No 25 mm modules				
				1	One 25 mm module				
				2	Two 25 mm modules				
					Main material				
					T	Transparent PVC			
						Sealing material			
						0	FKM A		
							Hydraulic connectors		
							0	8 x 5 hose	
							1	PVC DN 10 threaded connector	
							4	Hose 12 x 6	
							9	Connecting nipple / expansion module	
								Version	
								0	With ProMinent® logo
								1	Without ProMinent® logo
								2	With ProMinent® logo, without mounting plate
								3	Without ProMinent® logo, without mounting plate

Accessories supplied:

- Wall fastenings for PG 13.5 modules: Calibration plate, mounting kits for PG 13.5 probes

The identity code DGM A 3 2 1 T 0 0 0 describes, for example, a fully assembled configuration of a flow module with sensor, two PG 13.5 modules (e.g. for pH and ORP probes) and a 25 mm module (e.g. for CLE 3 chlorine sensor) 8 x 5 tube connectors are ready mounted.

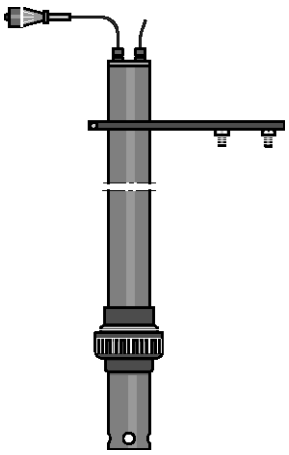
Recommended Accessories

		Order no.
for potential equalizer plug	–	791663
Flow sensor for flow expansion module (optional)	–	791635
additional calibration cup	–	791229
PG 13.5 sampling tap	for 13.5 module	1004737
25 mm sampling tap	for 25 mm module	1004739

- Max. 7 modules possible on a mounting plate
- More on request

FKM = Fluorine Rubber

1.5.4 Immersion Fittings for Sensors



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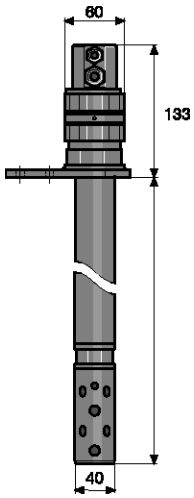
PVC Immersion Assembly Type ETS 1 P

Immersion fitting to hold **one** conductivity, Pt 100, pH or ORP sensor with SN6 plug-in head and PG 13.5 screw-in thread. In addition, a stainless steel rod is integrated as a liquid reference potential.

Sensor connector (inner)	SN6 connector
Signal lead connector (outer)	Coax SN6 male connector
Material	Rigid PVC
Type of fitting	Clamping flange with mounting plate
Immersion depth	Variable
Max. temperature	55 °C

	Order no.
ETS 1 P	914950



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PP Immersion Assembly Type IPHa 1-PP

Immersion fitting for holding **one** sensor (e.g. pH, ORP) with PG 13.5 screw-in thread and standard 120 mm length. The inside diameter is sized so that either pH or ORP transducers can be installed. In addition, a stainless steel rod is integrated as a liquid reference potential. The outside diameter is 40 mm. Immersion depths of 1 and 2 m are offered, however customers can independently lengthen or shorten the immersion pipe. The fitting head contains two cable connectors; measuring lines of 3-7 mm diameter can be led out.

Note: Measuring lines are not included in the scope of delivery.

Material	Probe housing material: PP Seal material: FKM
Max. temperature	80 °C
Pressure	Installation at atmospheric pressure
Immersion depth	Max. 1, or 2 m; variable
Immersion lance diameter	40 mm

Dimensions Table: Flange

Fixed flange	DN 40
Hole circle Ø K	110 mm
Bolts	4 x M16
Thickness d_2	18 mm
Diameter Ø D	150 mm

	Length when fitted m	Order no.
IPHa 1-PP	1	1008600
IPHa 1-PP	2	1008601

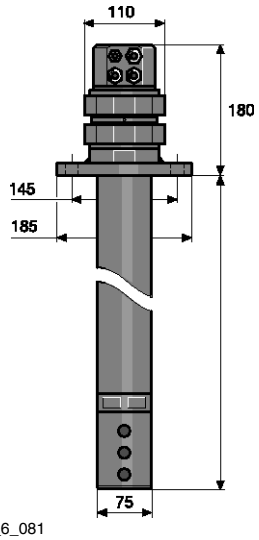
Other materials available on request.

FKM = Fluorine Rubber

Accessories for Fitting Type IPHa 1

	Order no.
Immersion pipe mounting for IPHa 1-PP	1008624
Clamped threaded connector with fixed flange DN 40 according to DIN 2642 for IPHa 1-PP	1008626
Clamped threaded connector for welding connection for IPHa 1-PP	1008628
Protective (weatherproofed) cover for assembly head for IPHa 1-PP	1008630
Water-retaining basin for IPHa 1-PP	1008632
Weatherproof cover PP	1023368

1.5 Accessories Sensor Technology



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PP Immersion Assembly Type IPHa 3 -PP

To hold up to **three** sensors (e.g. pH, ORP, temperature) with PG 13.5 screw-in thread and standard 120 mm length. The inside diameter is dimensioned so that up to three pH, ORP or temperature transducers can be installed. In addition a stainless steel rod is incorporated as a liquid reference potential. The outside diameter is 75 mm. Immersion depths of 1 and 2 m are offered, however, customers can independently lengthen or shorten the immersion pipe. The fitting head contains four cable connectors, measuring lines of 3-7 mm diameter can be led out. Measuring lines are not contained in the scope of supply. Technical data is as for fitting IPHa 1, except the immersion tube diameter is 75 mm.

Material	Probe housing material: PP Seal material: FKM
Max. temperature	80 °C
Pressure	Installation at atmospheric pressure
Immersion depth	Max. 1, or 2 m; variable
Immersion lance diameter	75 mm

Dimensions Table: Flange

Fixed flange	DN 65
Hole circle Ø K	145 mm
Screws	4 x M16
Thickness d_2	18 mm
Diameter Ø D	185 mm

	Length when fitted m	Order no.
IPHa 3-PP	1	1008602
IPHa 3-PP	2	1008603

Other materials available on request.

FKM = Fluorine Rubber

Accessories for Fitting Type IPHa 3

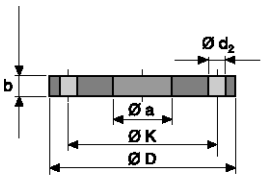
	Order no.
Immersion pipe mounting for IPHa 3-PP	1008625
Clamped threaded connector with fixed flange DN 65 according to DIN 2642 for IPHa 3-PP	1008627
Clamped threaded connector for welding connection for IPHa 3-PP	1008629
Protective (weatherproofed) cover for assembly head for IPHa 3-PP	1008631
Water-retaining basin for IPHa 3-PP	1008633
Weatherproof cover PP	1023368

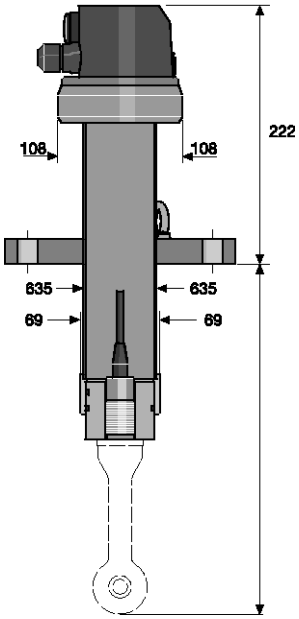
Weatherproof cover for in-line probe fitting type IMA-ICT 1

For use in immersion assembly, type IMA-ICT 1.

	Order no.
Weatherproof cover PP	1023368

1.5 Accessories Sensor Technology





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Immersion Assembly Type IMA-ICT 2

To hold one inductive conductivity sensor of type ICT 2.

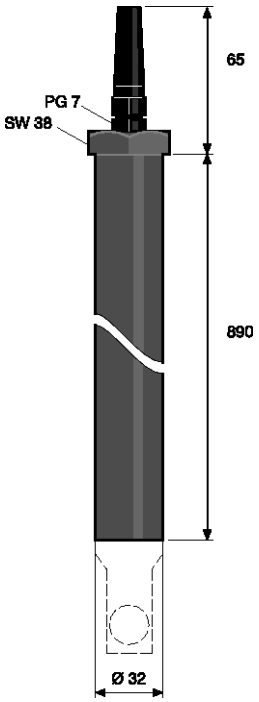
Material	Fittings: Stainless steel 1.4404 Seal: FKM
Max. temperature	125 °C
Max. pressure	10 bar
Length when fitted	1 m
Immersion lance diameter	70 mm
Flange	Stainless steel flange DN 80 PN 16

Dimensions Table: Flange

Flange	DN 65/PN 16
Ø D	200 mm
Ø K	160 mm
Ø d_2	8 x 18 mm
b	20 mm
Ø a	63.5 mm
Screws	M 16

	Order no.
IMA-ICT 2	1023353

Adaptation to processes through flange installation in tank from top.



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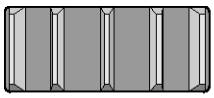
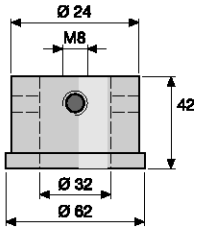
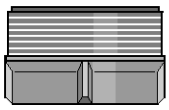
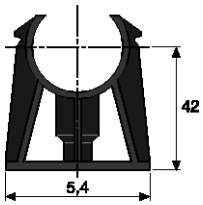
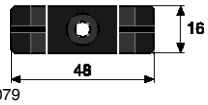






pk_6_078





pk_6_079

Immersion assembly type TA-LM

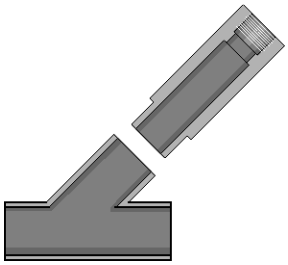
To hold **one** conductivity sensor of type LM and LMP with M 28 thread for side fasting with pipe clips (2 contained in the scope of supply) or with union nut/collar bush/screw-in part for fastening in a tank cover.

Union nut and screw-in part are to supplied by the customer (standard parts).

Material	PP
Max. temperature	70 °C
Enclosure rating	IP 68
Max. pressure	5.0
Immersion lance diameter	32 mm
Pipe length	890 mm

	Length mm	Order no.
TA-LM	890	1020632
Headed bush d50	–	1020634
Extension tube 1000	910	1020633

1.5.5 Installation Fittings / Adapters

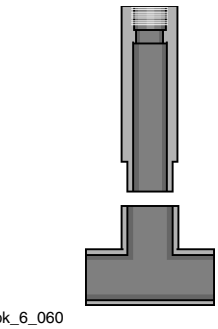


pk_6_059

Adapter set (T-piece and adapter)

For direct fitting of conductivity, Pt 100, pH or ORP sensors with PG 13.5 screw-in pipework:

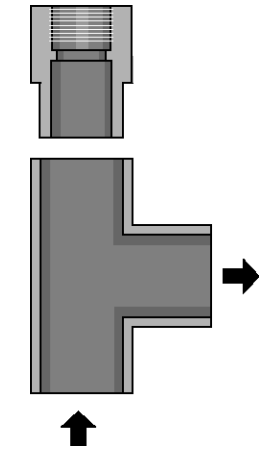
	Material	Order no.
90° T-piece DN 20	PVC	1001493
90° T-piece DN 25	PVC	1001494
45° T-piece DN 20	PVC	1001491
45° T-piece DN 25	PVC	1001492



pk_6_060

PVC adapter set for type LM sensors

For direct fitting of type LM conductivity sensors with 3/4" screw-in thread for measuring in the flow.

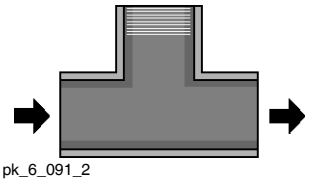


pk_6_090_2

For LM(P) 001 conductivity sensors

The sensors are fitted in the straight section of the T-piece.

	Material	Order no.
90° T-joint DN 25	PVC	356410
Adapter DN 25 with 3/4" thread	PVC	356923
90° T-joint DN 25	PP	358674
Adapter with 3/4" thread	PP	356953

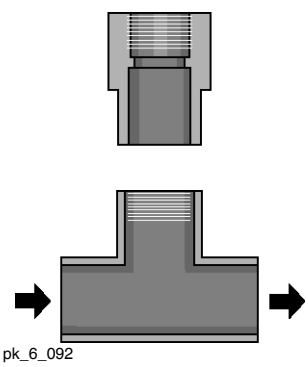


pk_6_091_2

For LM(P) 01 conductivity sensors

The sensors are fitted in the outlet of the T-piece.

	Material	Order no.
90° T-piece DN 20 - 3/4"	PVC	356455
90° T-piece DN 20 - 3/4"	PP	356471

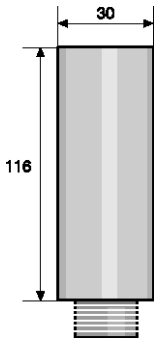


pk_6_092

For LM(P) 1 conductivity sensors

The sensors are fitted in the outlet of the T-piece.

	Material	Order no.
90° T-joint DN 25	PVC	356410
Inline fitting DN 25 - 3/4"	PVC	1020616



pk_6_065

Adapter PP, PG 13.5

For direct fitting of conductivity, Pt 100, pH or ORP sensors with PG 13.5 screw-in thread in, for example, pipework, tanks:

Max. temp: 80 °C (at atmospheric pressure)

EPDM sealing ring

	Material	Outer thread	Order no.
Adapter DN 20	PP	R 1/2"	1001834
Adapter DN 25	PP	R 3/4"	1001835

Adapter, stainless steel, PG 13.5

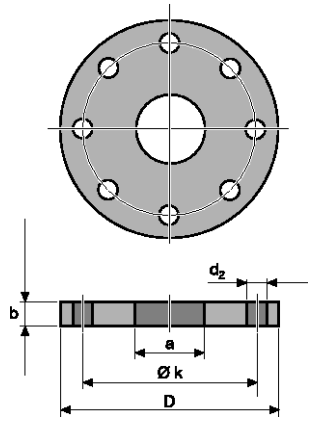
For direct fitting of conductivity, Pt 100, pH or ORP sensors with PG 13.5 screw-in thread in, for example, pipework, tanks:

Max. temp: 180 °C (at atmospheric pressure)

Sealing ring, FKM (fluorine rubber)

	Material	Outer thread	Order no.
Adapter DN 20	SS	R 1/2"	1020737
Adapter DN 25	SS	R 3/4"	1020738

Installation kit for type ICT 2 sensors



pk_6_093

Fixed flange	ANSI 2"	DN 50
SS 316L	300 lbs	PN 16
Pitch circle	127	125
Screws	M 16	M 16
Thickness	22.2	18
Diameter	165.1	165

For direct fitting of the inductive conductivity sensor ICT 2 in pipework and tanks.

	Order no.
Installation kit for type ICT 2 sensors	1023364

Kit consisting of

- Stainless steel flange ANSI 2 inch 300 lbs, SS 316L (adaptable to DIN counter flange DN 50 PN 16)
- Nut 3/4" stainless steel

Parts that come into contact with the medium:

- Sealing disk, "2", / PTFE
- Spacer ring, PTFE
- Seal

Set-in nozzle for T-piece (PP), sensor type ICT 1

For connection of the inductive conductivity sensor ICT 1 in PP T-piece.

	Order no.
Set-in nozzle external thread 2 1/4" DN 40 including FKM O-ring	1023371

T-piece adapter (PP) for sensor type ICT 5

For installation of the inductive conductivity sensor ICT 5 in PP pipework.

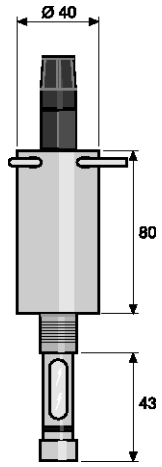
	Order no.
T-piece, PP, 1 1/2" external thread - DN 40 including EPDM O-ring	1096349

Solvent threaded union (PVC) for sensor type ICT 5

For direct fitting of the inductive conductivity sensor ICT 5 in PVC pipework.

	Order no.
Straight threaded solvent union, PVC, 1 1/2" external thread DN40 including O-ring	1096348

1.5 Accessories Sensor Technology



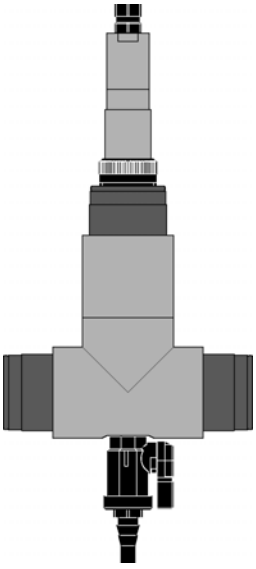
pk_6_013

Retractable sensor housing for pH, ORP sensors WA-PH 1

To hold **one** pH sensor with PG 13.5 screw-in thread and length of between 110-125 mm for fitting in the storage tank or in the flow. The sensor can be removed and fitted for calibration and cleaning without draining the liquid from the storage tank or without interrupting the process in the flow.

Material	PP
Max. temperature	70 °C
Max. pressure	5.0 bar
Thread	3/4"

	Order no.
WA-PH 1	1020631



pk_6_110

Installation fitting INLI for chlorine sensor CLO

The installation valve permits the installation of the sensor for free chlorine types CLO (part no. 1033870, 1033871, 1033878) and the sensor for conductivity type CCT 1-mA (order no. 1081545) for operation in the process line (G 1“) or in the bypass to the process line. Use either with a free outlet or return of the sample water to the process line. Sample water temperature up to 70 °C/2 bar and 40 °C/7 bar. Keep the flow constant.

Max. temperature	70 °C (at 2 bar)
Max. pressure	7 bar (at 40 °C)
Flow for operation of the sensor CLO	400 - 800 l/h

Material

T-piece and fittings	PP
O-ring	EPDM
Sampling tap	PVDF/FPM
Stopcock	PVDF/FPM
Reducer	Stainless steel 1.4571

Connectors

Sensor	G 1"
Sampling tap	G 1/4"
Hose on sampling tap	6 x 4 mm
Sample water line	G 1"

	Order no.
Installation fitting for chlorine sensor CLO	1047238

Accessories

	Order no.
Stopcock	1048213

Spare Parts

	Order no.
Sampling tap	1047266

1.5 Accessories Sensor Technology

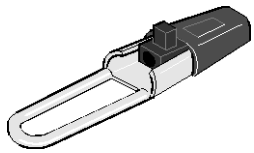
pk_6_072

Immersion pipe adapter for the dissolved oxygen sensor type DO 1-mA-20 ppm

PVC adapter for connection of the dissolved oxygen sensor type DO 1 mA-20 ppm to an immersion pipe with 1 – 1/4" internal thread.

DULCOTEST® sensors for dissolved oxygen See page → 1-38

	Order no.
Immersion tube adapter for DO 1-mA-20 ppm	1020537



pk_6_073

Cable bracket for the dissolved oxygen sensor type DO 1-mA-20 ppm

The stainless steel and polyamide cable bracket serves to guide and fix the sensor cable with the dissolved oxygen sensor type DO 1:-mA-20 ppm.

DULCOTEST® sensors for dissolved oxygen See page → 1-38

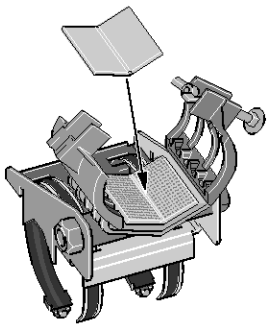
	Order no.
Cable bracket for DO 1-mA-20 ppm	1020539

Pipe adapter for the dissolved oxygen sensor type DO 2-mA-10 ppm

The PVC adapter is a spare part for the dissolved oxygen sensor type DO 2-mA-10 ppm. One half of the adapter has a 1 – 1/2" external diameter, the other half has a 50 mm external diameter and has a 1 – 1/4" pipe internal thread at both ends. The dissolved oxygen sensor type DO 2 mA-10 ppm can be adapted to an Imperial and to a metric pipe using a corresponding 45° standard angle piece (provided by the customer).

DULCOTEST® sensors for dissolved oxygen See page → 1-38

	Order no.
Pipe adapter for DO 2-mA-10 ppm	1020538



pk_6_010

Railing bracket for plastic pipes

Stainless steel and plastic bracket for fixing plastic pipes with an external diameter of 50 mm to railings (e.g. on tanks in clarification plants). Spare part for the dissolved oxygen sensor type DO 2-mA-10 ppm.

DULCOTEST® sensors for dissolved oxygen See page → 1-38

	Order no.
Railing bracket for DO 2-mA-10 ppm	1020536

P_AC_0284_1_SW1

Adapter for the dissolved oxygen sensor type DO 3-mA-20 ppm

The adapter, DN 32, PVC, is a spare part for the dissolved oxygen sensor type DO 3-mA-20 ppm. One side of the adapter has an Rp1" thread for connection of the sensor. The other side of the adapter has a glued connector for connection to a standard PVC pipe, DN 32 (supplied by the customer) via a 45° angle (Order no. 356335).

	Order no.
Reduction nipple, PVC-U, metric RP1"	356924

1.5 Accessories Sensor Technology

P_AC_0286_1_SW1

45° bracket for the dissolved oxygen sensor type DO 3-mA-20 ppm

The 45° angle, d 40-DN 32, PVC, is a spare part for the dissolved oxygen sensor type DO 3-mA-20 ppm. One side is connected (bonded) to a standard PVC pipe, DN 32 (supplied by the customer). The other side of the angle is connected to the sensor adapter (Order no. 356924) (bonded).

	Order no.
Angle 45° 21.15.01 d40/ DN 32, PVC	356335

1.6 Application Examples

Application and Ordering Examples for the DULCOMETER® Compact See page → 2-49
D1Cb and D1Cc Application and Ordering Examples See page → 2-25
DACb application and ordering examples See page → 2-10

1.6 Application Examples

2.0 Measuring and Control Units DULCOMETER®

2.0.1 Overview of controllers DULCOMETER®

DULCOMETER® controllers provide maximum process reliability with a comprehensive range of uses. Different measured variables can be precisely determined. Depending on the application, the control action of the DULCOMETER® controllers are precisely adapted to the respective requirements. Different mountings enable versatile use.

The advantages at a glance:

- excellent measuring reliability, for example by means of symmetrical input with pH/ORP
- excellent measuring precision, for example by means of high-ohmic input with pH/ORP
- minimal interference resistance, for example by AC voltage interference suppression
- Two-wire system for interference-resistant measurement
- Versatile use, thanks to the many options and different mountings

DULCOMETER® controllers, DULCOTEST® sensors and ProMinent® metering pumps – thereby ideally coordinating the entire control circuit with measurement, regulation, metering and registration.

Controller selection table

Function	DACb	Compact	D1Cb	D1Cc
Measured variablen				
pH	✔	✔	✔	✔
ORP	✔	✔	✔	✔
Chlorine	✔	✔	✔	✔
Chlorine dioxide	✔		✔	✔
Chlorite	✔		✔	✔
Bromine	✔		✔	✔
Conductive conductivity	✔	✔		
Inductive conductivity		✔		
Conductivity via mA	✔		✔	✔
Peracetic acid	✔		✔	✔
Hydrogen peroxide	✔		✔	✔
Ozone	✔		✔	✔
Dissolved oxygen	✔		✔	✔
Fluoride	✔		✔	✔
Ion-selective sensors	✔			
0/4…20 mA standard signal general measured variables	✔		✔	✔
Power supply				
90 – 253 V~	✔	✔	✔	✔
24 V DC	✔			
Method of installation, degree of protection				
Wall mounting IP 65			✔	
Control panel mounting IP 54, 1/4 DIN				✔
Combination housing (wall mounting, pillar assembly) IP 66 + IP 67. Installation on control panel IP 54	✔	✔		
Measurement				
Number of measuring channels	**2 or 3 optionally available**	**1**	**1**	**1**
Sensor monitoring for pH	✔	✔	✔	✔
Temperature compensation for pH	✔	✔	✔	✔
Temperature compensation for conductivity		✔		
pH compensation for chlorine	✔			
Control				
PID controller	✔	✔	✔	✔
Monodirectional controller (e.g. with pH acid or alkali)	✔	✔		
Bidirectional controller (e.g. with pH acid and alkali)	✔		✔	✔

2.0 Measuring and Control Units DULCOMETER®

Function	DACb	Compact	D1Cb	D1Cc
Control inputs				
Digital control inputs	✔, 4/7	✔, 1	✔, 1	✔, 1
Control outputs				
Control of metering pump by pulse frequency	✔, 2/4	✔	✔, 2	✔, 2
Control of solenoid valve/motor-driven metering pump	✔	✔	✔	✔
Flow interference variable processing via mA	✔			
Flow interference variable processing via frequency (e.g. from contact water meter)	✔			
Metering time monitoring with deactivation of the control variable	✔	✔	✔	✔
Output relay configurable as limit value relay	✔, 2	✔, 1	✔, 2	✔, 2
Cycle timer	✔, 2		✔, 2	✔, 2
Real-time timer	✔, 2			
Outputs				
Analogue output 0/4…20 mA	✔, 2/3	✔, 1	✔, 1	✔, 1
Special functions				
Data logger with SD card	✔			
Web server via LAN	✔			
Parameter set switch-over via timer	✔			
Parameter set switch-over via contact	✔			
PROFIBUS®-DP	✔			
PROFINET	✔			
Modbus RTU	✔			
Subsequent extension of functions via enabling code	✔		✔	✔
Operating hour counter	✔		✔	✔

2.0 Measuring and Control Units DULCOMETER®

2.0.2 Survey of applications in measuring and control technology

Company name	. . . . .	Cust. no. . . . .
Address:	. . . . .	
Contact:	. . . . .	
Phone:	. . . . .	E-mail: . . . . .
Industrial segment/sector:	. . . . .	
Description of the application:	. . . . .	
Is there an analysis of the measuring solution?	❑ yes, there is	❑ no

Required measuring parameters:

Temperature (min.):	max.:	typically: . . . . .
Pressure (min.):	max.:	typically: . . . . .
pH value (min.):	max.:	typically: . . . . .
ORP value (min.):	max.:	typically: . . . . .
Conductivity of the solution (approx.):	. . . . . µS/cm	. . . . . mS/cm
Does the solution contain fluoride (F-)? If so, concentration:	. . . . . mg/l	. . . . . g/l
Clear or turbid solution?	❑ clear	❑ turbid

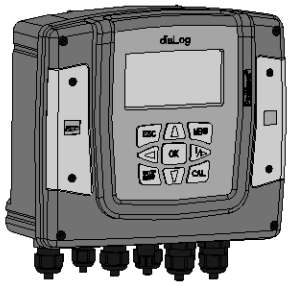
Does the solution contain solids? If so, which / how many: . . . . . .

Other comments

. . . . . .
. . . . . .
. . . . . .

2.1 Controller DULCOMETER® diaLog DACb

2.1.1 Controller DULCOMETER® diaLog DACb



P_DM_0031_SW1

Water parameter analysis made easy – with the DULCOMETER® diaLog DACb

Do you wish a simple controller for water analysis? One that is easy to operate and with which you can freely select between all common measured variables per channel? There is one: our all-rounder DULCOMETER® diaLog DACb! What is more, it is Ethernet-/LAN-capable and can be ideally integrated into existing networks.

The controller DULCOMETER® diaLog DACb is our compact all-rounder for water analysis. With its specially designed functionalities, e.g. processing or interference variables and switchover of control parameters, it closes the control circuit between DULCOTEST® sensors and ProMinent® metering pumps. The two measuring and control channels of the DULCOMETER® diaLog DACb can be individually configured to meet customer requirements. Everything that you need for the reliable treatment of industrial and process water, potable water as well as swimming pool water.

Your benefits

- Simple operation thanks to a clearly arranged display
- More for your money: two measuring and control channels now in the basic configuration
- Versatile use: all common measured variables can be set per channel and subsequently altered
- Control from everywhere: LAN-capable and convenient remote access via integrated web server
- Maximum flexibility: individually adjustable to different operating statuses, e.g. Day-Night mode
- Excellent process reliability: avoidance of incorrect metering by time-based monitoring of control variables
- Global application options: 24 operating languages can be selected and changed
- Minimal time and effort: effortless duplication of device settings
- Precise monitoring and documentation: Event, calibration and measured data logger with easy-to-access SD memory card
- Optimum communication: Integration into customer networks by means of different field bus systems (PROFIBUS® DP, Modbus RTU)

Technical Details

- Measured variables: pH, ORP, chlorine, chlorine dioxide, chlorite, bromine, conductivity, peracetic acid, hydrogen peroxide, ozone, dissolved oxygen and fluoride
- Method of installation, degree of protection: Combination housing (wall mounting, control panel mounting, pillar assembly) IP 67 and IP 66
- Control: two measuring and control channels, each with independent monodirectional PID controller (optional: two bidirectional PID controllers)
- 24 V DC protective low voltage supply e.g. by means of solar system or in the wet area of waterworks
- Temperature compensation for pH and for chlorine dioxide process sensor CDP, pH compensation for chlorine
- Digital inputs for the processing of control signals, e.g. of process water limit contacts, remote stop control and to monitor the liquid levels in chemical storage tanks
- Control outputs for electronically controlled metering pumps and solenoid valves
- Interference variable processing: simple control of water parameters in flowing water by processing the flow in the control algorithm
- Adaptation of the controller setpoint to changed process conditions is possible via remote control by means of the mA signal of a PLC Programmable Logic Controller or with higher requirements via the field bus option

Field of application

- Measurement and control of water parameters in industrial and process water treatment plants
- Monitoring of the water parameters potable water
- Measurement of pH value and disinfection parameters in the food and beverage industry
- Measurement and control of the hygiene parameters in swimming pools
- Monitoring of the chlorine dioxide concentration in systems for legionella control and prevention, for example in schools, hotels or hospitals
- Measurement of the disinfection parameters of irrigation and sprinkler irrigation water in market gardens

2.1 Controller DULCOMETER® diaLog DACb

Technical Data

Measured variables and measuring ranges	**mV connection type:** pH: 0.00 ... 14.00 ORP voltage: -1500 ... +1500 mV **Connection type mA (amperometric measured variables, measuring ranges corresponding to the sensors):** Chlorine Chlorine dioxide Chlorite Bromine Ozone Hydrogen peroxide (PER sensor) Hydrogen peroxide (PEROX sensor with **PEROX transducer V2 Order No. 1047979**) Peracetic acid Dissolved oxygen **Connection type mA (potentiometer measured variables, measuring ranges corresponding to the transmitter):** pH ORP voltage **Fluoride:** via module VA and function extension package 3 and 4 **Conductivity mA via sensor CCT 1-mA-20 mS/cm** **Temperature:** via Pt 100/Pt 1000, measuring range 0 ... 150 °C
Resolution	pH: 0.01 ORP voltage: 1 mV Temperature: 0.1 °C Amperometric analysis (chlorine etc.): 0.001/0.01 ppm, 0.01 vol.%, 0.1 vol.%
Accuracy	0.3% based on the full-scale reading
Measurement input	pH/ORP (input resistance > 0.5 x 10^{12} Ω)
Temperature compensation	Pt 100/Pt 1000 for pH, chlorine dioxide (CDP) sensor and fluoride
Correction range	0 … 100 °C
pH compensation range for chlorine	Sensor CLE 3 and CLE 3.1: 6.5 ... 8.5, sensor CBR: 6.5 ... 9.5
Disturbance signals	Flow via 0/4 … 20 mA signal or contact water meter, 1 - 500 Hz. The multiplicative interference variable can influence all channels, while the additive interference variable only influences one channel.
Control characteristic	P/PID control
Control	2 or 3 bidirectional controls
Analogue outputs	2 (3) x 0/4 ... 20 mA electrically isolated, max. load 450 Ω, range and assignment (measured, correction, control variable) can be set
Control outputs	2 (4) pulse frequency outputs for the control of metering pumps 2 relays (limit value or pulse length control)
Alarm relay	250 V ~3 A, 700 VA contact type changeover contact
Digital control inputs	4 (7) as a remote control input for the functions pause control / sample water fault, parameter set switch-over, level monitoring of chemical tanks
Electrical connection	100 – 230 V, 50/60 Hz, 25 VA, optional 24 V DC
Field bus connection	PROFIBUS®-DP, Modbus RTU, PROFINET
Ambient temperature	0 ... 50°C (for use indoors or with a protective enclosure)
Enclosure rating	Wall-mounted: IP 66 and IP 67 (NEMA 4X) Installation in the control cabinet: IP 54 for control cabinet door
Tests and approvals	CE and MET (corresponding to UL as per IEC 61010)
Housing material	PC with flame proofing equipment
Dimensions	250 x 220 x 122 mm (WxHxD)
Weight	1.3 kg

Standard equipment with basic measured variable

- PID controller with pulse frequency-based metering pump control for 2 metering pumps.
- 2 analogue outputs for measured value, correction value or control variable (depending on the optional equipment).
- 4 digital inputs for sample water fault detection, level switch, pause and parameter switch-over.

2.1 Controller DULCOMETER® diaLog DACb

- 2 output relays selectable as limit value, cycle timer, real-time timer or intermittent programmable control output (depending on the optional equipment).
- Measured variables and language selection during commissioning.
- Temperature compensation of the pH, chlorine dioxide (CDP) and fluoride measurement via Pt100/Pt1000.
- 24 operating languages: all European languages as well as Chinese, Russian, Thai, Korean. The operating language is selected during commissioning and can be changed at any time by a keyboard shortcut. The documentation language is selected via the identity code. A data carrier is also supplied that contains all other languages.
- Device parametrisation is saved and transferred on an SD card.
- Calibration and event data logger (without SD card, data is saved in the controller).
- Interference variable processing (flow) via frequency (contact water meter).
- Subsequent upgrade of the software function by means of an activation key or firmware update.

Description of the possible measured variables as basic measured variables:

Module VA mV/temperature + mA sensor input:

- 1 sensor input for pH or ORP sensor and temperature sensor Pt100/Pt1000
- 1 sensor input for the connection of, for example, chlorine sensors, such as CBR or pH switch-over pHV1 and fluoride including interference variable or pH compensation for chlorine.

Module AA mA/mA sensor input:

- 2 sensor inputs for the connection of, for example, chlorine sensors, such as CBR or pH switch-over pHV1, including interference variable or pH compensation for chlorine.

Module VV mV/mV temperature sensor input:

- 2 sensor inputs for the connection of pH and ORP sensors and temperature sensors Pt100/Pt1000, e.g. of type PHER, RHER, PHEI, RHEIC, Pt100SE

Module L3 Conductivity temperature sensor input:

- 2 sensor inputs for the connection of conductive conductivity sensors and temperature sensors Pt100/Pt1000, e.g. of type LFT, LMP

Optional equipment for third measuring channel pH

Package 2

- Third measuring and control variable pH via mV or mA with or pH compensation for chlorine without external setpoint specification via analogue signal for channel 1 without interference variable flow via mA for channel 1
- Third analogue output.
- Control two additional metering pumps.

Package 3

- Third complete measuring and control channel, any measured variable, with PID controller.
- Third analogue output for measured value, correction value or control variable (depending on the optional equipment).
- Three additional digital inputs, e.g. for level monitoring, pause and sample water alarm for channel 2.
- Temperature compensation of the pH, chlorine dioxide (CDP) and fluoride measurement.

Package 4

- Combination of packages 2 and 3 (only one channel for amperometric sensors is available with the interference variable mA).

Communication options

- Measurement data logger with SD card.
- Visualisation of the measured data using a web server via LAN and PC/tablet PC and web browser.
- PROFIBUS® DP, Profinet and Modbus RTU.

Hardware extension

- Protective RC circuit for output relay: Protects the output relay if inductive loads are to be switched (e.g. solenoid valves or motors). Not with 24 V DC electrical connector.

2.1 Controller DULCOMETER® diaLog DACb

A complete measuring point comprises:

- Transmitter/controller DACb (see identity code)
- Fitting: DGMa..., DLG III ..., immersion fitting
- pH sensor (identity code-dependent)
- ORP sensor (identity code-dependent)
- Chlorine, chlorine dioxide, chlorite, bromine, dissolved oxygen sensor
- Transducer for pH or ORP dependent on the cable length (> 10 m)
- Sensor cable

(for further information: Immersion Fittings see page → 1-122; pH Sensors With SN6 or Vario Pin Plug-In Head see page → 1-46; ORP Sensors with Fixed Cable see page → 1-79; Sensors for Chlorine see page → 1-5; Transmitter 4 … 20 mA (Two-Wire System) see page → 2-67; Sensor Accessories see page → 1-113)

Accessories for controller DULCOMETER® diaLog DACb

	Order no.
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 - pre-assembled	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 - pre-assembled	1024107
SN6 coaxial connector, retrofit component, D1Cb, DAC, DCCa	1036885
Fitting kit for DAC control panel installation	1041095
Retrofit kit DACa/DACb RC module	1075226

2.1 Controller DULCOMETER® diaLog DACb

2.1.2 Identity Code Ordering System for diaLog DACb, Wall Mounting IP 67

DACb	Mounting type														
	W	Wall mounting													
	S	Control panel mounting													
		Design													
		00	with ProMinent logo												
			Operating voltage												
			4	24 V DC											
			6	100 - 230 V 50/60 Hz											
				Basic measured variables											
				VA	2 measuring and control channels, connector type mV/temperature + mA, e.g. for pH + chlorine sensors or pH + fluoride										
				AA	2 measuring and control channels, connector type mA + mA, e.g. for chlorine dioxide/chlorite sensors										
				VV	2 measuring and control channels, connector type mV/temperature + mV temperature, e.g. for pH + ORP or two pH sensors										
				L3	2 measuring and control channels, connector type: conductive conductivity and temperature via Pt100/ Pt1000										
					Extended functions										
					0	none									
					2	Package 2: third measured variable pH with pH compensation for chlorine or interference variable (mA) or external setpoint specification via mA, all acting on channel 1, additionally: 2 pump outputs, 3 digital control inputs, 1 mA output									
					3	Package 3: third measured variable of your choice + control, additionally: 2 pump outputs, 3 digital control inputs, 1 mA output									
					4	Package 4: Combination of packages 2 and 3									
						Software default settings									
						0	no default setting								
							Connection of the measured variables								
							0	all sensor inputs via terminal							
							1	max. 2 mV inputs via SN 6 coaxial connector							
								Digital sensor / actuator connectors							
								0	none						
									Communication interface						
									0	none					
									A	Modbus RTU, terminal					
									B	Profibus DPV1, terminal					
									E	LAN with web server, connection via M12 C coded					
									G	Profinet (2xM12)					
										Data logger					
										0	no data logger				
										1	with data logger				
											Hardware extension				
											0	none			
											1	Protective RC circuit for switching inductive loads via the output relay, e.g. DF2a, solenoid valves			
												Approvals			
												00	none		
												01	CE (Standard)		
													Certificates		
													0	none	
														Documentation language	
														00	No document
														DE	German
														EN	English
														ES	Spanish
														FR	French
														BG	Bulgarian
														CS	Czech
														DA	Danish
														SV	Swedish
														ET	Estonian
														EL	Greek
														FI	Finnish
														HR	Croatian
														HU	Hungarian
														IT	Italian
														JA	Japanese
														KO	Korean
														LT	Lithuanian
														LV	Latvian
														NL	Dutch
														PL	Polish
														PT	Portuguese
														RO	Romanian
														SL	Slovenian
														SK	Slovakian

2.1.3 Retrospective function extension for the diaLog DACb measuring and control system

Prerequisite:

Channel 2 must be available in the controller. Missing hardware must be retrofitted in the factory.

Channel 2 can be enabled from either package 2 or package 3. The packages correspond to the ones also described in the identity code. The data logger function can always be enabled.

The activation code can only be used for the relevant controller with the specified serial number.

The activation code can be transmitted via email and is then read into the controller from the SD card or entered over the controller keypad. The enabled function is then immediately available and need only be activated and parametrised.

The following information must be available to determine the activation code:

- The serial number of the controller in question (see operating menu under “Diagnostics”, “Device information”) and
- the desired upgrade package.

		Order no.
Based on package 2	Upgrade: Package 2 to package 3	1047874
	Upgrade: Package 2 to package 4	1047875
Based on package 3	Upgrade: Package 3 to package 4	1047876

		Order no.
Based on 0=no data logger	Upgrade: Data logger	1047877

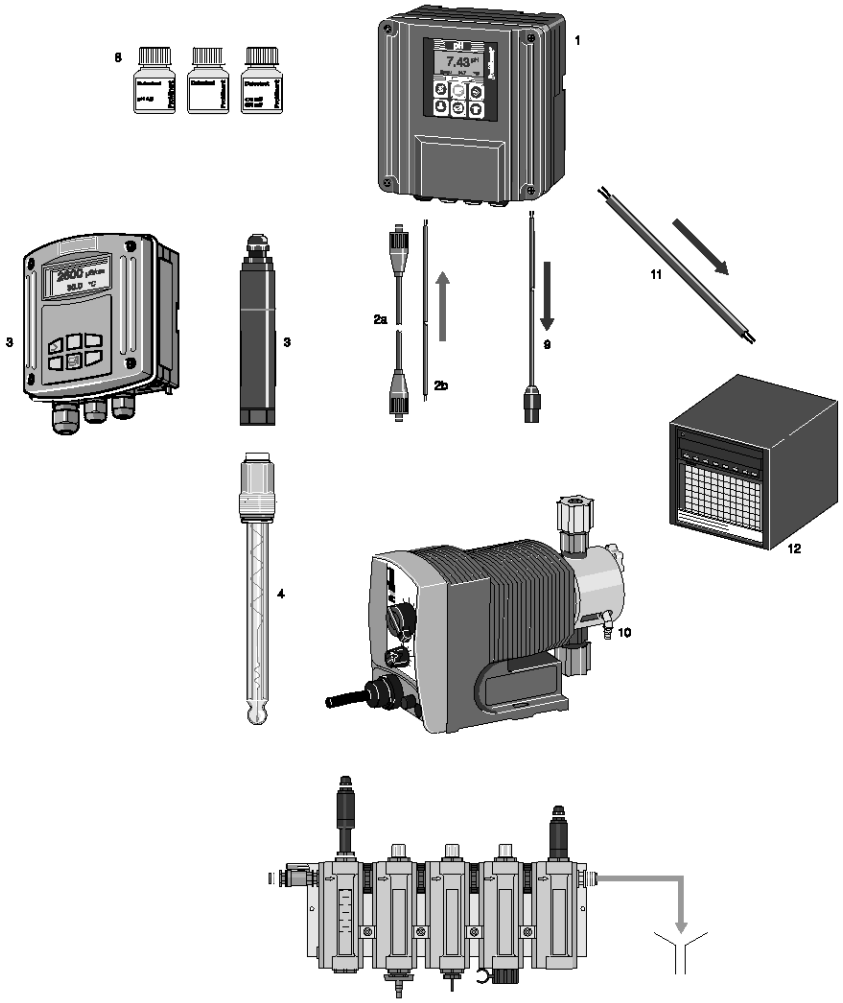
2.1 Controller DULCOMETER® diaLog DACb

2.1.4 DACb application and ordering examples

The application examples contain typical combinations of components for measuring stations in applications in the areas of swimming pool, drinking water, waste water and the food industry.

Components of a complete measuring and control system

1 Measuring and control device e.g. DACb
2a Measuring line e.g. coaxial cable for pH and ORP sensors, Pt 100/Pt 1000
2b Measuring line 2-core for amperometric sensors with mA signal and transducer
3 Transducer 4 ... 20 mA (for two wire system), DMTa or pH V1
4 Sensor, e.g. pH single-rod sensor
5 Fitting e.g. in-line probe housing type DGMA
6 Stopcock sample water line
7 Sampling tap
8 Buffer solutions (pH/ORP)
9 Signal cable (metering pump control)
10 Actuator e.g. Beta® metering pump



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Examples for:

1 Treatment of swimming pool water and decorative wells/fountains
2 Potable water monitoring
3 Monitoring of waste water (pH neutralisation)
4 Applications in the food industry
5 Odour reduction during exhaust air scrubbing

2.1.5 Application Examples, Treatment of Swimming Pool Water

Private swimming pool with measurement and metering of acid and chlorine based on the ORP value

Tasks and applications

The pool water of a private outdoor swimming pool, used for only a short time every year, is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the ORP value (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor).

Type DF2a peristaltic pumps are to be controlled. The sample water flow is to be monitored and upon failure, the controller should stop.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for pH and ORP diaLog DACb with data logger and protective RC circuit	→ 2-4	DACa00613000011010EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	ORP sensor RHES-Pt-SE	→ 1-68	150703
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa 320T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance in 24 languages
- Recording of measured data
- Automatically correct pH value and correct disinfectant concentration
- All products are selected to operate correctly with each other

Hotel swimming pool (public swimming pool) with measurement and control of the chlorine concentration and the pH value and measurement of the redox potential

Tasks and applications

The pool water of a hotel swimming pool, frequently used by guests, is to be treated. Sulfuric acid is used to correct the pH and sodium-calcium hypochlorite is used as the disinfectant. The disinfectant is to be regulated by measuring the chlorine (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor). An ORP measurement is to provide information about the disinfection effect. The measured values are to be recorded. The responsible caretaker would like to see the measured values and messages on his smartphone. To achieve this, a DACb is connected to an existing Wi-Fi network. Type DF2a peristaltic pumps are to be controlled. The sample water flow is to be monitored and, in the event of failure, the controller is to stop.

Components of the measuring/control station

Quantity		See page	Order no.
1	3-channel controller for pH, ORP and chlorine diaLog DACb with data logger, web interface and protective RC circuit	–	DACBW006VV3000E11010EN
1	pH sensor PHES-112-SE SLg100	–	1051745
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	ORP sensor RHES-Pt-SE SN6	–	1051746
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	Sensor for free chlorine CBR 1-mA-2 ppm	–	1038015
1	In-line probe housing DGMa with sample water scale and limit switch	–	DGMa321T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance in 22 languages
- View measured values and messages on a PC or smartphone
- Recording of measured data
- Automatically correct pH value and correct concentration of disinfectant
- All products are pre-selected to coordinate with each other

2.1 Controller DULCOMETER® diaLog DACb

Private swimming pool with measurement of free chlorine and pH value

Tasks and applications

The pool water of a frequently-used private indoor swimming pool is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the chlorine concentration (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor). Beta® 4b metering pumps are to be controlled.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for pH and chlorine diaLog DACb with data logger	→ 2-4	DACa00613000010010EN
1	Chlorine sensor CLE 3-mA 2 ppm	→ 1-7	792920
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa311T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Recording of measured data
- Automatically correct pH value and direct measurement and control of chlorine concentration
- All products are matched

Oxidation of well water with hydrogen peroxide

Tasks and applications

The water of a decorative well or fountain is to be disinfected/oxidised using hydrogen peroxide. The addition of hydrogen peroxide is to be measured. Metering is dependent on the measured value.

If with a control variable of 60% the setpoint is reached after 1 hour, then metering should enter the basic load settings and an alarm should be set (a calibration of the hydrogen peroxide sensor using a comparative measurement is required at regular intervals).

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for hydrogen peroxide diaLog DACb with data logger	→ 2-4	DACa00610000010010EN
1	Hydrogen peroxide sensor PER 1-mA-2000 ppm	→ 1-42	1022510
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Recording of measured data
- If the setpoint has not been reached within 1 hour, the dosing monitor signals via the alarm relay and sets control to an adjustable basic load
- All products are matched

2.1.6 Application Examples, Potable Water Monitoring

Measurement and control of ozone in water works for pre-oxidation of the raw water

Tasks and applications

In the treatment of potable water in a water works a measuring and control station is needed at the pre-oxidation stage at the inlet to the water works for the ozone oxidising and disinfectant agent used. With a constant flow, the fluctuating attrition of the ozone, caused by the changing quality of the raw water, is to be compensated on the basis of the measured variables. The following conditions must be met:

- Oxidising agent / disinfectant: Ozone with a concentration to be set to 0.2 ppm
- Raw water: Surface water with a pH of 7.3-7.6 and a temperature of 5 °C-17 °C
- Installation of the measuring station in the bypass of the process flow
- Alarm to signal transgression of upper and lower limit values
- Display of measured results and calibration via a measuring instrument in the proximity of the bypass installation and transmission of the measured value to the control desk via an electrically isolated 4-20 mA signal
- Alarm to signal lowering of sample water flow

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for ozone diaLog DACb with data logger	→ 2-4	DACa00610000010010EN
1	Ozone sensor OZE 3-mA-2 ppm	→ 1-36	792957
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Precise, self-regulating process management with changing raw water quality by the completely automated measuring and control station with variable-dependent control of ozone concentration
- Reliable, safe operation thanks to alarm signalling in the event of limit value transgression and lowering of sample water flow
- The control is monitored by transmission of the measured value as an electrically isolated 4-20 mA output signal by the controller to the control panel

Waterworks with control measurement of chlorine

Tasks and applications

The chlorine concentration in the outlet of a water works is to be monitored. Metering is performed with the volume proportional to the water flow. A magnetic flow meter with a 4-20 mA output signal directly controls a metering pump.

If the setpoint is not reached for at least 5 minutes, then a limit value relay should switch and signal via a signal generator that the stroke length of the metering pump must be increased. Conversely, monitoring should also be performed to determine if too much chlorine has been dosed (calibration of the chlorine sensor should be performed at regular intervals by means of a DPD 1 comparative measurement).

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for chlorine diaLog DACb with data logger	→ 2-4	DACa00610000010010EN
1	Chlorine sensor CLE 3-mA-0.5 ppm	→ 1-7	792927
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Recording of measured data
- Signalling via a limit value relay if the setpoint has been reached after 5 minutes.
- All products are matched

2.1 Controller DULCOMETER® diaLog DACb

Measurement and control of free chlorine with feedforward control in a waterworks

Tasks and applications

A measuring and control station is needed for the "free chlorine" disinfectant in the treatment of drinking water in a water works. Metering is largely proportional to the flow (magnetic flow meter 4...20 mA). However control can also be proportionately variable-dependent to compensate for peaks of chlorine loss, for instance in the event of rainfall. The following conditions must be met:

- Disinfectant: free chlorine with an adjustable concentration of 0.2 mg/l
- Raw water: source water with a pH of 7.0-7.5 and a temperature of 1-13 °C
- Installation of the measuring station in the bypass of the process flow
- Display of measured results and calibration via a measuring instrument in the proximity of the bypass installation and transmission of the measured value and control variable to the control panel via PROFIBUS®-DP
- Alarm to signal lowering of sample water flow (via PROFIBUS®-DP)
- Alarm signalling the transgression of the preset upper and lower limit values (via PROFIBUS®-DP)
- The measured data are to be recorded in the controller.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for chlorine with interference variable processing diaLog DACb with data logger and PROFIBUS-DP	→ 2-4	DACa00612000410010EN
1	Chlorine sensor CLE 3-mA-0.5 ppm	→ 1-7	792927
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Precise, self-regulating disinfection by a fully automated measuring and control station
- Flow-proportional control can be safeguarded by proportionate variable-dependent control to combat peaks of attrition
- Reliable, safe operation thanks to alarm signalling in the event of limit value transgression and lowering of sample water flow
- The control is monitored by transmission of the measured value and control variable via the PROFIBUS®-DP to the control panel

Waterworks with measurement of chlorine dioxide

Tasks and applications

The chlorine dioxide concentration in the outlet of a water works is to be monitored. Metering is in the first place performed with the volume proportional to the water flow. A MID with a 4 – 20 mA output signal is used.

If the proportionality is insufficient, then up to 20% of the control variable is made available by the controller in an additive manner (a calibration of the chlorine dioxide sensor by means of a DPD 1 comparative measurement is required at regular intervals). The DACb controller pulse frequency is used to control the ProMinent Bello Zon® chlorine dioxide generation system.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for chlorine dioxide diaLog DACb with data logger	→ 2-4	DACb00610000010010EN
1	Chlorine dioxide sensor CDE 2-mA-0.5 ppm	→ 1-30	792930
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Recording of measured data
- Primarily, chlorine dioxide metering proportional to flow. Where this is not possible additive measured-value dependent control
- All products are matched

2.1 Controller DULCOMETER® diaLog DACb

Legionella prevention in public buildings

Tasks and applications

The chlorine dioxide and the chlorite concentration are to be monitored and recorded in the fresh water distribution system of a public building for the prevention of legionella. Chlorite is a disinfection by-product of chlorine dioxide that arises if germs have been killed. The chlorite concentration is limited using a limit value of 0.2 mg/l.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for pH and chlorine diaLog DACb with data logger	→ 2-4	DACa00613000010010EN
1	Chlorine dioxide sensor CDE 2-mA-0.5 ppm	→ 1-30	792930
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	Chlorite sensor CLT 1-mA-0.5 ppm	→ 1-34	1021596
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa302T000
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Recording of all measured data
- Upon exceeding of the chlorite limit value, a limit value relay switches the chlorine dioxide metering off or to a basic load.
- All products are matched

Oxidation of well water with hydrogen peroxide

Tasks and applications

The water drawn from a deep well is to be oxidised using hydrogen peroxide. The addition of hydrogen peroxide is to be measured. Metering is dependent on the measured value.

If with a control variable of 60% the setpoint is reached after 1 hour, then metering should enter the basic load settings and an alarm should be set (a calibration of the hydrogen peroxide sensor using a comparative measurement is required at regular intervals).

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for hydrogen peroxide diaLog DACb with data logger	→ 2-4	DACa00610000010010EN
1	Hydrogen peroxide sensor PER 1-mA-2000 ppm	→ 1-42	1022510
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Hygienic trouble-free well water
- Simple operation, controller with plain text operator guidance
- Recording of measured data
- If the setpoint has not been reached within 1 hour, the dosing monitor signals via the alarm relay and sets control to an adjustable basic load
- All products are matched

2.1 Controller DULCOMETER® diaLog DACb

2.1.7 Application Examples, Waste Water Monitoring

Neutralisation of the waste water of an industrial plant (non-steady receipt of water)

Tasks and applications

Turbid waste water with a significantly fluctuating pH value and intermittent occurrence is to be neutralised in batch operation. The waste water is pumped into an interim tank and is neutralised using acid and alkali. The pH value should be measured and regulated in a stirred batch storage tank. The pH sensor should be fitted at a typical position on the tank using an immersion fitting. Once it has been neutralised the water is pumped onwards. and the pH value should be controlled again in this pipe.

The DACb controller data logger automatically records the pH values and temperatures of both pH measuring points. In parallel, a digital input is used to record the end position switch of the storage tank outlet. In this way, it can be precisely determined how high the pH value was at the time of draining. Any limit value transgressions that may have occurred are also recorded in the data logger. If a limit value transgression occurs, the shut-off valve closes automatically. A neutral zone is additionally defined in the controller. If the pH value comes within this neutral zone, no control takes place. There may be solids in the waste water.

Components of the pH measuring/control station in the collection tank

Quantity		See page	Order no.
1	2-channel controller for pH and ORP diaLog DACb with data logger and protective RC circuit	→ 2-4	DACa00613000011010EN
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Pt 100 temperature sensor	→ 1-82	305063
1	Cable combination of control line 5 m SN6, open end (Pt 100, Pt 1000)	→ 1-114	1003208
1	Immersion fitting with 3 sensor slots IPHa 3-PP	→ 1-123	1008602
1	Cable combination coaxial 5 m - SN6 - pre-assembled	→ 1-123	1008633

Components of the measuring/control station in the outlet

Quantity		See page	Order no.
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Retractable process assembly WA-PH 1	→ 1-128	1020631

Note: the use of other sensors is also possible depending on the quality of the waste water (see Selection Guide for pH Sensors DULCOTEST®→ 1-1)

With seriously contaminated waste water with solid matter content

Quantity	Name	See page	Order no.
1	pH sensor PHEX 112 SE	→ 1-53	305096

With clear waste water

Quantity	Name	See page	Order no.
1	pH sensor PHEP 112 SE	→ 1-49	150041

Benefits

- Simple operation, controller with plain text operator guidance in 24 languages
- Recording of all measured data and the opened or closed status of the shut-off valve
- pH limit value monitoring of drainage water
- pH control and final checking in a controller
- All products are selected to operate correctly with each other

Neutralisation of the waste water of an industrial plant (continuous receipt of water)

Tasks and applications

In an industrial plant, waste water arises in a continuous manner (continuous production), and can be acidic or alkaline. The water runs through a manifold. The flow volume is measured using a flow meter because the flow varies within wide limits. There is a pH sensor with a pH sliding retractable assembly in the pipework with which the pH value is adjusted. Further along the pipework the pH value is used once again as a final check.

The flow signal of the flow meter is evaluated as a multiplicative interference variable in the DACb controller, i.e. this flow signal = disturbance variable is used to evaluate the controller control variable (control of the metering pumps) in a flow dependent manner. In the event of a similar control deviation (deviation of the actual from the setpoint), for example, with a reduced flow less acid or alkali is necessary than with an increased flow. Provision of this information makes it easier for the controller to adhere to the setpoint. In the absence of this flow information, a PID controller alone could not perform such a task or could only perform it with great difficulty. A neutral zone is additionally defined in the controller. If the pH value comes within this neutral zone, no control takes place.

There may be solids in the waste water.

The DACb controller data logger automatically records the pH values and temperatures of both pH measuring points. Any limit value transgressions that may have occurred are also recorded in the data logger.

Components of the pH measuring/control station in the collection tank

Quantity		See page	Order no.
1	2-channel controller for 2 x pH and temperature diaLog DACb with data logger	→ 2-4	DACb00614000011010EN
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Retractable process assembly WA-PH 1	→ 1-128	1020631

Components of the measuring/control station in the outlet

Quantity		See page	Order no.
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Retractable process assembly WA-PH 1	→ 1-128	1020631

Note: the use of other sensors is also possible depending on the quality of the waste water (see Selection Guide for pH Sensors DULCOTEST®→ 1-1)

With seriously contaminated waste water with solid matter content

Quantity	Name	See page	Order no.
1	pH sensor PHEX 112 SE	→ 1-53	305096

With clear waste water

Quantity	Name	See page	Order no.
1	pH sensor PHEP 112 SE	→ 1-49	150041

Benefits

- Simple operation, controller with plain text operator guidance in 24 languages
- Processing of the flow signal as a disturbance variable
- Recording of all measured data and the opened or closed status of the shut-off valve
- pH limit value monitoring for the waste water
- pH control and final checking in a controller
- All products are selected to operate correctly with each other

2.1 Controller DULCOMETER® diaLog DACb

2.1.8 Application Examples in the Food Industry

Bottler disinfection in the beverage industry

Tasks and applications

Continuous disinfection of the filler with disinfection solution means this sensitive part of the bottling process is reliably sterilised. Continuous spraying with disinfectant solution means high hygiene requirements are fulfilled.

The disinfectant solution comprises water with additional chlorine dioxide. The concentration of the chlorine dioxide is measured and set to the desired value using the DACb controller. From time to time the chlorine dioxide concentration must be increased.

An alternative parameter set can be activated in the DACb via a switch input. In this way, a switchover, regularly required, can be carried out smoothly without the need for continual adaptation of the setpoint in the controller menu.

The measured data is to be recorded.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for chlorine dioxide diaLog DACb with data logger	→ 2-4	DACb00610000010010EN
1	Chlorine dioxide sensor CDR 1-mA-2 ppm	→ 1-32	1033393
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance in 24 languages
- Recording of all measured data
- Switchover of control parameters via an external potential-free contact
- All products are selected to operate correctly with each other

Irrigation water disinfection for useful plants

Tasks and applications

The irrigation water from, for example, lettuce seedlings is extracted from a well. The water could be contaminated with germs which could harm the salad seedlings. To prevent this, the irrigation water is disinfected using chlorine dioxide. The irrigation water requirement varies. Consequently, the irrigation water volume flow is measured. The irrigation water volume flow is used as an additive interference variable to control the addition of chlorine dioxide dependent on the required chlorine dioxide concentration and the irrigation water flow.

All measured data is to be recorded. The irrigation water may contain suspended matter. The pH value and the electrolytic conductivity are also to be monitored.

Components of the measuring/control station

Quantity		See page	Order no.
1	3-channel controller for the measurement and control of chlorine dioxide concentration and the measurement of the pH value and electrolytic conductivity, diaLog DACb, with data logger and web interface	→ 2-4	DACb00612000010010EN
1	Chlorine dioxide sensor CDR 1-mA-2 ppm	→ 1-32	1033393
5 m	Coaxial cable, Ø 5 mm, 10.0 m	→ 1-113	305040
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m - SN6 - pre-assembled	→ 1-123	1008633
1	Conductivity sensor CCT 1-mA-20 mS/cm	→ 1-84	1081545
5 m	Cable type LKT 4 x 0.5 mm² and shield for connection of the CCT 1	–	723612
1	In-line probe housing DGMa with sample water limit contact	–	DGMa312T000
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance in 22 languages
- Processing of the irrigation water flow signal as an interference variable
- Recording of all measured data
- All products are pre-selected to coordinate with each other

2.1.9 Odour Reduction Application Examples (Clarification Plants)

Exhaust air scrubbers, clarification plants or fragrance production

Tasks and applications

The odorous components of the exhaust air from a clarification plant are to be scrubbed out using an exhaust air scrubber and oxidised using hydrogen peroxide. Here the hydrogen peroxide concentration is to be regulated to maintain 100 mg/l. As the exhaust air is acidic, the pH value is to be regulated to maintain 7.2. The measured values are to be recorded. The scrubbing water temperature can vary widely in the range 5 - 35 °C. Beta® 4b metering pumps are to be pulse frequency controlled.

Components of the measuring/control station

Quantity		See page	Order no.
1	2-channel controller for pH and chlorine diaLog DACb with data logger	→ 2-4	DACa00613000010010EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	H_2O_2 sensor PEROX-H2.10 P	→ 1-43	792976
1	PEROX transducer V2, measuring range switchable up to 20/200/2,000 mg/l	→ 1-43	1034100
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	Pt 100 temperature sensor	→ 1-82	305063
1	Cable combination of control line 5 m SN6, open end (Pt 100, Pt 1000)	→ 1-114	1003208
1	Reference electrode REFP-SE	→ 1-82	1018458
1	DLG III A with PVC hose connection	→ 1-119	914955
1	Polishing paste (90 g tube)	→ 1-82	559810
1	Magnetic stirrer 100-240 V		790915
1	Magnetic stirring PTFE (magnetic stir bar) 15 x 6	–	790917
1	Photometer DT3B	→ 2-65	1039317

Benefits

- Simple operation, controller with plain text operator guidance in 24 languages
- Recording of all measured data
- Simultaneous measurement and control of the pH value and the hydrogen peroxide concentration
- All products are selected to operate correctly with each other

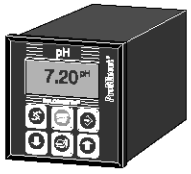
2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.1 Controller DULCOMETER® D1Cb/D1Cc

The water analysis workhorse

The controller DULCOMETER® D1Cb/D1Cc can be used for control tasks in potable water treatment, waste water treatment and many other areas. Safe, convenient and clear, thanks to the large illuminated graphic display, plain text operating menu and pH sensor monitoring.

The D1Cb/D1Cc controller is a 1-channel P/PID controller for the measured variables pH, ORP, chlorine, chlorine dioxide, chlorite, ozone, bromine, peracetic acid, hydrogen peroxide, fluoride, dissolved oxygen and conductivity via mA. The sensors for pH and ORP can be directly connected via coaxial cable or using the 4-20 mA sensor input. The controller can bidirectionally control the measured variables, monitor limit values and transmit the measured value via an mA output, e.g. to a PLC Programmable Logic Controller. The mA output can optionally also be configured as an interference variable output. The controller has two pulse frequency outputs to control two metering pumps (raise and lower). Two output relays can optionally be used as limit value relays or to control motor-driven pumps or solenoid valves. An alarm relay signals the occurrence of a fault. A digital input is used to switch off the control or to process a sample water limit contact by remote control. The impact of temperature on the measurements can be provided by temperature measurement or by manual input. Menu-driven operation is possible in 20 languages.



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D1Cb (top), D1Cc (bottom)

Your benefits

- Flexibility through free selection of variables from all measured variables
- Safety through sensor monitoring of pH for glass breakage and line breakage
- Flexibly upgradable, thanks to subsequent activation option of functions by means of an activation code
- Various installation options: wall-mounted or installation in a control cabinet

Technical Details

- Measured variables: pH, ORP, chlorine, chlorine dioxide, chlorite, bromine, conductivity, peracetic acid, hydrogen peroxide, ozone, dissolved oxygen and fluoride
- Method of installation, degree of protection: D1Cb wall mounting IP 65, D1Cc control panel mounting IP 54, 1/4 DIN
- Measurement: 1 measuring channel, temperature compensation for pH
- Control: PID controller, bidirectional controller (e.g. with pH acid and alkali)
- Control inputs: 1 digital control input

Field of application

- Measurement and control of water parameters in industrial and process water treatment plants
- Waste water neutralisation
- Measurement of the pH value and the disinfection parameters in potable water treatment and in the food and beverage industry
- Measurement and control of the hygiene parameters in swimming pools

2.2 Controller DULCOMETER® D1Cb/D1Cc

Technical Data

Measuring range	**Type of connection mV:** pH 0.00 … 14.00 ORP - 1,000 … +1,000 mV **Type of connection mA:** Chlorine: 0.00...0.500/2.00/5.00/10.0/20.0/50.0/100.0 ppm Chlorine dioxide: 0.00...0.500/2.00/10.0/20.0 ppm Chlorite: 0.02...0.50/0.1...2 ppm Bromine: 0.02...2.0/0.1...10.0 ppm Ozone: 0.00...2.00 ppm Hydrogen peroxide, PER1 sensor : 2.0...200.0/20...2,000 ppm Peracetic acid: 1...20/10...200/100...2,000 mg/l Dissolved oxygen: 0.1...10/0.1...20 ppm pH: 0.00...14.00 ORP: 0...+1,000 mV Conductivity: 0...20/200/1,000 mS/cm, via mA converter Temperature: 0...100 °C via mA converter
Resolution	pH: 0.01 pH ORP: 1 mV Amperometric (e. g. chlorine): 0.001/0.01 ppm, 0.01 vol.%
Accuracy	0.5% of the upper measuring range value
Measurement input	SN6 (input resistance > 0.5 x 10^{12} Ω)
Correction variable	Temperature via Pt 100/Pt 1000
Correction range temp.	0 … 100 °C
Control characteristic	P/PID control
Control	2-way control
Signal current output	1 x 0/4-20 mA galvanically isolated max. load 450 Ω Adjustable range and allocation (measured variable, correction variable, controlled variable)
Control outputs	2 pulse frequency outputs for metering pump actuation 2 relays (limit value or pulse length)
Alarm relay	250 V ~ 3 A, 700 VA changeover contact
Electrical connection	100 – 230 V, 50/60 Hz, 15 VA
Ambient temperature	-5 … 50 °C
Enclosure rating	Wall mounting: IP 65 Control panel version: IP 54
Dimensions	Wall mounting: 198 x 200 x 76 mm (WxHxD) Control panel version: 96 x 96 x 145 mm (WxHxD) (D1Cc)
Weight	0.8 kg

- Flexibly upgradable thanks to subsequent activation option for functions by means of activation code (see D1Ub/D1Uc upgrade identity code)
- Equipped for the most important basic requirements in water treatment
- Illuminated graphic display
- Operator guidance through clear text menu available in 20 languages in the controller
- Automatic buffer detection for pH calibration

D1Ub Identity Code Ordering System, Subsequent Function Upgrade for D1Cb see page → 2-24

A complete measurement station comes with:

- Measuring transducer/controller D1Cb/D1Cc (see Identity code)
- Fitting: DGMa..., DLG III ..., immersed fitting
- pH sensor (corresponding to Identity code)
- ORP sensor (corresponding to Identity code)
- Chlorine, chlorine dioxide, chlorite, bromine, dissolved oxygen sensor
- Transducer for pH or ORP (corresponding to Identity code)
- Sensor cable

Accessories for Controller DULCOMETER® D1Cb/D1Cc

	Order no.
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 - pre-assembled *	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled *	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 - pre-assembled *	1024107
SN6 coaxial connector, retrofit component, D1Cb, DAC, DCCa	1036885
Protective RC circuit, retrofit kit for D1Cb	1034238
Spare parts kits D1Cc (frame, support brackets)	790130

* For measured variable connection = 5

2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.2 Identity Code Ordering System DULCOMETER® D1Cb, Wall Mounting

D1Cb	Installation
W	Wall mounting (IP 65)
	Version
00	With ProMinent logo
	Power supply
6	90...253 V, 48/63 Hz (wide-range power supply)
	Approvals
01	CE approval
	Hardware add-on I
0	None
	Hardware add-on II
0	None
1	RC protection for power relays
	External connection
0	None
	Software defaults
U	Software default setting (all of the following selection options are automatically set to the default setting)
V	Software pre-set (the following selection options must be evaluated)
	Measured variable presetting
0	Universal (choice upon commissioning)
A	Peracetic acid
B	Bromine
C	Chlorine
D	Chlorine dioxide
F	Fluoride
H	Hydrogen peroxide (PER1)
I	Chlorite
P	pH
R	ORP
S	0/4...20 mA Standard signal, general
T	Temperature via mA transducer
X	Dissolved oxygen
Z	Ozone
L	Conductivity via mA transducer
	Connection of the measured variable (presetting)
1	mA terminal can be switched to mV, all measured variables selectable
2	SN6 plug for P or R or standard signal 0/4-20mA, all measured variables selectable
5	mV terminal can be switched to mA, all measured variables can be selected
	Correction variable
0	None
2	Temperature Pt 100/1000 via terminal (for pH and conductivity)
4	Manual temperature entry (for pH and conductivity)
	Control input
0	None
1	Pause control
	Signal output
0	None
1	1 Analogue signal output 0/4...20 mA
	Relay control
G	Alarm and 2 limit value relays or 2 timer relays
M	Alarm and 2 solenoid valve relays or 2 timer relays
	Pump control
0	None
2	2 pumps via pulse frequency
	Control characteristic
0	None
1	P-control
2	PID control

Language	
00	No default
DE	German
EN	English
ES	Spanish
SV	Swedish
PT	Portuguese
CN	Chinese
FR	French
CZ	Czech
JP	Japanese
KR	Korean
NO	Norwegian
NL	Dutch
PL	Polish
RU	Russian
TH	Thai
HU	Hungarian
IT	Italian
DK	Danish
FI	Finish
GR	Greek

2.2.3 Identity Code Ordering System DULCOMETER® D1Cc, Control Panel Mounting

D1Cc

Code	**Type of mounting**
D	Control panel installation (IP 54)

Code	**Design**
00	With ProMinent logo

Code	**Operating voltage**
6	90...253 V, 48/63 Hz (wide voltage power supply)

Code	**Certification**
01	CE approval

Code	**Hardware extension I**
0	None

Code	**Hardware extension II**
0	None

Code	**External connection**
0	None

Code	**Software default settings**
U	Software basic setting (all of the following selection options are automatically set to the basic setting)
V	Software pre-set (the following selection options must be evaluated)

Code	**Measured variable default setting**	Code	
0	Universal (choice upon commissioning)	P	pH
A	Peracetic acid	R	ORP
B	Bromine	S	0/4...20 mA standard signal, general
C	Chlorine	T	Temperature via mA transducer
D	Chlorine dioxide	X	Dissolved oxygen
F	Fluoride	Z	Ozone
H	Hydrogen peroxide (PER1)	L	Conductivity via mA transducer
I	Chlorite		

Code	**Measured variable connection (default setting)**
1	mA terminal can be switched to mV, all measured variables can be selected
5	mV terminal can be switched to mA, all measured variables can be selected

Code	**Correction variable**
0	None
2	Temperature Pt 100/1000 via terminal (for pH and conductivity)
4	Manual temperature input (for pH and conductivity)

Code	**Control input**
0	None
1	Pause control

Code	**Signal output**
0	None
1	1 analog signal output 0/4...20 mA

Code	**Power activation**
G	Alarm and 2 limit value relays or 2 timer relays
M	Alarm and 2 solenoid valve relays or 2 timer relays

Code	**Pump activation**
0	None
2	2 pumps via pulse frequency

Code	**Control characteristic**
0	None
1	Proportional control
2	PID control

Code	**Language**
00	No default setting
DE	German
EN	English
ES	Spanish
SV	Swedish
PT	Portuguese
CN	Chinese
FR	French
CZ	Czech
JP	Japanese
KR	Korean
NO	Norwegian
NL	Dutch
PL	Polish
RU	Russian
TH	Thai
HU	Hungarian
IT	Italian
DK	Danish
FI	Finish
GR	Greek

If software default setting **U** = software default setting is selected, the measured variables pH or ORP can be selected during commissioning. The menu language is automatically requested.

The connection of the measured variable is 5 = mV input for pH/ORP via shield clamp.

With all other options, the default settings (first option) are selected.

The controller with software with default settings can also be ordered with an order number.

	Order no.
Controller in basic setting D1CbW00601000U01000G0000	1036423

Subsequent activation of functions is possible at any time using an activation key.

This activation key can only be used with the controller with the specified serial number. The activation code can be provided by phone, fax or e-mail and can be simply entered into the control keyboard. The new function is then available and need only be enabled and parametrised.

The following information is essential to obtain the activation code:

- Serial number of the controller (refer to nameplate or operator menu under "General Settings and Information")
- Current identity code of the controller (refer to operator menu under "General Settings and Information"
- Required identity code

2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.4 D1Ub Identity Code Ordering System, Subsequent Function Upgrade for D1Cb

D1Ub	Software defaults										
		Software pre-set									
		Default - measured variable									
		0	Universal (choice of measured variable upon commissioning)								
			Connection of measured variable								
			1	Standard signal 0/4-20 mA, all measured variables and mV input for pH/ORP (standard)							
				Correction variable							
				0	None						
				2	Temperature Pt100/Pt1000 via terminal (for pH and conductivity)						
				4	Manual temperature entry (for pH and conductivity)						
					Control input						
					0	None					
					1	Pause control					
						Signal output					
						0	None				
						1	1 analogue signal output 0/4-20 mA				
							Power control				
							G	Alarm and 2 limit value relays or 2 timer relays			
							M	Alarm and 2 solenoid valve relays or 2 timer relays			
								Pump control			
								0	None		
								2	2 pumps via pulse frequency		
									Control modes		
									0	None	
									1	P control	
									2	PID control	
										Language	
										00	no default

2.2.5 D1Uc Identity Code Ordering System, Subsequent Function Upgrade for D1Cc

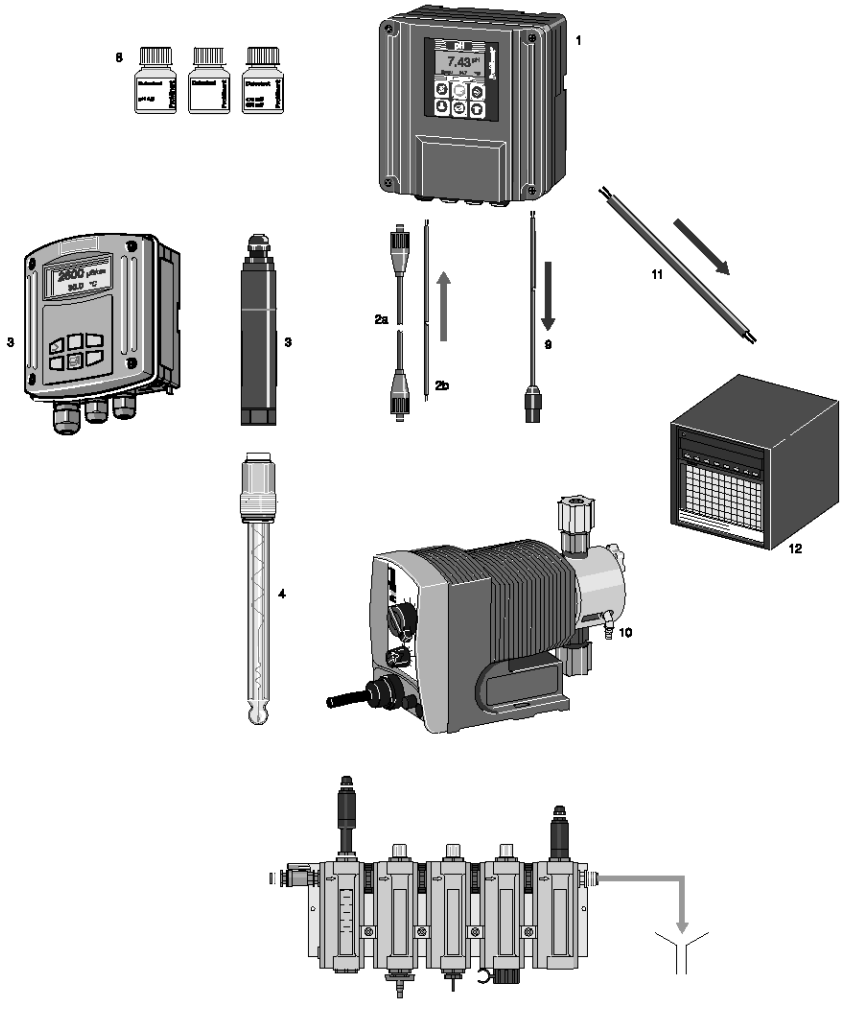
D1Uc	Software defaults										
		Software preset.									
		Default - measured variable									
		0	Universal (choice of measured variable upon commissioning).								
			Connection of measured variable								
			1	Standard signal 0/4-20 mA, all measured variables and mV input for pH/ORP (standard).							
				Correction variable							
				0	None.						
				2	Temperature Pt100/Pt1000 via terminal (for pH and conductivity).						
				4	Manual temperature input (for pH and conductivity).						
					Control input						
					0	None.					
					1	Pause control.					
						Signal output					
						0	None.				
						1	1 Analogue signal output 0/4-20 mA.				
							Power control				
							G	Alarm and 2 limit value relays or 2 timer relays.			
							M	Alarm and 2 solenoid valve relays or 2 timer relays.			
								Pump control			
								0	None.		
								2	2 pumps via pulse frequency.		
									Control modes		
									0	None.	
									1	Proportional control.	
									2	PID control.	
										Language	
										00	no default setting.

2.2.6 D1Cb and D1Cc Application and Ordering Examples

The application examples contain typical combinations of components for measuring stations in applications in the areas of swimming pool, drinking water, waste water and the food industry.

Components of a complete measuring and control system

1 Measuring and control device e.g. DACb
2a Measuring line e.g. coaxial cable for pH and ORP sensors, Pt 100/Pt 1000
2b Measuring line 2-core for amperometric sensors with mA signal and transducer
3 Transducer 4 ... 20 mA (for two wire system), DMTa or pH V1
4 Sensor, e.g. pH single-rod sensor
5 Fitting e.g. in-line probe housing type DGMA
6 Stopcock sample water line
7 Sampling tap
8 Buffer solutions (pH/ORP)
9 Signal cable (metering pump control)
10 Actuator e.g. Beta® metering pump



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Examples for:

1 Treatment of swimming pool water and decorative wells/fountains

2 Potable water monitoring

3 Treatment and monitoring of waste water (pH neutralisation)

4 Applications in the food industry

2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.7 Application Examples, Treatment of Swimming Pool Water

Private swimming pool with measurement and metering of acid and chlorine based on the ORP value

Tasks and applications

The pool water of a private outdoor swimming pool, used for only a short time every year, is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the ORP value (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor).

Type DF2a peristaltic pumps are to be controlled. The sample water flow is to be monitored and upon failure, the controller should stop.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, pH	→ 2-20	D1CBW00601010VP5010M21EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	1 channel controller D1Cb, ORP	→ 2-20	D1CBW00601010VR5010M21EN
1	ORP sensor RHES-Pt-SE	→ 1-68	150703
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa 320T000
4 m	Control line LiYY 2 x 0.25 mm^2 Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance in 20 languages
- Automatically correct pH value and correct disinfectant concentration
- All products are selected to operate correctly with each other

Private swimming pool with measurement and metering of acid and bromine

Tasks and applications

The pool water of a private outdoor swimming pool, used for only a short time every year, is to be treated. Sulphuric acid is used to correct the pH and bromine (BCDMH) is used as a disinfectant, that is dissolved and dosed via a bromine sluice. The disinfectant is to be regulated on the basis of a bromine measurement (a comparative calibration using a DPD 1 measuring unit should be carried out at regular intervals, likewise calibration of the pH sensor). The measured values are to be recorded. A DF2a peristaltic pump for pH correction and the solenoid valve of a bromine sluice are to be controlled. The sample water flow is to be monitored and upon failure, the controller should stop.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, pH	→ 2-20	D1CBW00601010VP5010M21EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	1 channel controller D1Cb, bromine	→ 2-20	D1CBW00601010VB1010M21EN
1	Bromine sensor BCR 1-mA-10 ppm	→ 1-26	1041698
2 m	Control line LiYY 2 x 0.25 mm^2 Ø 4 mm 2 m (e.g.: flow sensor)	→ 1-115	725122
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa311T000
4 m	Control line LiYY 2 x 0.25 mm^2 Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text, operator guidance in 20 languages, display of measured data
- Automatically correct pH value and correct disinfectant concentration
- All products are selected to operate correctly with each other

Private swimming pool with measurement of free chlorine and pH value

Tasks and applications

The pool water of a frequently-used private indoor swimming pool is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the chlorine concentration (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor). Beta® 4b metering pumps are to be controlled.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, pH	→ 2-20	D1CBW00601010VP5010M21EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	1 channel controller D1Cb, chlorine	→ 2-20	D1CBW00601010VC5010M21EN
1	Chlorine sensor CLE 3-mA 2 ppm	→ 1-7	792920
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm 2 m (e.g.: flow sensor)	→ 1-115	725122
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa311T000
4 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Automatically correct pH value and direct measurement and control of chlorine concentration
- All products are matched

Oxidation of well water with hydrogen peroxide

Tasks and applications

The water of a decorative well or fountain is to be disinfected/oxidised using hydrogen peroxide. The addition of hydrogen peroxide is to be measured. Metering is dependent on the measured value.

If with a control variable of 60% the setpoint is reached after 1 hour, then metering should enter the basic load settings and an alarm should be set (a calibration of the hydrogen peroxide sensor using a comparative measurement is required at regular intervals).

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, bromine	→ 2-20	D1CBW00601010VH1010M21EN
1	Hydrogen peroxide sensor PER 1-mA-2000 ppm	→ 1-42	1022510
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa311T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- If the setpoint has not been reached within 1 hour, the dosing monitor signals via the alarm relay and sets control to an adjustable basic load
- All products are matched

2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.8 Application Examples, Potable Water Monitoring

Waterworks with control measurement of chlorine

Tasks and applications

The chlorine concentration in the outlet of a water works is to be monitored. Metering is performed with the volume proportional to the water flow. A magnetic flow meter with a 4-20 mA output signal directly controls a metering pump.

If the setpoint is not reached for at least 5 minutes, then a limit value relay should switch and signal via a signal generator that the stroke length of the metering pump must be increased. Conversely, monitoring should also be performed to determine if too much chlorine has been dosed (calibration of the chlorine sensor should be performed at regular intervals by means of a DPD 1 comparative measurement).

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, chlorine	→ 2-20	D1CBW00601010VD1010G21EN
1	Chlorine sensor CLE 3-mA-0.5 ppm	→ 1-7	792927
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Signalling via a limit value relay if the setpoint has been reached after 5 minutes.
- All products are matched

Legionella prevention in public buildings

Tasks and applications

The chlorine dioxide and the chlorite concentration are to be monitored and recorded in the fresh water distribution system of a public building for the prevention of Legionella. Chlorite is a disinfection by-product of chlorine dioxide that arises if germs have been killed. The chlorite concentration is limited using a limit value of 0.2 mg/l.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, chlorine dioxide	→ 2-20	D1CBW00601010VD1010M21EN
1	Chlorine dioxide sensor CDE 2-mA-0.5 ppm	→ 1-30	792930
1 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm 2 m (e.g.: flow sensor)	→ 1-115	725122
1	1 channel controller D1Cb, chlorite	→ 2-20	D1CBW00601010VI1010M21EN
1	Chlorite sensor CLT 1-mA-0.5 ppm	→ 1-34	1021596
1 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm 2 m (e.g.: flow sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa302T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- Upon exceeding of the chlorite limit value, a limit value relay switches the chlorine dioxide off or to a basic load.
- All products are matched

Oxidation of well water with hydrogen peroxide

Tasks and applications

The water drawn from a deep well is to be oxidised using hydrogen peroxide. The addition of hydrogen peroxide is to be measured. Metering is dependent on the measured value.

If with a control variable of 60% the setpoint is reached after 1 hour, then metering should enter the basic load settings and an alarm should be set (a calibration of the hydrogen peroxide sensor using a comparative measurement is required at regular intervals).

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, hydrogen peroxide	→ 2-20	D1CBW00601010VH1010G21EN
1	Hydrogen peroxide sensor PER 1-mA-2000 ppm	→ 1-42	1022510
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Simple operation, controller with plain text operator guidance
- If the setpoint has not been reached within 1 hour, the dosing monitor signals via the alarm relay and sets control to an adjustable basic load
- All products are matched

2.2 Controller DULCOMETER® D1Cb/D1Cc

2.2.9 Application Examples, Waste Water Monitoring

Neutralisation of the waste water of an industrial plant

Tasks and applications

In an industrial plant, waste water arises in an intermittent manner (batch production), and can be acidic or alkaline. The water is collected in a storage tank. There is a stirrer in the storage tank, a pH immersion fitting with wet holding cup, based on which the pH value is adjusted. The discharge connecting piece, which can be closed off using a shut-off valve with a limit switch, of a storage tank contains a pH sensor with a pH changeover device, which is used for the final check.

If a limit value transgression occurs, the shut-off valve closes automatically. Additionally, a neutral zone is defined in the controller. If the pH value comes within this neutral zone, no control takes place. There may be solids in the waste water.

Components of the pH measuring/control station in the collection tank

Quantity		See page	Order no.
1	1 channel controller D1Cb, pH	→ 2-20	D1CBW00601010VP5010M21EN
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Pt 100 temperature sensor	→ 1-82	305063
1	Cable combination of control line 5 m SN6, open end (Pt 100, Pt 1000)	→ 1-114	1003208
1	Immersion fitting with 3 sensor slots IPHa 3-PP	→ 1-123	1008602
1	Cable combination coaxial 5 m - SN6 - pre-assembled	→ 1-123	1008633

Components of the measuring/control station in the outlet

Quantity		See page	Order no.
1	1 channel controller D1Cb, pH	→ 2-20	D1CBW00601010VP5010M21EN
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Retractable process assembly WA-PH 1	→ 1-128	1020631

Note: The use of other sensors is also possible depending on the quality of the waste water (see Selection Guide for pH Sensors DULCOTEST®→ 1-1)

With seriously contaminated waste water with solid matter content

Quantity	Name	See page	Order no.
1	pH sensor PHEX 112 SE	→ 1-53	305096

With clear waste water

Quantity	Name	See page	Order no.
1	pH sensor PHEP 112 SE	→ 1-49	150041

Benefits

- The waste water pH value is within the specified limit values
- Simple operation, controller with plain text operator guidance in 20 languages
- pH limit value monitoring of drainage water
- All products are selected to operate correctly with each other

2.2.10 Application Examples in the Food Industry

Bottler disinfection in the beverage industry

Tasks and applications

Continuous disinfection of the filler with disinfection solution means this sensitive part of the bottling process is reliably sterilised. Continuous spraying with disinfectant solution means high hygiene requirements are fulfilled.

The disinfectant solution comprises water with additional chlorine dioxide. The concentration of the chlorine dioxide is measured and set to the desired value using the D1Cb controller.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, chlorine	→ 2-20	D1CBW00601010VD1010G21EN
1	Chlorine dioxide sensor CDR 1-mA-2 ppm	→ 1-32	1033393
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Hygienic trouble-free bottling
- Simple operation, controller with plain text operator guidance in 22 languages
- All products are matched

Irrigation water disinfection for useful plants

Tasks and applications

The irrigation water from e.g. salad seedlings is drawn from a well. The water could be contaminated with germs which could harm the salad seedlings. To prevent this, the irrigation water is disinfected using chlorine dioxide. The irrigation water requirement is always constant.

The irrigation water may contain suspended matter.

Components of the measuring/control station

Quantity		See page	Order no.
1	1 channel controller D1Cb, chlorine	→ 2-20	D1CBW00601010VD1010G21EN
1	Chlorine dioxide sensor CDR 1-mA-2 ppm	→ 1-32	1033393
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa301T000
5 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

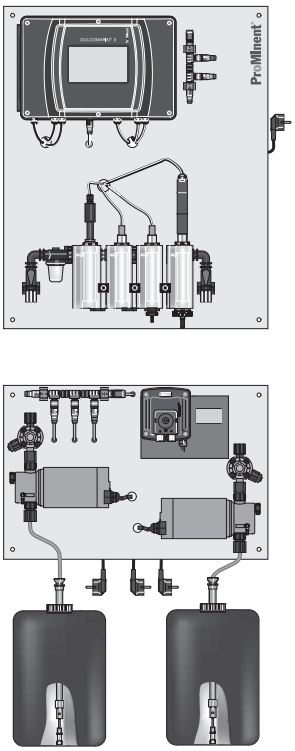
- Irrigation water does not harm the seedlings
- Simple operation, controller with plain text operator guidance in 20 languages
- Switchover of control parameters via an external potential-free contact
- All products are selected to operate correctly with each other

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

2.3.1 Measuring and control system DULCOMARIN® 3

New features and functions – a major step for the DULCOMARIN®. A gigantic step for your pool system.

The measuring and control system DULCOMARIN® 3 is your digital link to the technology of the future. It controls the entire range of swimming pools – from adventure pools to private pools. The system is operated using the large 7" touch display.



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The measuring and control system DULCOMARIN® 3 is a reliable system for the treatment of swimming pool water.

The intuitive menu guidance is also supported by videos. It shows step-by-step calibration of the sensors.

It is operated using the system's touch display. You can also operate the DULCOMARIN® 3 remotely online. You are therefore connected to your DULCOMARIN® 3 using your smartphone or any other internet-compatible end device (VNC app needed). You can therefore also control other features, lighting, circulating pumps and filter backwash. The system can be extended at any time to meet future requirements.

The circulation capacity of the pumps adapts to the water quality in Eco! operating mode. Chemicals are metered precisely according to demand based on measured values, reducing ongoing energy costs and saving chemicals.

The DULCOMARIN® 3 Global Unit is the central element of the measuring and control system. All the information relating to the individual pools and associated control circuits is collated here. Use the DULCOMARIN® 3 Compact version for one filtration circuit, and the Global Unit, which can display up to 16 Local Units for multi-pool systems with up to 16 filtration circuits. Networking is provided by the LAN-based cNet.

The DULCOMARIN® 3 can be connected as standard via Modbus RTU and corresponding gateways to a PLC or building bus system.

Availability:

- DULCOMARIN® 3 Compact Unit for the control of one filtration circuit
- DULCOMARIN® 3 Multipool Global Unit with up to 16 Local Units for the control of up to 16 filtration circuits

- By the end of the 2nd quarter of 2020 functional module (F-module)
- By the end of the 3rd quarter of 2020 OPC-UA, web interface and connection to DULCOnneX

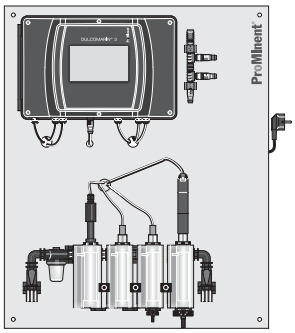
The DULCOMARIN® 3 includes Open Source Software (OSS). We are obliged by the LINUX Foundation to publish the associated contractual working and source codes. You can access this data by copying the following link into your browser's address bar and pressing enter: https://www.prominent.com/oss

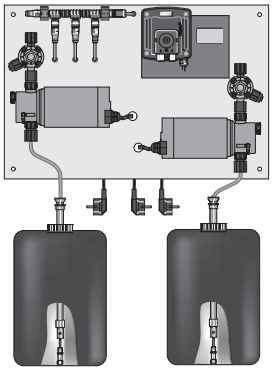
The data does not represent executable files. It is only published to fulfil our obligation.

Your benefits

- Energy- and cost-efficient control of your swimming pool
- The DULCOMARIN® 3 can be accessed from every internet-compatible device (VNC app needed)
- Simple calibration of the sensors with video support
- Status messages and alarm by e-mail
- View and assess the time-based course of the measured values of all pools on the built-in screen writer
- Simple, unrestricted LAN connection – like in your home network
- Subsequent extendibility by means of the ProMinent internal cNet bus system
- Intelligent chlorine sensors: save the sensor data and are always in the optimum measuring range with auto-ranging
- Intelligent metering pumps: provide information on operating parameters, such as chemical level statuses and pump capacity, within the range of 0.7 l/h to 1,000 l/h
- Connection to a PLC or building control system via Modbus RTU and gateways with other fieldbus systems.
- View measured data directly on the controller: as enabled by the integral screen recorder with data logger via USB

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools





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Technical Details

- Measured variables: pH, ORP, free chlorine, total chlorine, combined chlorine and temperature
- Precision: 0.3 % of the measuring range limit value
- Control characteristic: P/PI/PID control
- Digital inputs: 8 potential-free control inputs e.g. for measured water errors, pause, control, parameter switch-over
- Modular ports: 4 to accommodate 2-channel I/O modules in each, selectable via identity code and retrofittable
- Pump relay (pulse frequency): 4
- Output relay: 3 potential-free changeover contacts, 3 changeover contacts supplied, voltage-switching
- All output relays can be replaced
- Signal current output: via 2-channel I/O modules 2 x 0/4-20 mA or 4 x 0/4-20 mA
- Interfaces: USB, LAN (Ethernet), Wi-Fi (WLAN)
- Supply voltage: 100 – 230 V, 50/60 Hz, optional 24 V DC

Field of application

- Control and regulation of the entire range of swimming pools
- Water parks
- Public swimming pools
- High-end private pools

The applications are defined in the identity code

Every filtration circuit has a proprietary on-site calibration option for all measured variables.

What is Eco!Mode operating mode?

Eco!Mode permits the circulation capacity to be lowered when the DIN hygiene parameters pH, ORP, free and combined chlorine are within the permitted limits.

A circulating pump with frequency converter with analogue input is needed for this.

The reduction can be activated via a remote control, dependent on the DIN hygiene parameters being observed, the time and appropriate activation. A combination of criteria is also possible. If the DIN hygiene parameters are no longer adhered to, then the circulation capacity is again raised to the nominal power.

Lowering the pump capacity saves energy and, in so doing, reduces CO_2 emissions.

If the DIN hygiene parameters are no longer adhered to, then chlorine metering is again increased to the normal setpoint.

What is a VNC viewer?

VNC stands for Virtual Network Computing and is the remote control of the DULCOMARIN® 3 controller via a PC with Windows operating system, tablet/smartphone with Android or IOS

The remote control sees what the local operator is operating and vice versa. This means that help and support can be easily provided remotely. The DULCOMARIN® 3 needs to be accessible via the internet.

VNC programs are available to download

in app stores provided by the above mentioned operating system providers e.g.:

https://www.realvnc.com/de/connect/download/vnc/

What is cNet?

The cNet is a LAN-based, ProMinent-specific network, which connects a Global Unit and up to 16 Local Units. The cNet may not be connected to an existing LAN network. You need 1 LAN connecting cable M12 - RJ45, 5.0 m or 10.0 m, and 1 LAN coupling IP 68 per unit for cNet connectivity. All other LAN connections are provided by conventional commercially available LAN cables and LAN switches. One LAN switch is needed per 100 metres.

One Global Unit and 4 Local Units can be connected to the 5-port LAN switch offered.

Compliance of all units with CANopen specifications:

On the hardware side, all units comply with the harmonised CAN specification 2.0 (ISO99 – 1, ISO99 – 2). This includes the CAN protocol (ISO 11898 – 1) and details on the physical layer in compliance with ISO 11898 – 2 (high speed CAN up to 1 Mbit/sec) and ISO 11898 – 3 (low speed CAN up to 125 kBit/sec). The device complies with the CAN-Open specification CIA-DS401 that forms the basis of the European standard EN50325 – 4. It also complies with the controller device profile CiA-404.

DULCOnneX

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

Accessories for the DULCOMARIN® 3 measuring and control system

General accessories

	Order no.
PHES-112-SE SLg100	1051745
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 - pre-assembled	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 - pre-assembled	1024107
Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122

Accessories for CANbus cabling

	Order no.
T-distributor M12 5 pole CAN	1022155
Termination resistor M12 plug	1022592
Connecting cable - CAN M12 5 pole 0.3 m	1024568
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 M12 5-pin. 10 m	1046383
Connecting cable - CAN M12 5-pole 25 m	1055588
Connecting cable - CAN M12 5-pole 50 m	1055589

Accessories for LAN and cNet cabling

	Order no.
Connecting cable LAN M12 - RJ45 5.0 m	1026715
Connecting cable LAN M12 - RJ45 10.0 m	1026716
Cross-over patch cable 2x RJ45 connector 5 m	1027859
LAN coupling IP 68	1104183
Industrial 5-port LAN switch (for one Global Unit and 4 Local Units)	734799
Plug power unit 24 VDC for LAN switch	1083061

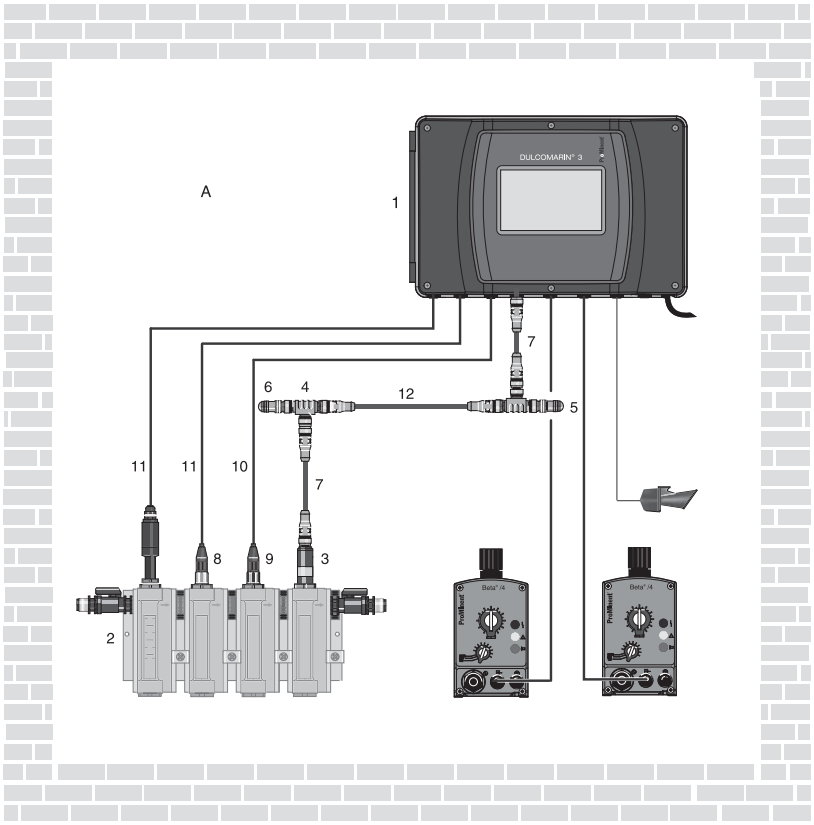
Important:
Do not allow the maximum CAN bus length (excluding branch cables) to exceed 400 m!
The length of the LAN cable between the DULCOMARIN® 3 and a LAN switch is a maximum of 100 m. Then a LAN switch needs to be refitted. There is no limit to the length of the cable if this rule is observed.

2.3.2 Configuration examples for the measuring and control system DULCOMARIN® 3

Configuration example: 1-pool system

The specific example of a measuring and control system for pH, ORP, free chlorine and temperature for a filter circuit consists of the following components (without metering technology):

A Plant room



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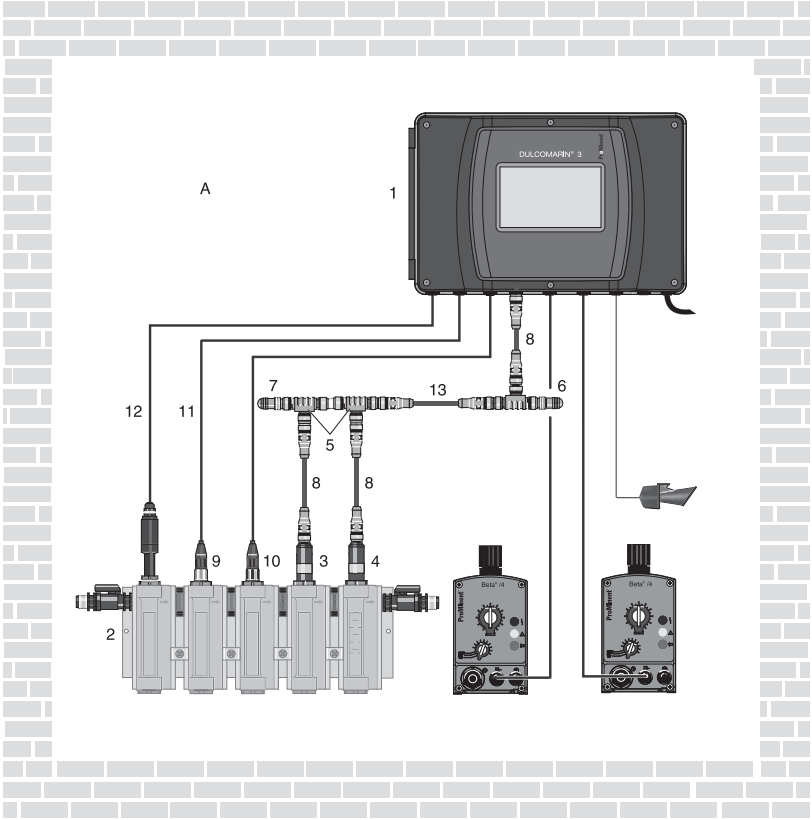
Item	Quantity	Name	Order no.
1	1	DULCOMARIN® 3 Compact for 1 pool	DCPAEUWPMA6L001XXEN01
2	1	DULCOTEST® in-line probe housing DGMa 3 2 1 T 0 0 0	–
3	1	Chlorine sensor CLE 3-CAN-P-10 ppm	1083209
4	3	T-distributor M12 5 pol. CAN	Included in delivery
5	1	Temination resistance M12 connector	Included in delivery
6	1	Temination resistance M12 plug	Included in delivery
7	3	Connection cable - CAN M12 5 way 0.5 m	Included in delivery
8	1	PHES-112-SE SLg100	1051745
9	1	RHES-Pt-SE SLg100	1051746
10	2	Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled	1024106
–	–	Connecting cable - CAN M12 5-pole 25 m	1055588
–	–	Connecting cable - CAN M12 5-pole 50 m	1055589
11	2 m	Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122
12	–	Connecting cable - CAN, sold by the metre	1022160

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

Configuration example: 1-pool system

The specific example of a measuring and control system for pH, ORP, free and combined chlorine and temperature for a filter circuit consists of the following components (without metering technology):

A Plant room



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Item	Quantity	Name	Order no.
1	1	DULCOMARIN® 3 Compact for 1 pool	DCPAEUWPMA6L001XXEN01
2	1	DULCOTEST® in-line probe housingDGMa 3 2 2 T 0 0 0	–
3	1	Chlorine sensor CTE 1-CAN-P-10 ppm	1083210
4	1	Chlorine sensor CGE 3-CAN-P-10 ppm	1083211
5	3	T-distributors M12 5 pole CAN	Included in delivery
6	1	Load resistor M12-coupler	Included in delivery
7	1	Load resistor M12-plug	Included in delivery
8	3	Connecting cable - CAN M12 5 pole 0.5 m	Included in delivery
9	1	PHES-112-SE SLg100	1051745
10	1	RHES-Pt-SE SLg100	1051746
11	2	Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled	1024106
–	–	Connecting cable - CAN M12 5-pole 25 m	1055588
–	–	Connecting cable - CAN M12 5-pole 50 m	1055589
12	2 m	Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122
13	1	CAN Connection cable	As required

Configuration example: Multipool system

The Multipool system differs only by the identity code of the controllers:

The Global Unit (there needs to be one and there may only be one).

The Global Unit itself can control a filtration circuit or act as a pure operating unit in the pool caretaker's office:

Example:

Global Unit with measuring and control function for one filtration circuit:

DCPAEUWPMGA6W100001XXDE01

Global Unit in the pool caretaker's office, without measuring and control function:

DCPAEUWPMGA6W000001XXDE01

Local Unit: there can be up to 16, but it does not support Wi-Fi:

DCPAEUWPMHA60100001XXDE01

The following is needed to network the controllers to each other:

	Order no.
Connecting cable LAN M12 - RJ45 5.0 m	1026715
LAN coupling IP 68	1104183
Industrial 5-port LAN switch (for one Global Unit and 4 Local Units)	734799
Plug power unit 24 VDC for LAN switch	1083061

To be provided by the customer

- Specification for the LAN switch
- Network switch 100 to 2000 MBit/s, screened RJ-45 ports, metal housing, optimised for data traffic, e.g. TP-Link TL-SG108 V3 8
- Specification for the LAN cable
- CAT 5 or higher specification, at least 100 Mbit/s data rate
- Maximum length to LAN switch: 100 m
- You can opt for a fibreglass connection with longer lengths

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

The DULCOMARIN® 3 Compact and Multipool systems differ only by the identity code of the controllers.

What is a DULCOMARIN® 3 Compact Unit?

DULCOMARIN® 3 Compact Unit is intended for the control of a filter circuit.

It can measure and regulate the measured variables pH, ORP, free chlorine, combined chlorine, total available chlorine and temperature.

The controller is usually installed in the plant room. Full operation can be performed using a PC with VNC viewer , located in the pool caretaker's office to ensure that you keep an eye on all values. The connection is either via the standard LAN or optional Wi-Fi. Conventional LAN-Office components can be used. A VNC viewer needs to be installed on the terminal device for this (e.g. PC).

A LAN connecting cable M12 - RJ45 is needed to connect to a LAN network or PC.

A DULCOMARIN® 3 Compact Unit with software version 01.00.04.00 or later can be converted once to a Multipool Local Unit.

What is a DULCOMARIN® 3 Multipool Global Unit?

A DULCOMARIN® 3 Multipool system consists of a Global Unit with a 7" touch display. It is, as it were, the central control unit via which all controllers of all pools, the Local Units, can be fully controlled. There needs to be one installed in each system and there may only be one. It can control a filtration circuit or act as a pure operating unit in the pool caretaker's office.

If the Global Unit itself controls a filtration circuit, i.e. it is located in the plant room, then full operation can be performed via a PC or tablet PC with a VNC viewer located in the caretaker's office. The connection is either via the standard LAN or optional Wi-Fi. Conventional LAN-Office components can be used. A VNC viewer needs to be installed on the terminal device for this (e.g. PC).

A LAN connecting cable M12 - RJ45 is needed to connect to a LAN network or PC.

The Global Unit can also optionally be equipped with Wi-Fi. Full operability is also possible via VNC this way.

A ProMinent-specific LAN-based cNet connector is available for connecting to the Local Units. A LAN M12 - RJ45 connecting cable is needed for this. The cNet may not be connected to existing LAN networks.

What is a DULCOMARIN® 3 Multipool Local Unit?

A DULCOMARIN® 3 Multipool system can control up to 16 filter circuits, e.g. 16 Local Units with a 7" touch display are needed. The controller is used to operate the local pool. Every Local Unit controls a filtration circuit. They are connected to the Global Unit via cNet.

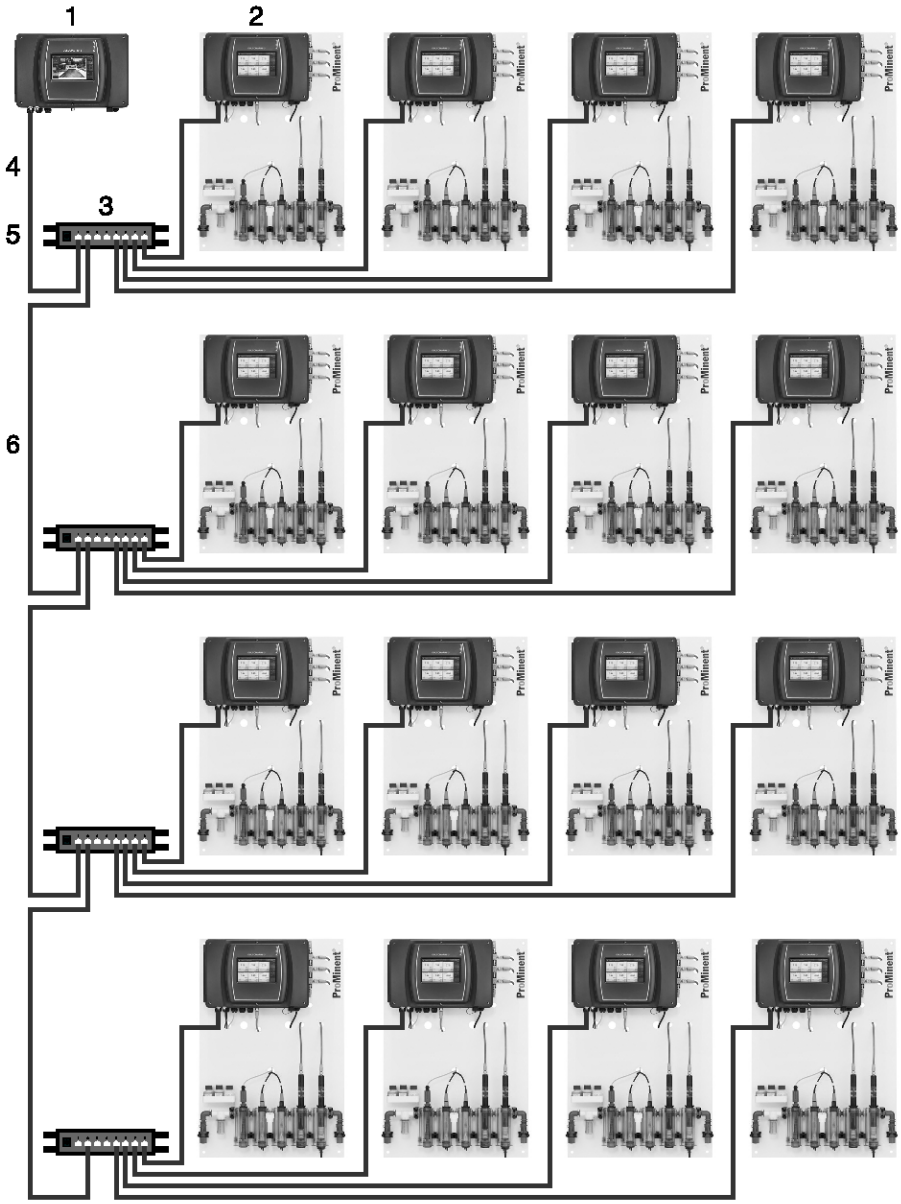
A LAN M12 - RJ45 connecting cable and a LAN coupling IP 68 are needed for this.

Conventional LAN cables and LAN switches can be used for the connection from the LAN coupling onwards.

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

Configuration example: Multipool system

1	Global Unit
2	up to 16 Local Units
3	LAN switch, e.g. TP-Link 8 Port Switch
4	Connecting cable LAN M12 - RJ45 5.0 m
5	LAN coupling IP68
6	Customer's LAN cable, up to 100 m in length



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Configuration example: Multipool system

Example

Global Unit as a single unit with measuring and control function for one filter circuit:

Identity code: DCPAEUWPM **GA** 6W **1** 00001XXDE01

Or as a ready mounted measuring and control station with sensors and optional metering pumps:

Identity code: DSPAPD80 **GW** A00D000010

Global Unit in the pool caretaker's office, without measuring and control function:

Identity code: DCPAEUWPM **GA** 6W **0** 00001XXDE01

Local Unit: there can be up to 16, but it does not support Wi-Fi:

Identity code: DCPAEUWPMHA60100001XXDE01

Or as a ready mounted measuring and control station with sensors and optional metering pumps:

Identity code: DSPAPD80 **H0** A00D000010

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

The following components are needed to network the controllers to each other

Connecting cable LAN M12 - RJ45 5.0 m 1026715

LAN coupling IP 68 104183

Industrial 5-port LAN switch (for one Global Unit and 4 Local Units) 734799

Plug power unit 24 VDC for LAN switch 1083061

Technical specifications if the customer is providing

LAN switches

Network switch 100 to 2,000 MBit/s, screened RJ-45 ports, metal housing, optimised for data traffic, e.g. TP-Link TL-SG108 V3 8

LAN cable

CAT 5 or higher specification, at least 100 Mbit/s data rate

Maximum length to LAN switch: 100 m

You can opt for a conventional fibreglass connection with longer lengths

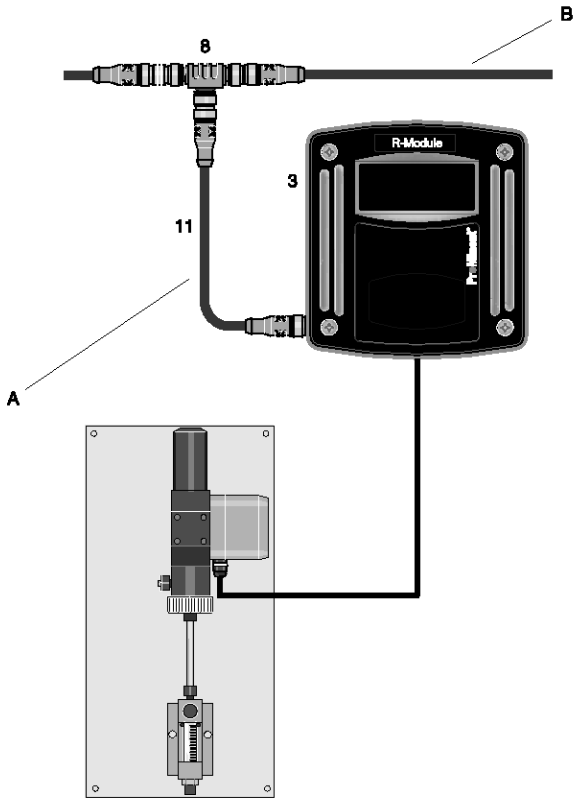
2.3.3 Identity code ordering system for DULCOMARIN® 3

DCPa	Regional design														
	EU	Europe (Standard)													
		Mounting type													
		W	Wall-mounting												
			Design												
			PM	ProMinent											
				Function											
				X	Compact Unit, 1 filter circuit										
				G	Multipool, Global Unit, cNet, there needs to be one global unit in a system										
				H	Multipool, Local Unit, cNet, there can be up to 16 local units										
					Application										
					A	7" touch operation									
						Supply voltage									
						4	24 V DC								
						6	100... 230 V, 50-60 Hz								
							Communication								
							X	LAN with web interface (please order LAN cable separately)							
							W	WLAN with VNC server							
								Module slot 1							
								0	No module						
								1	Module 2 x mV/temperature (inputs pH/ORP)						
									Module slot 2						
									0	No module					
									4	Module 2 x mA outputs (measured value/control)					
										Module slot 3					
										0	No module				
										4	Module 2 x mA outputs (measured value/control)				
											Expansion level 4 / module slot 4				
											0	No module			
											4	Module 2 x mA outputs (measured value/control)			
												Software packages			
												01	P1 standard with VNC, email, data logger, etc.		
													Smart Control		
													XX	None	
														Operating Instructions	
														XX	None
														DE	German
														EN	English
														FR	French
														ES	Spanish
														IT	Italian
														BG	Bulgarian
														CN	Chinese
														CZ	Czech
														DK	Danish
														EE	Estonian
														FI	Finnish
														GR	Greek
														HU	Hungarian
														JP	Japanese
														KR	Korean
														LT	Lithuanian
														LV	Latvian
														NL	Dutch
														PL	Polish
														PT	Portuguese
														RO	Romanian
														SE	Swedish
														SK	Slovakian
														SL	Slovenian
														RU	Russian
														TH	Thai
														TR	Turkish
															Approvals
															01

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

2.3.4 Control Module for Chlorine Gas Metering Devices (R module)

A Stub cable
B Main BUS cable



pk_5_043_C

The R module permits the control of chlorine gas metering units equipped with a position feedback potentiometer.

It includes 2 power relays for opening and closing and an input for a position feedback potentiometer 1 ... 10 kΩ

The R module is connected to other units via the main bus train.

The T-distributor and 0.5 m CAN connecting cable included in the scope of delivery are used for this connection.

The R module in the above example consists of the following components (without the chlorine gas metering device):

Item	Quantity	Name	Order no.
3	1	R module DXMa R W 2 0 00 01	–
8	1	T-distributor M12 5 pol. CAN	Included in delivery
11	1	Connection cable - CAN M12 5 way 0.5 m	Included in delivery

Our Sales department would be glad to assist with any questions you may have.

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

2.3.5 Chlorine sensors for DULCOMARIN® II and 3

The technical data for the sensors can be found in the chapters indicated.

Sensor type	Measured variable	Determining combined chlorine	Compatible with contamination	Compatible with chlorine electrolysis	Compatible with trichloroiso-cyanuric acid	Chapter
CLE 3-CAN-P-10 ppm (order no.: 1083209)	Free chlorine	No	Limited suitability	Yes	No	1.1:3
CBR 1-CAN-P-10 ppm (order no.: 1083135)	Free chlorine	Yes, with CTE 1-CAN-P-10 ppm, order no. 1083210	Suitable for higher loads, surfactants	No	No	1.1:3
CLO 1-CAN-P-10 ppm (order no.: 1083134)	Free chlorine	No	Tolerance against biofilm formation with hydrodynamic cleaning	Yes		1.1:5
CTE 1-CAN-P-10 ppm (order no.: 1083210)	Total chlorine	Yes, with CBR 1-CAN-P-10 ppm, order no. 1083135	Suitable for higher loads, surfactants	No	No	1.1:4
CGE 3-CAN-P-10 ppm (order no. 1083211)	Total available chlorine	Yes, with CTE 1-CANP-10 ppm, order no. 1083210	Suitable for higher loads, surfactants	Yes	Yes	1.1:3

2.3 Measuring and control system DULCOMARIN® 3 for water treatment in public swimming pools

2.3.6 DULCOnneX – digital fluid management

Location-independent system monitoring in real time

You always have all the key data and measured values in sight at all times with DULCOnneX. Monitor and document the status of your system in real time. Check your unit data, regardless of where you are, safely and reliably when you're out and about. Simply use the terminal device of your choice: smartphone, tablet or PC.

Refer to our catalogue or website for more information and references.

2.3.7 Accessories for the DULCOMARIN® measuring and control system

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UR5i v2Libratum UMTS - VPN 3G mobile wireless router

You can connect to your DULCOMARIN® 2 and 3, AEGIS II and SlimFLEX 5a using the mobile communications router UR5i via UMTS/HSPA+ irrespective of the distance. Mobile Ethernet makes it possible to use the available infrastructure for location-independent Ethernet communication. UMTS/ HSPA+ technology can be used for data transfer. Stable and permanent connections are monitored and maintained through continuous control. An integrated DHCP server makes simple installation and fast internet access possible. The ideal device for alarm signalling, remote maintenance and remote service.

Important for operation of the mobile communications router:

- The products do not include a mobile communications data contract, which has to be concluded separately with a mobile communications provider.
- Please check in advance the network coverage of your mobile communications provider.
- Make sure that the installation can be installed in a place where the signal received has sufficient strength and there is also a power supply.

Scope of delivery: Router, CD, patch cable, magnetic foot aerial, plug-in power pack.

Technical Details

- UMTS/HSPA+ Tri-Band
- max. download 14.4 Mbit/s, max. upload 5.7 Mbit/s
- Frequency bands:
  GSM/GPRS/EDGE: 850/900/1800/1900 MHz
  UMTS: 850/900/1900/2100 MHz
- VPN client for encrypted connection to the central unit:
  IPSec Client/Server
  OpenVPN Client/Server
  L2TP
  PPTP
- External GSM aerial (SMA - 50 Ohm)
- Power supply: 9-36 V DC
- Working temperature range: -40°C to +75°C
- Degree of protection: IP30
- 2x Ethernet 10/100
- 2 SIM card slots
- Weight: 150 g
- Dimensions: 51 x 87 x 116 mm
- Mounting: DIN top hat rail 35 mm

	Order no.
UR5i v2Libratum UMTS - VPN 3G mobile wireless router	1047329

2.4.1 Controller DULCOMETER® Compact

Compact yet fully equipped - the basic water analysis unit

As a controller in water analysis, the DULCOMETER® Compact is the correct controller for control tasks that require only a 1 way control.

The DULCOMETER® Compact controller is a one-channel PID controller for the measured variables pH, ORP, chlorine and inductive conductivity. It can monodirectionally control the measured variable, monitor limit values and transmit the measured value via an mA output, e.g. to a PLC. The mA output can optionally also be configured as a controlled variable output. The controller has one pulse frequency output to control one metering pump. One output relay can optionally be used as an alarm or limit value or to control motor-driven metering pumps or solenoid valves. A digital input is used to switch off the control or to process a sample water limit contact by remote control. The impact of temperature on the measurements can be provided by temperature measurement or by manual input. Menu-driven operation is language-independent.

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Your benefits

- Flexibility in the choice of measured variable with pH and ORP
- Always the optimum measured value resolution by auto-ranging with conductivity measurement
- Depending on the requirement, various display options for conductivity, such as: Conductivity, TDS (Total Dissolved Solids), salinity and specific resistance
- Safety through sensor monitoring of pH for glass breakage and line breakage
- Various installation options: wall-mounted, installation on an upright or in a control cabinet

Technical Details

- Measured variables: pH, ORP, chlorine, conductive and inductive conductivity
- Method of installation, degree of protection: Combination housing (wall mounting, control panel mounting, pillar assembly) IP 67, control panel IP 54
- Measurement: 1 measuring channel, temperature compensation for conductivity and pH
- Control: PID controller, monodirectional controller (e.g. with pH acid or alkali)
- Control inputs: 1 digital control input

Field of application

- Measurement and control of water parameters in industrial and process water treatment plants
- Permeate monitoring in reverse osmosis systems
- Measurement and control of the hygiene parameters in swimming pools

Technical Data

Measuring range	pH: 0 ... 14 ORP: -1000 ... +1000 mV Chlorine: 0.05 ... 5 ppm, intermittent metering up to 10 ppm, max. 12 h Conductive conductivity: 0.5 µS/cm ... 20 mS/cm (auto-ranging) Inductive conductivity with ICT 1: 200 µS/cm ... 1000 mS/cm (auto-ranging) Inductive conductivity with ICT 2: 20 µS/cm ... 2000 mS/cm (auto-ranging) Inductive conductivity with ICT 5: 200 µS/cm ... 2000 mS/cm (auto-ranging)
Resolution	pH: 0.01 pH ORP: 1 mV Chlorine: 0.01 ppm Conductivity: 0.1 µS/cm (depends on the measuring range)
Accuracy	0.5% of the upper range value
Temperature compensation range	0 ... 120 °C, chlorine 1 ... 45 °C
Control	Monodirectional PID control with selectable control direction
Inputs	Sensor input for the relevant measured variable Temperature sensor input: pH: Pt 1000, chlorine and conductivity: Pt 100/ Pt 1000 1 digital input as a remote control input for the functions pause control / sample water fault
Outputs	1 pulse frequency output for the control of metering pumps 1 active 0/4…20 mA output configurable as a measured or control variable, max. load: 400 Ω 1 output relay used as a changeover contact, can be configured as an alarm, limit value or pulse width-modulated control output for motor-driven metering pumps

2.4 Controller DULCOMETER® Compact

Cell constant, conductive conductivity	0.05 ... 12.0 cm^{-1}
Voltage supply	100 ... 230 V, 50/60 Hz, 5 W
Permissible operating temperature	-10 ... +60 °C
Enclosure rating	IP 67, based on NEMA 4 X Indoor
Dimensions	135 x 125 x 75 mm (H x W x D)
Weight	0.5 kg

2.4 Controller DULCOMETER® Compact

2.4.2 Identity code ordering system for DULCOMETER® Compact

DCCa	Type of mounting								
	W	Wall/pipe mounting IP 67							
	S	With fitting kit for control panel mounting IP 54							
		Design							
		00	With ProMinent® logo						
			Operating voltage						
			6	90 … 253 V, 48/63 Hz					
				Measured variable					
				C0	Free chlorine				
				PR	pH/ORP (switchable)				
				L3	Conductive conductivity (unit designation: COND_C)				
				L6	Inductive conductivity (unit designation: COND_I)				
					Hardware extension				
					0	None			
					2	SN 6 input for pH/ORP			
						Certifications			
						01	CE (Standard)		
							Certificates		
							0	None	
								Documentation language	
								DE	German
								EN	English
								ES	Spanish
								IT	Italian
								FR	French
								FI	Finnish
								BG	Bulgarian
								CN	Chinese
								CZ	Czech
								GR	Greek
								HU	Hungarian
								JP	Japanese
								KR	Korean
								LT	Lithuanian
								LV	Latvian
								NL	Dutch
								PL	Polish
								PT	Portuguese
								RO	Romanian
								RU	Russian
								SE	Swedish
								SK	Slovakian
								SI	Slovenian
								SV	Swedish
								TH	Thai

Accessories

	Order no.
Cable combination, coaxial, Ø 5 mm 0.8 m - SN6 - pre-assembled *	1024105
Cable combination, coaxial, Ø 5 mm 2 m - SN6 - pre-assembled *	1024106
Cable combination, coaxial, Ø 5 mm 5 m - SN6 - pre-assembled *	1024107
Assembly set for installation in control cabinet	1037273
Chlorine sensor CLB 2-µA-5 ppm	1038902
Chlorine sensor CLB 3-µA-5 ppm	1041696
SN6 coaxial connector, retrofit component, D1Cb, DAC, DCCa	1036885

2.4 Controller DULCOMETER® Compact

2.4.3 Application and Ordering Examples for the DULCOMETER® Compact

The application examples contain typical combinations of components for measuring stations in applications in the areas of swimming pool, drinking water and waste water.

Components of a complete measuring and control system

1 Treatment of swimming pool water and decorative wells/fountains

2 Potable water monitoring

3 Treatment and monitoring of waste water (pH neutralisation)

2.4.4 Application Examples, Treatment of Swimming Pool Water

Private swimming pool with measurement and metering of acid and chlorine based on the ORP value

Tasks and applications

The pool water of a private outdoor swimming pool, used for only a short time every year, is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the ORP value (a comparative check with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor).

Type DF2a peristaltic pumps are to be controlled. The sample water flow is to be monitored and upon failure, the controller should stop.

Components of the measuring/control station

Quantity		See page	Order no.
1	Compact controller for pH	→ 2-46	DCCaW006PR0010EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Cable combination coaxial 2 m-SN6 Ø 5 mm, pre-assembled	→ 1-113	1024106
1	Compact controller for ORP	→ 2-46	DCCaW006PR0010EN
1	ORP sensor RHES-Pt-SE	→ 1-68	150703
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa 320T000
4 m	Control line LiYY 2 x 0.25 mm^2 Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Operation is simple and independent of the operating language
- Automatically correct pH value and correct concentration of disinfectant
- All products are matched

Private swimming pool with measurement of free chlorine and pH value

Tasks and applications

The pool water of a frequently-used private indoor swimming pool is to be treated. Sulphuric acid is used to correct the pH and sodium-calcium hypochlorite is used as a disinfectant. The disinfectant is to be regulated on the basis of the chlorine concentration (a comparative calibration with a DPD 1 measurement should be carried out at regular intervals, likewise calibration of the pH sensor). Beta® 4b metering pumps are to be controlled.

Components of the measuring/control station

Quantity		See page	Order no.
1	Compact controller for pH	→ 2-46	DCCaW006PR0010EN
1	pH sensor PHES 112 SE	→ 1-47	150702
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	Compact controller for chlorine	→ 2-46	DCCaW006C00010EN
1	CLB 2-µA-5 ppm	→ 1-15	1038902
1	In-line probe housing DGMa with sample water scale and limit switch	→ 1-120	DGMa 320T000
4 m	Control line LiYY 2 x 0.25 mm^2 Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Operation is simple and independent of the operating language
- Automatically correct pH value and direct measurement and control of chlorine concentration
- All products are matched

2.4 Controller DULCOMETER® Compact

2.4.5 Application Examples, Potable Water Monitoring

Waterworks with control measurement of chlorine and pH

Tasks and applications

The chlorine concentration in the outlet of a water works is to be monitored. Metering is performed with the volume proportional to the water flow. A magnetically induced flow meter with a 4-20 mA output signal directly controls a metering pump.

If the setpoint is not reached for at least 5 minutes, then a limit value relay should switch and signal via a signal generator that the stroke length of the metering pump must be increased. Conversely, monitoring should also be performed to determine if too much chlorine has been dosed (calibration of the chlorine sensor should be performed at regular intervals by means of a DPD 1 comparative measurement).

Components of the chlorine measuring/control station

Quantity		See page	Order no.
1	Compact controller for chlorine	→ 2-46	DCCaW006C00010EN
1	CLB 2-µA-5 ppm	→ 1-15	1038902
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa 310T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Components of the pH measuring/control station

Quantity		See page	Order no.
1	Compact controller for pH	→ 2-46	DCCaW006PR0010EN
1	DULCOTEST® pH-Sensor PHEP-112-SE	→ 1-49	150041
1	Sensor connection cable, coaxial 2 m, SN 6 pre-assembled	→ 1-113	1005672
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa 310T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Operation is simple and independent of the operating language
- Signalling via a limit value relay if the setpoint has been reached after 5 minutes.
- All products are matched

Waterworks with control measurement of conductivity

Tasks and applications

The conductive conductivity in the outlet of a water works is to be monitored. The measured value is to be transmitted to a PLC via a 4-20 mA analogue signal.

Components of the measuring/control station

Quantity		See page	Order no.
1	Compact controller for conductive conductivity	→ 2-46	–
1	Conductivity sensor measuring range 20 mS/cm, type LFTK 1	→ 1-96	1002822
1	Screened sensor cable LF, 5 m	→ 1-114	1046026
1	DGMa in-line probe housing with sample water limit contact	→ 1-120	DGMa 310T000
2 m	Control line LiYY 2 x 0.25 mm² Ø 4 mm (e.g. sensor)	→ 1-115	725122

Benefits

- Operation is simple and independent of the operating language
- Signalling via a limit value relay if the setpoint has been reached after 5 minutes.
- All products are matched

2.4.6 Application Examples, Waste Water Monitoring

Neutralisation of the waste water of an industrial plant

Tasks and applications

In an industrial plant, waste water arises in an intermittent manner (batch production), the water is always acidic (or always alkaline). The water is collected in a storage tank. There is a stirrer in the storage tank, a pH immersion fitting with wet holding cup, based on which the pH value is adjusted. The storage tank discharge connecting piece contains a pH sensor with a pH changeover device, which is used for the final check.

The control is one-way, i.e. acidic or alkaline. There may be solids in the waste water. The measured values are transferred via the 4-20 mA analogue signal.

Components of the pH measuring/control station in the collection tank

Quantity		See page	Order no.
1	Compact controller for pH	→ 2-46	DCCaW006PR0010EN
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Pt 1000 Temperature sensor	→ 1-82	1002856
1	Cable combination of control line 5 m SN6, open end (Pt 100, Pt 1000)	→ 1-114	1003208
1	Immersion fitting with 3 sensor slots IPHa 3-PP	→ 1-123	1008602

Components of the measuring/control station in the outlet

Quantity		See page	Order no.
1	Compact controller for pH	→ 2-46	DCCaW006PR0010EN
1	DULCOTEST® pH sensor PHER 112 SE	→ 1-52	1001586
1	Cable combination coaxial 5 m-SN6, shield connection	→ 1-113	1024107
1	Retractable process assembly WA-PH 1	→ 1-128	1020631

Note: The use of other sensors is also possible depending on the quality of the waste water (see Selection Guide for pH Sensors DULCOTEST®→ 1-1)

For seriously contaminated waste water with solid matter content

Quantity	Name	See page	Order no.
1	pH sensor PHEX 112 SE	→ 1-53	305096

For clear waste water

Quantity	Name	See page	Order no.
1	pH sensor PHEP 112 SE	→ 1-49	150041

Benefits

- Operation is simple and independent of the operating language
- pH limit value monitoring for the waste water
- All products are matched

2.5 Controllers for cooling tower control

2.5.1 Overview of cooling tower control

Controller selection table

Function	AEGIS II	SlimFLEX 5a
Number of cooling towers controlled	2	1
Bleeding/desludging		
- Conductive conductivity-dependent	✔	✔
- Inductive conductivity-dependent (via mA)	✔	
- alternatively dependent on the volume of water added	✔	✔
- alternatively, as a percentage based on a time base of 5 minutes	✔	✔
Biocide metering	up to 2 per cooling tower	up to 2
Forced bleeding with timer-controlled biocide metering	time-dependent and/or measured value-dependent	time-dependent and/or measured value-dependent
Bleed lock after timer-controlled biocide metering	✔	✔
Metering of chemicals (inhibitors, dispersants)	up to 4	up to 2
- Contact water meter-controlled	✔	✔
- alternatively, dependent on the bleed valve opening time	✔	✔
- alternatively, as a percentage based on a time base of 5 minutes	✔	✔
- controlled via a fluorine sensor	✔	✔
Control of metering pumps and bleed dampers		
Pulse frequency outputs for the metering of chemicals	4	-
Changeover contact output relay, with power supply, for the control of a bleed damper or metering pumps	2	1
Changeover contact output relay, potential-free for the control of metering pumps	3	4
Corrosion measurement		
for two different metals, for instance stainless steel, copper, mild steel, admiralty metal	✔	
Analogue outputs 0/4…20 mA	up to 4	up to 2
Special functions		
Field bus, Modbus RTU	✔	
PROFIBUS-DP, BACnet via external gateway on request	✔	
Subsequent function extension via plug-in modules	✔	✔
LAN connector with web server (standard)	✔	✔
Wi-Fi with web server (optional)	✔	✔
E-mail reporting/alarm output, up to 5 e-mail addresses, data logger file as appendix	✔	✔
Graph visualisation of metering and bleeding on the web interface	✔	✔
Data logger (4-week recording time) via USB and e-mail	✔	✔
Power supply		
100 - 230 V AC	✔	✔
Method of installation, degree of protection		
Wall mounting IP 65	✔	✔

2.5.2 Controller AEGIS II

Treatment of cooling water in evaporation cooling systems - VDI 2047 and 42-compliant Federal Immission Control Ordinance (BImSchV)-compliant

Controller AEGIS II continuously measures and controls the conductivity and biocide concentration to keep pipework and heat exchangers clean.

The AEGIS II records all the necessary measuring parameters for cooling water treatment and controls the functions necessary for smooth operation:

- Measures the electrolytic conductivity – controls bleeding
- Biocide metering – time-dependent or as measurement and control, VDI 2047 and 42-compliant. Federal Immission Control Ordinance (BImSchV)-compliant (e.g. chlorine)
- Corrosion measurement – determines whether enough corrosion inhibitor is being metered
- pH measurement – measures and controls the pH value

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Your benefits

- Control of biocide metering over 1, 7 or 28 days, real-time clock
- If desired, the biocide concentration can be measured and controlled online
- Measurement of conductivity, temperature and flow control with the CTFS type digital sensor
- Serial web interface for unit configuration and remote maintenance with e-mail alarms (the controller must be connected to the Internet for e-mail alarms). WiFi as an option
- Forced bleeding: performs bleeding before biocide metering, based on time or measured values
- Bleed lock: blocks bleeding after biocide metering has taken place
- Operating status displayed by 10 status LEDs
- Blockage of relays between one another to prevent the metering of incompatible chemicals
- Locking of relays by digital control inputs

Technical Details

- 8 digital inputs for contact water meter, flow detector and control signals
- 10 status LEDs display the operating status
- 9 flexible relay outputs: for setpoint-dependent flow volume-proportional or time-based control of actuators
- Measured variables: conductivity, pH, ORP, chlorine, bromine, chlorine dioxide and more

Field of application

- Control of bleeding in evaporation cooling systems
- Volume-proportional control or regulation of the metering of corrosion inhibitors, de-foamers and dispersants
- Measurement and control of the inhibitor concentration through the use of a fluorescence sensor
- Measurement and optionally control of the pH value and ORP voltage
- Metering of biocides, based on time or measured values

Technical Data

Measuring range

Conductivity:
with digital sensor CTFS at input A and B and via serial module D1:
0.1 - 10 mS/cm
via conductivity module L3 depending on sensor used (LMP, LFT):
50 µS/cm - 20 mS/cm
via mA module AA with the inductive conductivity sensor ICT:
8 to 2 mS/cm, 20 mS/cm, 200 mS/cm
Connection type mV:
pH: 0,00 ... 14,00
ORP voltage: - 1,500 ... + 1,500 mV
Type of connection mA (amperometric measured variables, measuring ranges according to sensors, 2 ppm, 10 ppm):
Chlorine
Chlorine dioxide
Bromine
Temperature:
via Pt 100/Pt 1000, measuring range 0 ... 150 °C

2.5 Controllers for cooling tower control

Resolution	pH: 0,01 ORP voltage: 1 mV Temperature: 0.1 °C Amperometric analysis (chlorine etc.): 0.001/0.01 ppm, 0.01 Vol.%, 0.1 Vol.%
Inputs and outputs	3 plug-in module positions for 2-channel plug-in modules according to identity code 1 mA input for any analogue signals 5 output relays acting as changeover contacts, of which 3 are potential-free and 2 are AC/DC 4 pulse frequency outputs for controlling metering pumps 2 serial sensor inputs for CFTS conductivity sensors and CRS corrosion sensors 8 digital control inputs for contact water meter, flow switch and pause for locking
Accuracy	0.3 % based on the full-scale reading
Measurement input	pH/ORP (input resistance > 0.5 x 10^{12} Ω)
Temperature compensation	Pt 100/Pt 1000 for pH
Temperature correction range	0 … 100 °C
Control characteristic	P/PID control
Electrical connection	90 – 253 V, 50/60 Hz, 25 VA, 24 V DC
Field bus connection	Modbus RTU, additional field buses via gateway
Ambient temperature	0 ... 50 °C (for use indoors or with a protective enclosure)
Enclosure rating	Wall-mounted: IP 67
Tests and approvals	CE, MET (corresponding to UL as per IEC 61010)
Housing material	PPE with flame-proof finish
Dimensions H x W x D	240 x 360 x 110 mm
Climate	Permissible relative humidity: 95 %, non-condensing DIN IEC 60068 –2-30

Description of modules

Module AA mA/mA sensor input (slot 1-3):

- 2 sensor inputs for the connection of, for example, chlorine sensors, such as CBR or pH switch-over pHV1

Module V2 mV/mV temperature sensor input (slot 2-3):

- 2 sensor inputs for the connection of pH and ORP sensors and temperature sensors Pt100/Pt1000, e.g. of type PHER, RHER, PHEI, RHEIC, Pt100SE

Module H1 mA/mA output (slot 1-3):

- 2 galvanically isolated analogue outputs 0/4-20 mA for the output of measured values of control variables

Module D1 serial sensor monitoring module (slot 1-3):

- Module 2 digital sensor input for the connection of CTFS or CRS corrosion sensors

Module V1 mV/temperature + mA module (slot 2-3):

- 1 sensor input for pH or ORP sensor and temperature sensor Pt100/Pt1000
- 1 sensor input for the connection of, for example, chlorine sensors, such as CBR or pH switch-over pHV1

Module CM Modbus RTU + 2 mA outputs (slot 3):

- 1 Modbus RTU slave, for connection to a PLC Programmable Logic Controller or gateway
- 1 Modbus RTU master, for the connection of a Pyxis fluorometer sensor
- 2 galvanically isolated analogue outputs 0/4-20 mA for the output of measured values of control variables

Module CA Modbus RTU + 2 mA outputs + 2 mA inputs (slot 3):

- 1 Modbus RTU slave, for connection to a PLC Programmable Logic Controller or gateway
- 1 Modbus RTU master, for the connection of a Pyxis fluorometer sensor
- 2 galvanically isolated analogue outputs 0/4-20 mA for the output of measured values of control variables
- 2 sensor inputs for the connection of, for example, chlorine sensors, such as CBR or pH switch-over pHV1

2.5 Controllers for cooling tower control

Identity code ordering system for AEGIS II cooling tower control

AGIB

Regional code

EU	Europe

Design

00	with ProMinent logo

Operating voltage

6	100 – 240 V, 50/60 Hz

Communication interface

LO	LAN
WO	LAN + WLAN
L1	LAN without M12 LAN cable
W1	LAN + WiFi without M12 LAN cable

Application pre-setting

XX	no default setting

Serial sensor A

XX	Selection for commissioning

Serial sensor B

XX	Selection for commissioning

Extension slot 1 (Input C/D)

XX	No module
L3	Conductivity temperature sensor input
AA	mA/mA sensor input
H1	mA/mA output
D1	serial sensor module

Extension slot 2 (Input E/F)

XX	No module
L3	Conductivity temperature sensor input
AA	mA/mA sensor input
V2	mV/mV temperature sensor input
H1	mA/mA output
D1	serial sensor module
V1	mV/temperature + mA module

Extension slot 3 (Input I/J)

XX	No module
L3	Conductivity temperature sensor input
AA	mA/mA sensor input
V2	mV/mV temperature sensor input
H1	mA/mA output
D1	serial sensor module monitoring
V1	mV/temperature + mA module
CM	Modbus RTU + mA/mA output
CA	Modbus RTU + mA/mA output + mA/mA sensor input

Pump activation (P/V)

0	Configuration during commissioning

Pre-wired relay outputs

0	Only for use outside Europe

Pre-wired output relay

0	Only for use outside Europe

Inhibitor metering outputs

0	Configuration during commissioning

Biocide metering outputs

0	Configuration during commissioning

Hardware extension

0	none

Approvals

01	CE
07	MET (USA)
08	CE + MET (Europe)

Documentation language

DE	German
EN	English
ES	Spanish
FR	French
BG	Bulgarian
CS	Czech
DA	Danish
ET	Estonian
EL	Greek
FI	Finnish
HR	Croatian
HU	Hungarian
IT	Italian
JA	Japanese
KO	Korean
LT	Lithuanian
LV	Latvian
NL	Dutch
PL	Polish
PT	Portuguese
RO	Romanian
SK	Slovakian
SR	Serbian
SL	Slovenian
SV	Swedish
RU	Russian
TH	Thai
TR	Turkish
ZH	Chinese

Retrofit modules for AEGIS II and SlimFLEX 5a

It is possible at all times to retrofit modules.

		Order no.
mA/mA output modules	AEGIS II, SlimFLEX 5a	1092565
2x conductivity temperature sensor input modules	AEGIS II, SlimFLEX 5a	1081809
mA/mA sensor input modules	AEGIS II, SlimFLEX 5a	1081806
2x mV/mV temperature sensor input modules	AEGIS II, SlimFLEX 5a	1081807
Module 2x serial sensor inputs	AEGIS II	1092566
Modules mA/mV + temperature sensor inputs	AEGIS II	1081808
Module Modbus RTU + 2 mA outputs	AEGIS II	1094377
Module Modbus RTU + 2 mA outputs + 2 mA inputs	AEGIS II	1094350

2.5 Controllers for cooling tower control

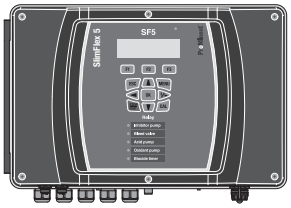
2.5.3 Controller SlimFLEX 5a

Controller SlimFLEX 5a, the entry level class for cooling water treatment, VDI 2047 Sheet 2 and BLMSchV 42-compliant, the innovative and flexible controller.

The cooling tower regulator SlimFLEX 5 continuously measures and controls conductivity and controls biocide metering, keeps pipework and heat exchangers clean and prevents legionella.

The SlimFLEX5a records all the important measuring parameters for cooling water treatment and controls functions necessary for smooth operation:

- Time-dependent biocide metering (boost metering). Control can be done by measuring the ORP voltage in the cooling water.
- Measurement of electrolytic conductivity – controls bleeding.
- pH measurement with integral PID controller.



P_MSRZ_0020_SW1

Your benefits

- A web interface for unit configuration and remote maintenance standard, Wi-Fi is optionally available
- Forced bleeding: performs bleeding before biocide metering
- Bleed lock: blocks bleeding after biocide metering has taken place
- Operating status displayed by 6 status LEDs

Technical Details

- 6 digital inputs for contact water meter, flow detector and control signals
- 6 status LEDs display the operating status
- 5 flexible relay outputs: for setpoint-dependent flow volume-proportional or time-based control of actuators
- Measured variables: Conductivity, pH, ORP

Field of application

- Control of bleeding in smaller evaporation cooling systems
- Volume-proportional control or regulation of the metering of corrosion inhibitors, de-foamers and dispersants
- pH measurement and optional pH control
- Time-dependent metering of up to 2 biocides

Technical Data

Measuring range	Conductivity: 10 ... 10,000 µS/cm pH: 0.00 ... 14.00 ORP voltage: -1,500 ... +1,500 mV
Resolution	Conductivity: 1 µS/cm pH: 0.01 ORP voltage: 1 mV Temperature: 0.1 °C
Inputs and outputs	2 plug-in module positions: Plug-in modules for 2-channel modules: mA outputs, pH/ORP inputs 5 output relays acting as changeover contacts, of which 3 are potential-free and 2 are AC/DC 1 serial sensor input for CFTS sensor 6 digital status inputs
Accuracy	0.3% based on the full-scale reading
Measurement input	pH/ORP (input resistance > 0.5 x 10^{12} Ω)
Temperature compensation	Pt 100/Pt 1000 for pH
Temperature correction range	0 … 100 °C
Control characteristic	P/PID control
Electrical connection	100 – 230 V, 50/60 Hz, 25 VA
Ambient temperature	0 ... 50 °C (for use indoors or with a protective enclosure)
Enclosure rating	Wall-mounted: IP 65
Tests and approvals	CE, MET (corresponding to UL as per IEC 61010)
Housing material	PPE with flame-proof finish
Dimensions H x W x D	220 x 250 x 122 mm
Climate	Permissible relative humidity: 95%, non-condensing DIN IEC 60068 – 2-30

2.5.4 DULCOTEST® sensor for conductivity, type CTFS

Multi-parameter sensor for electrolytic conductivity, temperature and flow control for use in cooling water treatment. Installation in bypass fitting DGMa and in DN 20 pipework. For operation on the AEGIS II and SlimFLEX 5a cooling tower controller.

Your benefits

- 3 measured variables in one sensor: electrolytic conductivity, temperature and flow control
- Auto-ranging within the measuring range for electrolytic conductivity 100...10,000 µS/cm

A2500

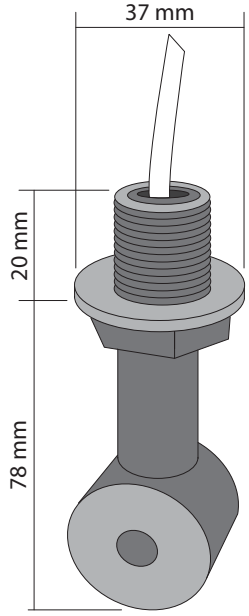
Measuring range	0.1…10 mS/cm
Cell constant k	10.00 cm^{-1} ±5%
Temperature measurement	Semiconductor temperature sensor
Medium temperature	0 … 50 °C
Max. pressure	7.0 bar up to 35 °C
Sensors	Graphite, epoxy
Shaft material	PP
Seals	FKM
Thread	see Installation
Fitting length	see Installation
Installation	Installation without separate rotary adapter: in DGMa, 25 mm module: adapter CTFS/DGMA M25-NPT ¾" PVDF, part no. 1080293.
Electrical connection	3 m fixed cable, extendible to 50 m, with cable type: 0.5 mm^2 or AWG 22.
Enclosure rating	IP 65
Typical applications	Cooling water.
Resistance to	Ingredients in the water of the target application, taking into account the compatibility of the material
Measuring and control equipment	AEGIS II and SlimFLEX 5a cooling tower controller
Measuring principle, technology	Conductive. Integrated temperature measurement and thermal flow detector

	Order no.
CTFS sensor conductivity/temperature/flow complete	1081727

Please observe the general notes on p. → 1-84 (Overview Table for Conductivity Sensors)

2.5 Controllers for cooling tower control

2.5.5 Conductivity sensor ICT 8-mA



P_DCT_0085_SW1

Inductive sensor for the measurement of electrolytic conductivity. Suitable for contaminated water. With integrated temperature correction and factory-calibrated 4...20 mA output signal. For operation with the controllers diaLog DAC, D1Cb, D1Cc, AEGIS® II, DULCOMARIN®.

Your benefits

- Measured variable: electrolytic conductivity up to 200 mS/cm without polarisation effect
- The inductive (non-contact) measuring principle permits applications in water with solids content and in film-forming media
- Fail-safe 4-20 mA output signal for flexible connection to measuring equipment with standard 4...20 mA input
- Integrated temperature correction replaces separate temperature sensor and sensor fitting

Measuring range	three configurable measuring ranges 0.2...2.0 mS/cm / 0.5...20 mS/cm / 1...200 mS/cm
Temperature correction	integrated in the sensor electronics, temperature co-efficient: 1.7%/K
Medium temperature / pressure	max. 50 °C at 1 bar
Sensor material	PP
Seals	EPDM
Installation length	75
Electrical connection	Fixed cable, 6-wire (6x0.25 mm^2). The cable length is: 2 m cable between the sensor and 4-20 mA cable transmitter and 10 m between the cable transmitter and monitor.
Typical applications	Desalination control in cooling towers, contaminated waste water, control of electroplating and rinsing baths, salt water desalination, adjustment of the salt content in swimming pool water
Resistance to	Water ingredients in the target application, taking into account compatibility to PP/EPDM and combating film-forming media
Installation	1/2" male thread (BSP) for mounting by flange, installation in PVC pipes, DN 50 by means of installation adapter ICT8, DN 50, PVC, order no. 1106570, immersion using an immersion pipe, 1 m, order no. 1105964
Measuring and control equipment	diaLog DAC, D1Cb, D1Cc, AEGIS II
Measuring principle, technology	Inductive, 2 coils. Integrated temperature measurement, integrated 4...20mA transducer

	Order no.
ICT 8 -mA-200 mS/cm	1098530

NEW

2.6.1 Transmitter DULCOMETER® DMTa

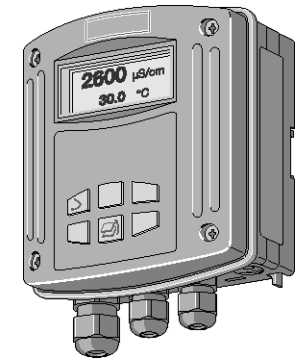
The compact 2-wire transmitter – the link to the PLC and DULCOMETER®.

The transmitter DULCOMETER® DMTa converts the sensor signals for pH, ORP value, chlorine concentration and conductivity into an interference-insensitive 4-20 mA analogue signal. Flexible, safe and always the optimum resolution of measured value.

The 2-wire transmitter DMTa converts the following sensor signals into an interference-insensitive 4-20 mA analogue signal: pH, ORP, temperature, chlorine and conductivity.

It is fed via the 2-wire analogue input of a PLC or via a 2-wire analogue input of a ProMinent controller. The 4-20 mA analogue current proportional to the measured value is transmitted via the same two lines.

The DMTa offers an on-site calibration option of the sensor and galvanic separation between the sensor input and measured value output.



pk_5_001

Your benefits

- Flexibility in the choice of measured variable with pH, ORP and temperature
- Excellent operational safety, thanks to sensor monitoring (pH)
- Galvanic isolation between the sensor and supply
- Always the optimum measured value resolution by auto-ranging with conductivity measurement
- Safety through sensor monitoring of pH for glass breakage and line breakage
- Various installation options: wall-mounted, installation on an upright or in a control cabinet

Technical Details

- Measured variables: pH, ORP, chlorine, temperature and conductivity
- Accuracy: 0.5% of the upper range value
- Correction variable: Temperature via Pt 100/Pt 1000 (pH, chlorine, conductivity)
- Communication interface: PROFIBUS®-DP (wall-mounted only)
- Protection class: IP 65 (wall-mounted, pipe installation), IP 54 (installation in a control cabinet)
- Display: Graphic display

Field of application

Measuring technology in water treatment in the following sectors:

- Processes and process technology
- Food and beverage industry
- Chemical industry
- Pharmaceuticals
- Waste water treatment
- Power station technology

Technical Data

Measuring range	pH - 1.00 … 15.00 - 1200 … +1200 mV ORP voltage 0.01 … 50.0 mg/l chlorine -20 … +150 °C 1 µS/cm … 200 mS/cm (autoranging), corresponding to cell constant
Cell constant	0.006 … 12.0/cm for conductivity
Resolution	0.01 pH 1 mV 0.1% from measurement range for chlorine 0.1 °C Conductivity 1/1000 of display value (min. 0.001 µS/cm)
Accuracy	0.5% from measurement range
Measurement input	mV terminal (pH, ORP); imput resistance > 5 x 10^{11} Ω Chlorine terminal (DMT chlorine sensors) Pt 100/1000 terminal Conductivity terminal (2 or 4 wire connector)
Correction variable	Temperature via Pt 100/1000 (pH, chlorine, conductivity)
Correction range	Chlorine: 5 … 45 °C, pH: 0 … 100 °C, conductivity: 0 … 100 °C
Current output	4…20 mA
Fault current	23 mA

2.6 DULCOMETER® Transmitters

Feed voltage	2-wire transmitter, 16 … 35 V DC, nominal 24 V PROFIBUS®-DP version, 16 … 30 V DC, nominal 24 V
Communication interface	PROFIBUS®-DP (wall-mounted version only)
Permissible ambient temperature	0…55 °C
Climate	Relative humidity up to 95% (non-condensing)
Enclosure rating	IP 65 (wall/pipe mounted) IP 54 (control panel installation)
Display	graphical display
Housing material	PPE
Dimensions H x W x D	135 x 125 x 75 mm
Weight	0.45 kg

A complete measuring station comprises the following:

- DMTa measuring transducer (see Identity code)
- In-line probe fitting: DGMa..., DLG III ..., immersible in-line probe fitting
- Chlorine sensor (dependent on Identity code)
- Assembly set for chlorine sensor
- pH sensor (dependent on Identity code)
- ORP sensor (dependent on Identity code)
- Temperature sensor Pt 100 /Pt 1000 (dependent on Identity code)
- Conductivity sensor
- Sensor cable
- PROFIBUS® DP connection accessories

(for further information: Immersion Fittings see page → 1-122; Sensors for Chlorine see page → 1-5; pH Sensors with SN6 or Vario Pin Plug-In Head see page → 1-46; ORP Sensors with Fixed Cable see page → 1-79; DULCOTEST® Temperature Sensors see page → 1-82; Conductivity Sensors see page → 1-83; Sensor Accessories see page → 1-113; Metering Monitor, Signal Cable see volume 1 page)

2.6.2 Identity Code Ordering System for Transmitter DMTa

DULCOMETER® Transmitters

DMT	Series												
	A	Version											
		Installation											
		W	Wall mounted (also pillar mounted)										
		S	Control panel installation[1]										
			Version										
			0	With ProMinent® logo									
				Power supply									
				9	Current loop 4-20 mA (two wire technology), operating voltage 16...40 V DC, nominal 24 V DC (only if communication point = none)								
				5	PROFIBUS® DP, operating voltage 16…30 V DC, nominal 24 V DC (only if communication interface = PROFIBUS® DP)								
					Communication interfaces								
					0	None							
					4	PROFIBUS® DP (assembly type W only)							
						Measured variable 1							
						P	pH						
						R	ORP						
						T	Temperature						
						C	Chlorine						
						L	Conductivity						
							Measured variable 2 (Correction variable)						
							1	Temperature Pt 1000/Pt 100					
							0	None (in the case of measured variable T)					
								Enclosure rating					
								0	Standard				
									Language				
									D	German			
									E	English			
									F	French			
									S	Spanish			
									I	Italian			
										Presetting A, probe			
										0	Standard ProMinent® buffer solution pH 7 and 4		
										D	Reference buffer DIN 19266 pH 7 and 4		
										V	Variable buffer recognition		
											Presetting B, probe		
											0	Autom. temperature measurement (standard)	
											1	Manual temperature measurement	
											2	Autom./manual temperature measurement	
											9	No temperature measurement	
												Presetting C, output	
												0	Proportional measured variable (Standard)
												1	Manual adjustable current value
												2	Proportional or manual
												3	Proportional or manual hold
												4	4 mA constant current

The last four figures in the identity code represent the software defaults, e.g. cell constants for conductivity, temperature compensation, etc.

0 = standard parameters

The measuring transducer can be factory-set. The defaults can be easily changed in the operating menu.

Note:

[1] The rear housing part is omitted for control panel mounting.

2.6 DULCOMETER® Transmitters

2.6.3 Application Example: Measurement of Free Chlorine with Connection to a PLC

Tasks and applications

In the treatment of drinking water in a water works with a PLC as the higher-order control system, simple measuring stations are needed to measure the disinfectant "free chlorine" at the outlet of the water works and thereafter to monitor protection of the network in the distribution system. Metering is proportional to the flow and is controlled by the PLC. The following conditions must be met:

- Disinfectant: free chlorine with an adjustable concentration of 0.1 ppm
- Raw water: groundwater with a pH of 7.5 and a temperature of 8-13 °C
- Installation of the measuring station in the bypass of the process flow
- Display of the measurement result and calibration by a measuring instrument in the proximity of the bypass installation and transmission of the measured value to the PLC via an electrically isolated 4-20 mA signal
- Power supply to the measuring instrument via the PLC (two wire instrument)

Components of the measuring/control station

Quantity	Name	See page	Order no.
1	Transmitter DMTa	→ 2-59	DMTa W090C00D000
1	Sensor for free chlorine CLE 3-DMT-5 ppm	→ 1-9	1005511
1	Universal cable, 5-pin round plug	→ 1-114	1001300
1	Bypass fitting DGMA	→ 1-120	DGMa 101T000

Benefits

- Simple, compact and cost-effective measuring station close to the bypass installation
- Electrical installation cost-savings due to power supply over a two wire system
- No need for electrical isolation of the output signal by electrical isolation integral to the DMT

2.7.1 Portable Meter Portamess® – Measured Variable pH/ORP

Robust manual measuring instrument to withstand the most severe mechanical and chemical loading.

Measuring range pH -2.00 to + 16.00, ORP -1,300 … +1,300 mV

pH and ORP measurement with Portamess® pH/ORP - battery-powered, hand-held meter with automatic or manual temperature compensation.

pk_5_099

The Portamess® pH/ORP is used to measure the pH and ORP value in the industrial, environmental, food and waste water sectors. The unit complies with the requirements of the EMC Act and the NAMUR NE 21 recommendations. Calibration can be done with buffer solutions made of different, pre-selectable buffer sets.

Your benefits

- Robust and protected against ingress (IP 66 protection)
- Long lifespan: Over 2,000 h operating time with only 3 x AA batteries
- Always in sight: Large LC display
- Hard-wearing membrane keypad
- Integrated sensor quiver to protect the sensor
- Robust, watertight, gold-plated sockets

Technical Details

- **Measuring ranges pH:** -2.00 … +16.00, ORP: -1,300 … +1,300 mV
- **Measuring errors pH:** < 0.01, ORP: < 0.1% of the measured value ±0.3 mV
- **Sensor adaptation:** 8 buffer sets to choose from
- **Temperature compensation:** manual
- **Protection class:** IP 66
- **Operating time:** 2,000 hours with 3 x AA cells
- **Dimensions:** H x W x D 160 x 133 x 30
- **Weight:** 560 g with batteries
- **Scope of delivery:** Measuring instrument, field case, operating instructions in German, English and French.

Field of application

- Industry
- Environmental protection
- Food production
- Water or waste water inspection

	Order no.
Portamess® 911 pH	1008710

Accessories

	Capacity ml	Order no.
PHEKT-014F	–	1036537
Coaxial cable Ø 5 mm, 0.8 m - SD*	–	305098
Buffer pH 7.0	50	506253
Buffer pH 4.0	50	506251

* fits all ProMinent pH and ORP sensors with SN6 connector

Sensor quiver see p. → 2-69

2.7 Measuring and Test Systems

2.7.2 Portable Meter Portamess® – Measured Variable Conductivity

Robust measuring instrument to withstand the most severe mechanical and chemical loading.

Measuring range 0.01 µS/cm – 1,000 mS/cm

The measuring instrument Portamess® conductivity is a robust, leak-tight and battery-operated hand-held measuring instrument with a large measuring range and automatic or manual temperature compensation, which can be used in the industrial, environmental, food and waste water sectors.

pk_5_098

The Portamess® conductivity is used to measure conductivity and temperature in the industrial, environmental, food and waste water sectors. The unit complies with the requirements of the EMC Act and the NAMUR NE 21 recommendations. Calibration can be done with buffer solutions made of different, pre-selectable buffer sets.

Your benefits

- Robust and protected against ingress
- Long lifespan: Over 1,000 h operating time with only 3 x AA batteries
- Always in sight: Large LC display

Technical Details

Measuring ranges:

- Conductivity instrument: 0.01 µS/cm ... 1,000 mS/cm, with sensor LF204: 1 µS/cm ... 500 mS/cm
- Temperature: -20 … 120 °C
- Salinity: 0.0 … 45.0 g/kg (0 … 30 °C)
- TDS: 0 … 1,999 mg/l (10 … 40 °C)

Measuring error:

- Conductivity < 0.5% of the measured value (with conductivities of > 500 mS/cm < 1% of the measured value) ±1 digit
- Temperature < 0.3 K ±1 digit

Sensor adaptation:

- Direct input of the cell constants, automatic establishment of the cell constants with KCl solution 0.01 or 0.1 mol/l, cell adaptation with any known solutions

Cell constant k:

- 0.010 … 199.9 cm-1 (adjustable)

Temperature compensation:

- Configurable, manual or measured

Protection class:

- IP 66

Operating time:

- Approx. 1,000 hours with 3 x AA cells

Dimensions:

- 160 x 133 x 30 mm (H x W x D)

Weight:

- 560 g with batteries

Scope of delivery:

- Measuring instrument, field case, conductivity sensor LF 204, operating instructions in German, English and French

Field of application

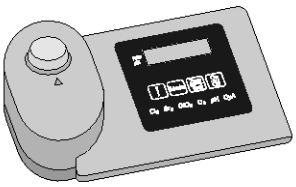
- Industry
- Environmental protection
- Food production
- Water or waste water inspection

	Order no.
Portamess® 911 Cond	1008713

Note:

The scope of delivery does include the conductivity sensor LF 204.
Conductivity sensor LF 204 see p. → 2-69, Sensor quiver see p. → 2-69

2.7.3 Photometer



P_DT_0074_SW
Photometer

Precise measurement results through high-quality interference filters

Photometers measure nearly all disinfectants and the pH value based on the photometric principle. They are portable, compact and make safe, simple measurement possible.

The photometers DT1B, DT3B and DT4B are used, among other things, as a reference method for calibrating the electrochemical sensors for chlorine, chlorine dioxide, chlorite, H_2O_2, bromine and ozone. They have been adapted to today's requirements and can be used in almost all areas of water analysis. High-quality interference filters and long-term stable LEDs are used as the light source in the high-precision optics. The entire measuring unit is maintenance-free. Precise and reproducible analysis results are achieved with minimum time and effort. The units are winning customers over with their excellent operating convenience, ergonomic design, compact dimensions and ease of use.

Your benefits

- Portable and compact
- Simple to operate with text support
- safe, simple measurement of chlorine, chlorine dioxide, chlorite, H_2O_2, bromine, ozone, pH and trichloro-isocyanuric acid
- Can be calibrated
- Memory function for the last measurements
- Backlit display
- Real-time clock
- Countdown
- Watertight, degree of protection IP 68

Technical Details

Measuring ranges of the DT1B:

- 0.05 ... 6.0 mg/l free chlorine (DPD1) + total chlorine (DPD1+3)
- 5 ... 200 mg/l free chlorine (high range)
- 0.1 … 13.0 mg/l bromine (DPD1)
- 0.05 … 11 mg/l chlorine dioxide (DPD1)
- 0.03 … 4.0 mg/l ozone (DPD4)
- 6.5 … 8.4 pH (phenol red)
- 1 … 80 mg/l cyanuric acid

Measuring ranges of the DT3B:

- 1 … 50 / 40 … 500 mg/l hydrogen peroxide (H_2O_2)

Measuring ranges of the DT4B:

- 0.03 … 2.5 mg/l chlorite
- 0.05 … 11 mg/l chlorine dioxide
- 0.05 … 6 mg/l chlorine

Measuring tolerance: depending on the measured value and measuring method

Battery: 4 x AA/LR6

Permissible ambient temperature range: 5…40 °C

Relative humidity: 30 ... 90% (non-condensing)

Degree of protection: IP 68

Housing material: ABS

Keypad: polycarbonate film

Dimensions: 190 x 110 x 55 mm (L x W x H)

Weight: 0.4 kg

2.7 Measuring and Test Systems

Field of application

- Swimming pools
- Potable water
- Process water

	Order no.
Photometer DT1B	1039315
Photometer DT3B hydrogen peroxide	1039317
Photometer DT4B	1039318

Photometers supplied with accessories, container vessels and reagents.

Consumable items

	Order no.
DPD1 tablets, 100 pieces *	1061892
DPD3 tablets, 100 pieces **	1061893
Glycine tablets, 20 pieces	1061944
Phenol red tablets 100 pieces	305532
Cyanuric acid tablets, 100 no.	1039744
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l, for calibration of the photometer during fluoride determination	1010382
3 pieces replacement cuvettes; round cuvettes with lid for DPD, phenol red and cyanuric acid detection (DT1, DT1B, DT4, DT4B, DT2B, DT2C)	1007566
3 pieces replacement cuvettes for fluoride detection (DT2B and DT2C)	1010396
Chlorine dioxide tablets No. 1, 250 no.	1039732
Chlorine dioxide tablets No. 2, 250 no.	1039733
Chlorine HR tablets, 100 pieces	1075056
Acidifying tablets, 100 pieces	1075057

* replaces DPD1 buffer, 15 ml (1002857) and DPD1 reagent, 15 ml (1002858)

** replaces DPD3 solution, 15 ml (1002859)

Spare parts

Chlorite measurement

	Order no.
Stirrer for purging of chlorine dioxide (DT4)	1022754
3 pieces replacement cuvettes; round cuvettes with lid for DPD, phenol red and cyanuric acid detection (DT1, DT1B, DT4, DT4B, DT2B, DT2C)	1007566

H_2O_2 measurement

	Order no.
Reagent for H_2O_2 (DT3), 15 ml	1023636
Replacement cuvettes, 5 pieces, for H_2O_2 (DT3)	1024072

2.8.1 Transmitter 4 … 20 mA (Two-Wire System)

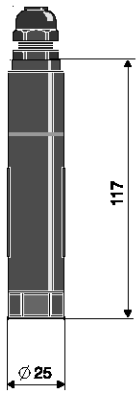
Benefits:

- Reliable signal transmission, even over large distances
- Interference-resistant 4 ... 20 mA signal
- Simple installation directly on the sensor

Typical applications:

Transmission of the measuring signal even over long distances and/or transmission of interference-resistant measured signals (e.g. pH, ORP) in conjunction with controllers type D1C, D2C and DULCOMARIN® or direct connection to PCs and/or a PLC. If using a PLC, it has to have an electrically isolated input.

pH measuring transducer 4 ... 20 mA type pH V1



pk_5_064

Measuring range	pH 0 … 14
Measuring error	< 0.1 pH (typical ±0.07 pH)
Socket	SN6
Input resistance	> 5 x 10^{11} Ω
Signal current output	4 … 20 mA ≈ -500 … +500 mV ≈ pH 15.45 … -1.45 not calibrated, not electrically isolated
Power supply DC	18...24 V DC
Ambient temperature	-5…50 °C, non-condensing
Enclosure rating	IP 65
Dimensions	141 mm (length), 25 mm (Ø)

	Order no.
pH measuring transducer 4 ... 20 mA type pH V1	809126

ORP measuring transducer 4 ... 20 mA type RH V1

Measuring range	0 … 1000 mV
Measuring error	< ±5 mV (typical ±3 mV)
Socket	SN6
Input resistance	> 5 x 10^{11} Ω
Signal current output	4 … 20 mA ≈ 0 … +1000 mV not electrically isolated
Power supply DC	18...24 V DC
Ambient temperature	-5…50 °C, non-condensing
Enclosure rating	IP 65
Dimensions	141 mm (length), 25 mm (Ø)

	Order no.
ORP measuring transducer 4 ... 20 mA type RH V1	809127

Temperature measuring transducer 4 ... 20 mA type Pt100 V1

Measuring range	0 … 100 °C
Measuring error	< ±0,5 °C (typical ±0,3 °C)
Socket	SN6
Input resistance	~ 0 Ω
Signal current output	4 … 20 mA ≈ 0 … +100 °C not electrically isolated
Power supply DC	18...24 V DC
Ambient temperature	-5…50 °C, non-condensing
Enclosure rating	IP 65
Dimensions	141 mm (length), 25 mm (Ø)

	Order no.
Temperature measuring transducer 4 ... 20 mA type Pt 100 V1	809128

2.8 Accessories for Measuring and Control Devices

PEROX transducer

The microprocessor-based PEROX transducer is used to control and activate the PEROX sensor and to evaluate the sensor signal. It is screwed directly on to the sensor head. The H_2O_2 transducer can be directly connected to the D1C controller via a 3-core signal cable.

The PEROX transducer is approx. 205 mm long with a diameter of 32 mm.

PEROX transducer for H_2O_2 measurement

Contains an internal selector switch for the three ranges:

1 … 20, 10 … 200 and 100 … 2,000 mg/l H_2O_2

	Order no.
PEROX Transducer V2	1047979

PEROX transducer V1 for D1Ca on request.

Accessory

	Order no.
Two-wire measuring line 2 x 0.25 mm² Ø 4 mm	725122

2.8.2 Accessories for Portable Meters Portamess®

Sensor quiver

5 pieces, for water tight storage of sensors. For Portamess® pH and Cond

	Order no.
Sensor quiver	1008716

Conductivity sensor LF 204

pk_5_093

Number of electrodes	4
Sensor shaft	Black epoxy
Sensors	Graphite
Shaft length	120 mm
Shaft diameter	15.3 mm
Cable length	1.5 m
Temperature sensor	)NTC (30 kΩ) -5 … 100 °C
Immersion depth min.	36 mm
Max. pressure	2 bar
Temperature	0 … 90 °C
Cell constant	0.475 cm^{-1} ±1.5%
Measuring range	1 µS/cm…500 mS/cm

	Order no.
Conductivity sensor LF 204	1008723

2.9 DULCOnneX – digital fluid management

2.9.1 DULCOnneX – digital fluid management

Location-independent system monitoring in real time

You always have all the key data and measured values in sight at all times with DULCOnneX. Monitor and document the status of your system in real time. Check your unit data, regardless of where you are, safely and reliably when you're out and about. Simply use the terminal device of your choice: smartphone, tablet or PC.

Refer to our catalogue or website for more information and references.

3.0 Overview of Ordering System for Measuring and Control Points DULCOTROL® DWCa

3.0.1 Selection Guide

Measuring, control and monitoring tasks in water treatment

DULCOTROL® DWCa_P potable water/F&B	DULCOTROL® DWCa_W waste water
Treatment of potable water, water similar to potable water and treatment of rinsing water, industrial and process water in the food and beverage industry ■ Disinfection ■ Cleaning In Place (CIP) ■ pH adjustment ■ Monitoring	Treatment of industrial and municipal waste water ■ pH neutralisation ■ Disinfection ■ Detoxification ■ Desalination of process water ■ Control of dissolved oxygen ■ Monitoring

3.0.2 Description of the Identity Code Specifications in the DULCOTROL® DWCa Ordering System

The measuring and control stations can be configured using the respective identity code ordering system. With the "panel-mounted" version, all of the components except the sensors are mounted on a polypropylene plate. The DULCOTROL® ordering system works with user-based selection criteria so that you can select the most appropriate measuring and control station, largely without any serious technical understanding. One or two measured variables can be configured in each product range. **New:** The DACb controller is now used instead of the DACa controller for all measured variables. The Compact controller DCCa is also configured for inductive conductivity. This means that a third measured variable can be configured on site providing the fitting size permits this. An additional DGMa module is provided as standard. All communication interfaces of the DACb and also the connection to DULCOnneX can also be selected as part of the ordering system. The identity code specifications are explained in more detail below. The content and scope of delivery contained in the specifications are described in Chapter 3.1.3 (Technical description of the scope of delivery).

Specification: "Application"

The "Application" specification is used to define the application ("potable water", "waste water") in which the measuring and control station is deployed. This defines the types of sensors and fittings.

Specification: "Water to be measured"

This is used to further characterise the sample water (e.g. "clear water" or "turbid water") selected via the main application (e.g. potable water, waste water). The sensor type, measuring range (e.g. CLE 3-mA-2ppm) and fitting (e.g. DGMA) are defined in conjunction with the main application.

Specification: "Measured variable 1" and "Measured variable 2"

They are used to determine the measured variable to be measured or controlled (e.g. pH or chlorine). Up to two measured variables can be simultaneously selected within the scope of the specified options. This defines the sensor class (e.g. pH sensor or chlorine sensor) and the controller suitable for the measured variable and the appropriate measuring cable. We use the diaLog DACb controller for all measured variables apart from conductivity. We configure the Compact conductivity controller for the measured variable conductivity. The possible combinations of measured variables are listed in the tables in the "Technical description of the scope of delivery" chapter.

Specification: "Measurement and control"

This determines whether only the measuring function or the complete bidirectional control function for the selected measured variable is shown on the controller.

Specification: "Communication interface"

This specification defines which communication interface the controller has.

Specification: "Data logger"

NEW: A data logger is pre-installed as standard.

Specification: "Hardware expansion"

This specification defines whether a protective RC circuit is fitted to protect relays exposed to high loads.

3.0 Overview of Ordering System for Measuring and Control Points DULCOTROL® DWCa

Specification: "Sensor equipment"

This specification determines whether the measuring/control panel is supplied with or without sensors. If "with sensors" is selected, the sensors are also supplied in the original packaging. Select "without sensors" if the types of sensor supplied cannot be used as standard (see chapter 3.1.3: Technical description of the scope of delivery) (for example: Inapplicable measuring range) or if the measuring plates are to be stored.

Specification: "Design"

This specification defines customer-specific designs e.g. the label etc.

Specification: "Sample water preparation"

This specification defines whether a filter is fitted.

Specification: "Certification"

This specification defines the approvals and certificates.

Specification: "Documentation"

This specification defines the operating language of the controller and the operating instructions.

3.1 Measuring and Control Points DULCOTROL® DWCa_P Potable Water/F&B

3.1.1 Overview of DULCOTROL® DWCa_Potable Water/F&B

The compact measuring and control system for the reliable monitoring and treatment of potable and similar types of water. NEW: now based on the DACb controller instead of the DACa controller

Monitoring and treatment of potable and similar types of water with DULCOTROL® potable water/F&B – the compact measuring and control system specially designed for water treatment in waterworks and in the food and beverage industry.

Measuring and control systems DULCOTROL® for the potable water/F&B application are specially tailored to the potable water sector and the food and beverage industry. In addition, they also meet the particular requirements within these sectors: on the one hand, for potable water/product water treatment and, on the other hand, for the treatment of rinsing water, industrial water and process water. The measuring and control systems can be configured using the relevant identity code ordering system. With the "panel-mounted" version, all of the components except the sensors are mounted on a polypropylene plate. The DULCOTROL® ordering system works with user-based selection criteria so that you can select the most appropriate measuring and control system, largely without technical knowledge. One or two measured variables can be configured in each product range.

Your benefits

- **NEW:** A third measuring point can be retrofitted on site if the size of the configured bypass fitting permits this.
- **NEW:** All communication interfaces of the DACb controller and connection to DULCOnneX are possible.
- Availability of all key chemical measured parameters for water treatment
- Application-optimised configuration of the components using user-based order criteria
- Configuration of 1 or 2 complete measuring and control points on a plate
- The equipment of the controllers can be selected
- Flexible adaptation to special applications and measuring ranges by designing the measuring and control points without sensors and ordering the sensor type and measuring range separately
- Ready-to-connect plug-and-play measuring and control points for quick, easy installation and commissioning
- Extensive optional accessories (pressure reducers, filters, heat exchangers, sample water pump)

Technical Details

- Installation in the bypass of the main water line through which the medium flows
- Max. pressure, depending on design: 1 bar/3 bar/6 bar
- Flow, depending on design: 15...40 l/h/ 40...65 l/h/
- Max. medium temperature: primarily up to 45 °C, the versions for the identity code specification: “Water to be measured" "H" (hot water) up to 65 °C (max. 2 bar)
- Ambient temperature: +5...50 °C
- Degree of protection: IP65
- Power supply: 90-240 V, 50/60 Hz

Field of application

- Treatment of potable and product water (e.g. disinfection) in waterworks and domestic water installations
- Treatment of product water in the food and beverage industry
- Treatment of rinsing / industrial / process water for the food and beverage industry, e.g. cleaning and disinfection of pipework, vessels and machinery (cleaning in place)
- Monitoring of potable water distribution

3.1 Measuring and Control Points DULCOTROL® DWCa_P Potable Water/F&B

3.1.2 Permissible measured variable combinations for DULCOTROL® DWCa_P Potable water/F&B

Sample water 1: Potable water, product water

Measured variable 1 (channel 1)		Measured variable 2 (channel 2)													
		00	C0	C1	G0	P0	R0	D0	I0	L0	Z0	F0	H0	A0	X0
Free chlorine < pH 8	C0	x			x	x	x	x							
Free chlorine > pH 8	C1	x			x	x	x	x							
Total chlorine (free and combined chlorine)	G0	x				x	x								
pH	P0	x				x									
ORP	R0	x				x									
Chlorine dioxide	D0	x				x	x		x						
Chlorite	I0	x													
Conductivity	L0	x				x	x								
Ozone	Z0	x				x	x								
Fluoride	F0	x				x									
Hydrogen peroxide	H0	x				x									
Peracetic acid	A0	x				x				x					
Dissolved oxygen	X0	x				x									

Sample water 2: Rinsing water, process water, industrial process water

Measured variable 1 (channel 1)		Measured variable 2 (channel 2)													
		00	C0	C1	G0	P0	R0	D0	I0	L0	Z0	F0	H0	A0	X0
Free chlorine > pH 8	C1	x				x	x								
Total chlorine (free and combined chlorine)	G0	x				x	x								
pH	P0	x				x									
ORP	R0	x				x									
Chlorine dioxide	D0	x				x	x								
Chlorite	I0	x													
Conductivity	L0	x				x	x								
Ozone	Z0	x				x	x								
Fluoride	F0	x				x									
Hydrogen peroxide	H0	x				x									
Peracetic acid	A0	x				x				x					

Sample water H: Potable and product water, 45 °C...65 °C

Measured variable 1 (channel 1)		Measured variable 2 (channel 2)													
		00	C0	C1	G0	P0	R0	D0	I0	L0	Z0	F0	H0	A0	X0
Free chlorine	C1	x				x									
pH	P0	x				x									
ORP	R0	x				x									
Conductivity	L0	x				x	x								

When ordering, state the identity code in the above order of measured variable 1/measured variable 2 i.e. DWCa P... C0_P0... and not DWCa P... P0_C0...

Other measured variable combinations on request.

3.1.3 Identity Code Ordering System for DULCOTROL® DWCa_P Potable Water/F&B

DWCa	Application
	P Potable water
	Water to be measured
	1 Potable water/product water
	2 Rinsing water/industrial water/process water
	H Hot water to max. 65 °C, at max. 2 bar (measured variables C1, P0, R0, L0 only)
	Channel 1, measured variable 1
	C0 Free chlorine < pH 8
	C1 Free chlorine pH value > 8 and/or contaminated water
	G0 Total chlorine (free and combined chlorine)
	P0 pH
	R0 ORP
	D0 Chlorine dioxide
	I0 Chlorite
	L0 Conductivity
	Z0 Ozone
	F0 Fluoride
	H0 Hydrogen peroxide
	A0 Peracetic acid
	X0 Dissolved oxygen
	Channel 2, measured variable 2 (optional)
	00 none
	C0 Free chlorine < pH 8
	C1 Free chlorine > pH 8 and/or contaminated water
	G0 Total chlorine (free and combined chlorine)
	P0 pH
	R0 ORP
	D0 Chlorine dioxide
	I0 Chlorite
	L0 Conductivity
	Z0 Ozone
	F0 Fluoride
	H0 Hydrogen peroxide
	A0 Peracetic acid
	X0 Dissolved oxygen
	Measuring - Controlling
	9 All measured variables bidirectionally controllable
	Communication interface
	0 Without
	A Modbus RTU, terminal
	4 PROFIBUS® DPV1, terminal
	E LAN with web server, connection via M12 C coded
	G Profinet (2xM12)
	D DULCOnneX (appears in the scope of delivery as a separate unit)
	Data logger
	1 Data logger with measured value display on SD card
	Hardware expansion
	1 Protective RC circuit for output relay
	Sensor equipment
	0 With sensors
	1 Without sensors
	Version
	0 Panel-mounted with ProMinent Logo
	Sample water treatments
	0 Without
	1 with filter (not for measured variable D0, Z0)
	Certifications
	01 CE (Standard)

Documentation language

DE English
EN English
ES Spanish
IT Italian
FR French
FI Finish
BG Bulgarian
CN Chinese
CZ Czech
DK Danish
EE Estonian
GR Greek
HU Hungarian
JP Japanese
KR Korean
LT Lithuanian
LV Latvian
NL Dutch
PL Polish
PT Portuguese
RO Romanian
RU Russian
SE Swedish
SK Slovakian
SL Slovenian
SV Swedish
TH Thai

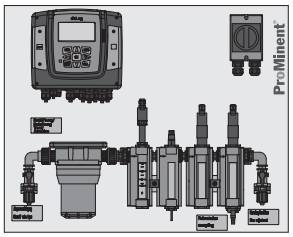
DWCa	P	1	C0	P0	9	0	1	0	0	0	1	01	EN	Identity code as a representative example

Third measured variable can always be retrofitted on site with the DGMa (additional module is provided). With the DLGIII : an amperometric measured variable and up to two measured variables with PG13.5 connector are available.

Permissible measured variable combinations for DULCOTROL® DWCa_P Potable water/F&B see → 3-4

3.1 Measuring and Control Points DULCOTROL® DWCa_P Potable Water/F&B

3.1.4 Examples of DULCOTROL® DWCa_P Potable Water/F&B



P_DCT_0038_SW1
similar figure

Example 1: DWCa_P_1_D0_I0_0_D_1_0_0_0_0_01_EN

Application in potable water/F&B:

Measurement of chlorine dioxide and chlorite in potable water/product water with an upstream filter (10µm). Controller with integrated data logger and communication interface Profinet®.

Controller

- DACBW006VA4000G11010EN

Fitting

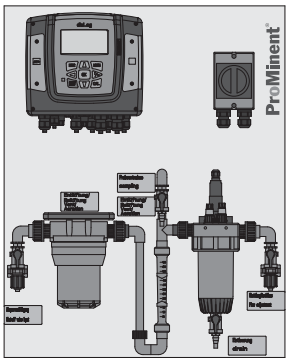
- DGM_A_3_2_0_T_0_0_2:
  - 1 measuring module: Chlorine dioxide sensor
  - 1 measuring module: Chlorite sensor
  - 1 flow control module

Sensors

- CDE-2-mA 0.5 ppm
- CLT1-mA-0.5 ppm

Plate-mounted water treatment system

- Filter



P_DCT_0035_SW1
similar figure

Example 2: DWCa_P_2_P0_C0_9_0_1_1_0_0_1_01_EN

Application in potable water/F&B:

Two-way control of pH and chlorine in rinsing water. The sample water is filtered through a 100 µm filter. The controller contains a relay protective RC circuit and a data logger.

Controller

- DACBW006VA4000011010EN

Fitting

- DLG III for pH and chlorine monitoring + flow control

Sensors

- CBR1-mA 2ppm
- PHER 112-SE

Plate-mounted water treatment system

- Filter

3.2 Measuring and Control Points DULCOTROL® DWCa_W Waste Water

3.2.1 Overview of DULCOTROL® DWCa_W Waste Water

The compact measuring and control system for the reliable monitoring and treatment of waste water. NEW: now based on the DACb controller instead of the DACa controller

Monitoring and treatment of waste water with DULCOTROL® Waste Water – the compact measuring and control system specially designed for applications in municipal and industrial waste water treatment.

The DULCOTROL® measuring and control systems for the waste water application are used in all industry sectors where waste water is treated. All the necessary components are mounted on a polypropylene plate and are ready to connect. The choice of components is matched to the application. The measuring and control systems can be configured using the relevant identity code ordering system. With the "panel-mounted" version, all of the components except the sensors are mounted on a polypropylene plate. The DULCOTROL® ordering system works with user-based selection criteria so that you can select the most appropriate measuring and control system, largely without technical knowledge. One or two measured variables can be configured in each product range.

Your benefits

- **NEW:** A third measuring point can be retrofitted on site if the size of the bypass fitting permits this.
- **NEW:** All communication interfaces of the DACb controller and connection to DULCOnneX are possible.
- Availability of all key chemical measured parameters for water treatment
- Application-optimised configuration of the components using user-based order criteria
- Configuration of 1 or 2 complete measuring and control points on a plate
- The equipment of the controllers can be selected.
- Flexible adaptation to special applications and measuring ranges by designing the measuring and control points without sensors and ordering the sensor type and measuring range separately
- Ready-to-connect plug-and-play measuring and control points for quick, easy installation and commissioning
- Extensive optional accessories (pressure reducers, filters, heat exchangers, sample water pump)

Technical Details

- Installation in the bypass of the main water line through which the medium flows
- Max. pressure, depending on design: 1 bar/3 bar/6 bar
- Flow, depending on design: 15...40 l/h/ 40...65 l/h/ 300...500 l/h
- Max. medium temperature: primarily up to 45 °C, the versions for the identity code specification: “Water to be measured" "H" (hot water) up to 65 °C (max. 2 bar)
- Ambient temperature: +5...50 °C
- Degree of protection: IP65
- Power supply: 90-240 V, 50/60 Hz

Field of application

- Treatment of industrial and municipal waste water
- pH neutralisation
- Disinfection
- Detoxification
- Desalination of process water
- Control of dissolved oxygen
- Monitoring

3.2 Measuring and Control Points DULCOTROL® DWCa_W Waste Water

3.2.2 Permissible measured variable combinations for DULCOTROL® DWCa_W Waste water

Sample water 4,5,7: clear and turbid waste water

Measured variable 1 (channel 1)		Measured variable 2 (channel 2)													
		00	C0	C1	G0	P0	R0	D0	I0	L0	Z0	F0	H0	A0	X0
Free chlorine > pH 8	C1	x				x	x								
Total chlorine (free and combined chlorine)	G0	x				x	x								
pH	P0	x				x									
ORP	R0	x				x									
Chlorine dioxide	D0	x				x	x								
Chlorite	I0	x													
Conductivity	L0	x				x	x								
Ozone	Z0	x				x	x								
Fluoride	F0	x				x									
Hydrogen peroxide	H0	x				x									
Peracetic acid	A0	x				x				x					

Sample water H: Potable and product water, 45 °C...65 °C

Measured variable 1 (channel 1)		Measured variable 2 (channel 2)													
		00	C0	C1	G0	P0	R0	D0	I0	L0	Z0	F0	H0	A0	X0
Free chlorine	C1	x				x									
pH	P0	x				x									
ORP	R0	x				x									
Conductivity	L0	x				x	x								

When ordering, state the identity code in the above order of measured variable 1/measured variable 2 i.e. DWCa W... C0_P0... and not DWCa W... P0_C0...

Other measured variable combinations on request.

3.2.3 Identity Code Ordering System for DULCOTROL® DWCa_W Waste Water

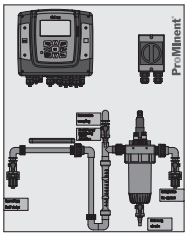
DWCa	Application													
	W	Waste water												
		Water to be measured												
		4	Clear waste water											
		5	Waste water with solid particle fraction, turbid											
		7	Waste water, clear or turbid, with fluoride content and pH < 7											
		H	Hot water to max. 65 °C, at max. 2 bar (measured variables C1, P0, R0, L0 only)											
			Channel 1, measured variable 1											
			C1	Free chlorine										
			G0	Total chlorine (free and combined chlorine)										
			P0	pH										
			R0	ORP										
			D0	Chlorine dioxide										
			I0	Chlorite										
			L0	Conductivity										
			Z0	Ozone										
			F0	Fluoride										
			H0	Hydrogen peroxide										
			A0	Peracetic acid										
			X0	Dissolved oxygen										
				Channel 2, measured variable 2 (optional)										
				00	none									
				C1	Free chlorine									
				G0	Total chlorine (free and combined chlorine)									
				P0	pH									
				R0	ORP									
				D0	Chlorine dioxide									
				I0	Chlorite									
				L0	Conductivity									
Documentation language				Z0	Ozone									
DE	English			F0	Fluoride									
EN	English			H0	Hydrogen peroxide									
ES	Spanish			A0	Peracetic acid									
IT	Italian			X0	Dissolved oxygen									
FR	French				**Measuring - Controlling**									
FI	Finish				9	All measured variables bidirectionally controllable								
BG	Bulgarian					**Communication interface**								
CN	Chinese					0	Without							
CZ	Czech					A	Modbus RTU, terminal							
DK	Danish					4	PROFIBUS® DPV1, terminal							
EE	Estonian					E	LAN with web server, connection via M12 C coded							
GR	Greek					G	Profinet (2xM12)							
HU	Hungarian					D	DULCOnneX (appears in the scope of delivery as a separate unit)							
JP	Japanese						**Data logger**							
KR	Korean						1	Data logger with measured value display on SD card						
LT	Lithuanian							**Hardware expansion**						
LV	Latvian							1	Protective RC circuit for power relay					
NL	Dutch								**Sensor equipment**					
PL	Polish								0	With sensors				
PT	Portuguese								1	Without sensors				
RO	Romanian									**Version**				
RU	Russian									0	Panel-mounted with ProMinent Logo			
SE	Swedish										**Sample water treatments**			
SK	Slovakian										0	Without		
SL	Slovenian										1	With filter(not for measured variable D0, Z0)		
SV	Swedish											**Certifications**		
TH	Thai											01	CE (Standard)	

DWCa	W	1	C0	P0	9	0	1	0	0	0	1	01	EN	Identity code as a representative example

Third measured variable can be retrofitted on site: a total of one amperometric measured variable and up to two measured variables are possible with a PG13.5 connector.

Permissible measured variable combinations for DULCOTROL® DWCa_W Waste water see → 3-8

3.2.4 Examples of DULCOTROL® DWCa_W Waste Water



P_DCT_0037_SW1
Similar figure

Example 3: DWCa_W_5_H0_00_9_A_1_1_0_0_1_01_EN

Waste water application:

Bidirectional control of the hydrogen peroxide in turbid waste water. The controller contains an RC circuit to protect the relays, a data logger and a Modbus RTU communication interface.

Controllers

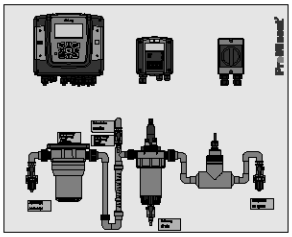
- DACBW006L34000A11010EN

Fitting

- DLG III for hydrogen peroxide + flow control

Sensors

- H_2O_2 sensor PEROX-H2.10.P
- PEROX transducer V2
- Pt100 temperature sensor



P_DCT_0039_SW1
similar figure

Example 4: DWCa_W_5_P0_L0_9_D_1_1_0_0_0_01_EN

Waste water application:

Bidirectional control of pH and measurement of conductivity in turbid waste water. The controller contains an RC circuit to protect the relays, a data logger and a DULCOnneX communication interface (appears in the scope of delivery as a separate unit).

Controller

- For pH: DACa PA 6 1 4 0 0 0 0 1 1 01 0 EN
- For conductivity: Compact controller

Fitting

- Piping + flow control

Sensors

- ICT 5
- PHEX 112-SE

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

3.3.1 Technical Description of Controllers

(for more exact information see chapter Measuring and Control Technology)

The DULCOMETER® diaLog DACb controller is used for the measurement of all measured variables with the exception of conductivity. The Compact controller is configured for conductivity measurement.

The DULCOMETER® diaLog DACb controller used with the DULCOTROL® DWCb can be selected as a single or two-channel controller. The third measuring channel can be configured on site, as required, providing the selected sensor fitting allows this. The following versions of the device can be separately selected using the DULCOTROL® identity code ordering system:

- Specification: **Communication interface**
  This specification defines the type of communication interface on the controller.
- Specification: **Data logger**
  All controller versions include a data logger as standard.
- Specification: **Hardware expansion**
  This specification defines whether a protective RC circuit should be available to protect relays subject to higher loading.

Hardware version and identity code of diaLog DACb controllers:

DACb - description of the hardware	Identity code of DACb
Package 4, three measured variables by 2 no. mV/mA modules, without communication	DACBW006VA400001101000XX
Package 4, three measured variables by 1 no. mV/mA module and 2 no. conductive conductivity/temperature modules, without communication	DACBW006L3400001101000XX
Package 4, three measured variables by 2 no. mV/mA modules, with Modbus RTU	DACBW006VA4000A1101000XX
Package 4, three measured variables by 1 no. mV/mA module and 2 no. conductive conductivity/temperature modules, with Modbus RTU	DACBW006L34000A1101000XX
Package 4, three measured variables by 2 no. mV/mA modules, with Profibus DPV1	DACBW006VA4000B1101000XX
Package 4, three measured variables by 1 no. mV/mA module and 2 no. conductive conductivity/temperature modules, with Profibus	DACBW006L34000B1101000XX
Package 4, three measured variables by 2 no. mV/mA modules, with LAN web server	DACBW006VA4000E1101000XX
Package 4, three measured variables by 1 no. mV/mA module and 2 no. conductive conductivity/temperature modules, with LAN web server	DACBW006L34000E1101000XX
Package 4, three measured variables by 2 no. mV/mA modules, with Profinet	DACBW006VA4000G1101000XX
Package 4, three measured variables by 1 no. mV/mA module and 2 no. conductive conductivity/temperature modules, with Profinet	DACBW006L34000G1101000XX

	Water to be measured	Compact controller identity code
Compact controller for conductive conductivity	1	DCCa W 00 6 L3 0 01 0 XX
Compact controller for inductive conductivity	2, 4, 5, 7	DCCa W 00 6 L6 0 01 0 XX

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

3.3.2 Technical Description of Sensors

(For detailed information see chap. Sensor Technology DULCOTEST®)

The identity code specifications "Application", "Measured variable" and "Water to be measured" define the sensor type to be used as specified below in the tables.

If another sensor type is necessary, the measuring/control panel can also be supplied without sensors (see identity code specification: "Sensor equipment"). The desired sensor should then be ordered separately.

Sensor types for the defined specifications "measured variable" and "water to be measured" for the potable water ("P") application

Measured variable		Water to be measured	Sensor type	Order no.
Free chlorine with pH value < 8	C0	1	CLE 3-mA-0.5 ppm	792927
Free chlorine with pH value > 8	C1	1	CBR 1-mA-0,5 ppm	1038016
Free chlorine	C1	2	CBR 1-mA-2 ppm	1038015
Free chlorine	C1	H	CLO 2-mA-2 ppm	1033878
Total chlorine	G0	1	CTE 1-mA-0.5 ppm	740686
Total chlorine	G0	2	BCR 1-mA-2 ppm	1040115
pH	P0	1	PHEP 112 SE	150041
pH	P0	2	PHER 112 SE	1001586
ORP	R0	1	RHEP-Pt-SE	150094
ORP	R0	2	RHER-Pt-SE	1002534
ORP combined with ozone: R0 Z0	Z0	1/2	RHEP-Au-SE	1003875
Chlorine dioxide	D0	1	CDE 2-mA-0.5 ppm	792930
Chlorine dioxide (temperature-corrected)	D0	2	CDR 1-mA-2 ppm	1033393
Chlorite	I0	1/2	CLT 1-mA-0.5 ppm	1021596
Conductivity, conductive	L0	1	LFTK 1 DE	1002822
Inductive conductivity	L0	2	ICT 5	1095248
Ozone	Z0	1/2	OZE 3-mA-2 ppm	792957
Fluoride (temp.corr.)	F0	1/2	FLEP 010-SE / FLEP 0100-SE	1028279
			Reference electrode REFP-SE	1018458
			Pt 100 SE	305063
			Measuring transducer 4-20 mA FPV1	1028280
Hydrogen peroxide	H0	1	H_2O_2 sensor PEROX-H2.10 P	792976
			PEROX Transducer V2	1047979
			Pt 100 SE temperature sensor	305063
Hydrogen peroxide	H0	2	PER 1-mA-2000 ppm	1022510
Peracetic acid	A0	1	PAA 1-mA-200 ppm	1022506
Peracetic acid	A0	2	PAA 1-mA-2000 ppm	1022507
Dissolved oxygen	X0	1/2	DO 3-mA-20 ppm	1094609

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

Sensor types for the defined specifications "measured variable" and "water to be measured" for the waste water ("W") application

Measured variable		Sample water	Sensor type	Order no.
pH	P0	4	PHEP 112 SE	150041
pH	P0	5	PHER 112 SE	1001586
pH	P0	6	PHEX 112 SE	305096
pH	P0	7	PHEF 012 SE	1010511
ORP	R0	4	RHEP-Pt-SE	150094
ORP	R0	5	RHER-Pt-SE	1002534
ORP	R0	6	RHEX-Pt-SE	305097
ORP combined with ozone: R0 Z0	Z0	1/2	RHEP-Au-SE	1003875
Fluoride (temp.corr.)	F0	4/5/7	FLEP 010-SE / FLEP 0100-SE	1028279
			Measuring transducer 4-20 mA FP 100 V1	1031331
			Reference electrode REFP-SE	1018458
Inductive conductivity	L0	4/5/6/7	ICT 5	1095248
Total chlorine	G0	4/5	BCR 1-mA-2 ppm	1040115
Free chlorine	C1	4/5	CBR 1-mA-2 ppm	1038015
Free chlorine	C1	H	CLO 2-mA-2 ppm	1033878
Hydrogen peroxide	H0	4/5	H_2O_2 sensor PEROX-H2.10 P	792976
			PEROX Transducer V2	1047979
			Pt 100 SE temperature sensor	305063
Dissolved oxygen	X0	4/5	DO 3-mA-20 ppm	1094609
Ozone	Z0	4/5	OZE 3-mA-2 ppm	792957
Chlorine dioxide (temperature-corrected)	D0	4/5	CDR 1-mA-2 ppm	1033393
Peracetic acid	A0	4/5	PAA 1-mA-200 ppm	1022506

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

3.3.3 Technical Description of Sensor Fittings

(For detailed information see chap. Sensor Technology DULCOTEST®)

The bypass fitting used depends in particular on the water to be measured but sometimes also on the measured variable or the combination of measured variables.

Sensor fittings in DULCOTROL® DWCa_P Potable water/F&B

Fitting type DGMa is used in the DULCOTROL® DWCa_P Potable water/F&B for all clear types of water similar to potable water. Fitting type DLG III is used for rinsing/industrial/process water with a turbid appearance in application "P".

Measured variable (sensor type)	Sample water	Sensor type
Free chlorine	1	DGMa
Total chlorine	1	DGMa
pH	1	DGMa
ORP	1	DGMa
Chlorine dioxide (CDE 2)	1	DGMa
Chlorite	1	DGMa
Conductivity (conductive)	1	DGMa
Ozone	1	DGMa
Hydrogen peroxide	1	DGMa
Peracetic acid	1	DGMa
Temperature	1	DGMa
Free chlorine	2	DLGIII
Total chlorine	2	DLGIII
pH	2	DLGIII
ORP	2	DLGIII
Chlorine dioxide (CDR)	2	DLGIII
Chlorite	2	DLGIII
Ozone	2	DLGIII
Hydrogen peroxide	2	DLGIII
Peracetic acid	2	DLGIII
Temperature	2	DLGIII
Conductivity, inductive	2	ICT 3 in T-piece
Fluoride (temp.corr.)	1/2	DLGIV
Dissolved oxygen (DO3)	1	Adapter d75 pipe

Sensor fittings in DULCOTROL® DWCa_W Waste Water

Fitting DLGIII is used in the DULCOTROL® DWCa_W Waste Water for all clear water or water with a minimal solids fraction.

Measured variable	Sample water	Sensor type
Chlorine dioxide (CDR)	4/5	DLGIII
Fluoride	4/7	DLG IV (PVC) + magnetic stirrer
Dissolved oxygen (DO3)	4/5	DLGIII
Total chlorine	4/5	DLGIII
Conductivity, inductive (ICT 5)	4/5/6	Adapter for PVC pipe DN 40 (bypass on plate)
Ozone	4/5	DLGIII
ORP	4/5	DLGIII
Temperature	4/5	DLGIII
Hydrogen peroxide	4/5	DLGIII
pH	4/5/7	DLGIII

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

3.3.4 Technical Description of the Hydraulic Connector/Pipework

An 8x5 mm hose connector is used as the sample water hydraulic connection for the "water to be measured" 1, 2, 4, 5, 7. Generally there is a shut-off ball valve fitted upstream and downstream of the bypass fitting. If ordered, a sample water filter is fitted upstream of the bypass fitting. The bypass fittings each contain a sampling tap. A metal pin is incorporated in the bypass fittings for potential equalisation.

3.3.5 Technical Description of Optional Accessories

Type		Sample water	Order no.
Pressure reducer DO 6F 1/2"	0,5 – 10 bar	1	302104
Pressure reducer V 82	0,5 – 10 bar	2	1031212
Sample water pump vonTaine® 0502 PP/FPM	Maximum flow, 1800 l/h; max. capacity: 4.5 m	1, 2, 4, 5, 7	1023089
Filter housing	–	1, 2, 4, 5, 7	1045244
Filter element	10 µm	1	1031210
Filter element	100 µm	2, 4, 5, 7	1031211

3.3 Technical Description of the Scope of Delivery of Measuring and Control Points DULCOTROL® DWCa

4.0 Measuring and control system for cooling water treatment

4.0.1 Measuring and control system for cooling water treatment

The measuring and control plate with the AEGIS II controller represents a compact unit for the reliable monitoring and treatment of cooling water. Optimum cooling water treatment is guaranteed by the measurement of all the necessary measuring parameters, including conductivity, pH value, ORP value and oxidative biocides, such as chlorine, chlorine dioxide or bromine concentration, and the volume-proportional addition of auxiliary chemicals, such as inhibitors or dispersants.

The AEGIS II uses a data logger to document the consumption of chemicals as well as the volume of additional water fed in and the bleed frequency. The reports based on these data can be sent daily by email to up to 5 addressees. Furthermore, the AEGIS II can also e-mail alerts in the event of faults. This might include the maximum bleeding duration or the maximum metering volume being exceeded.

The device configuration and visualisation by smartphone and tablet can be clearly presented, thanks to the Wi-Fi function of the AEGIS II.

	PM-1, Order No. 1093705	PM-2, Order No. 1093706	PM-3, Order No. 1093707	PM-5, Order No. 1097168	PM-6, Order No. 1097170	PM-7 with DULCOnneX, Order No. 1097171
Conductivity	X	X	X	X	X	X
pH measurement	X	X	X	X	X	X
ORP measurement	X	X	X	X	X	X
Flow switch	X	X	X	X	X	X
Corrosion measurement, copper		X	X		X	
Corrosion measurement, construction steel		X	X		X	
Fluoride sensor			X			
Chlorine measurement				X	X	
Pressure reduction				optional	optional	
DULCOnneX						X

Components

The measuring and control plate PM AEGIS II EU - type PM-1 consists of:

- AEGIS II controller, type AGIB006W0T1CTXXXXV2XXW0022001. Input for conductivity sensors (including temperature and flow), pH and ORP. Inclusive of Wi-Fi function and data logger. Control of a cooling tower with activation of metering pumps.
- CTFS sensor for conductivity/temperature/flow, fully assembled, for the measurement of conductivity, temperature and flow.
- pH sensor PHEI-112-SE for the pH value measurement in industrial water containing solids.
- ORP sensor RHEIC-Pt-SE for ORP value measurement in industrial water containing solids.
- Manometer for pressure display (also for flow control).
- 2 PVC ball valves for shut-off of the feed and discharge line.
- Stopcock for drainage of the sample medium (no sampling tap as not flammable).
- Filter insert 0.5 mm acting as a filter in the feed.
- Complete PVC pipework including brackets etc. and screw adapters for the sensors contained in the scope of delivery.

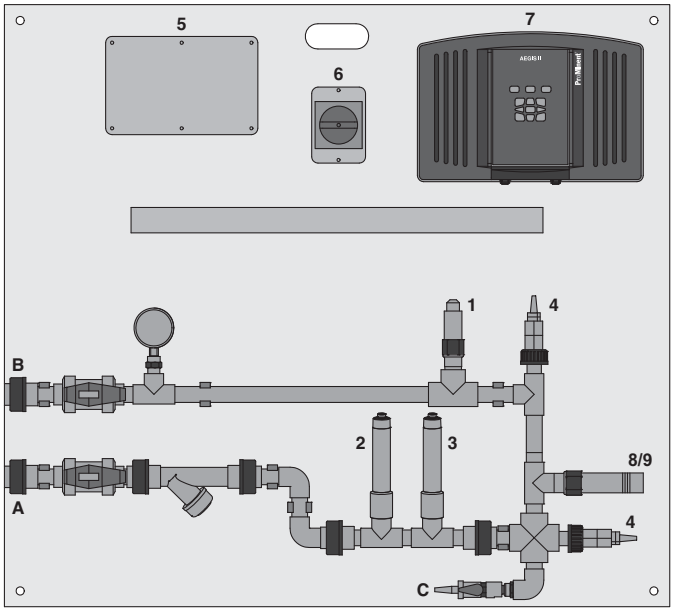
The measuring plate is supplied fully assembled and electrically wired. The measuring plate features an Emergency Stop switch and also has CE certification.

Dimensions of the measuring plate: 950 x 1,050 mm (HxW)

	Order no.
Measuring plate PM AEGIS 2 EU - type PM-1	1093705

4.0 Measuring and control system for cooling water treatment

Pos.	
1	CTFS sensor for conductivity/temperature/ flow, fully assembled (Order no. 1081727)
2	pH sensor PHEI 112 SE (Order no. 1076610)
3	ORP sensor RHEI C (Order no. 1082281)
4	Mounting points for corrosion sensor
6	Master switch
7	AEGIS® II cooling tower controller
8/9	Fluorosensor or chlorine sensor
A	Sample water feed, DN 20
B	Sample water drain, DN 20
C	Sampling



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Measuring plate PM AEGIS 2 EU - type PM-1, basic version equipment

Item		Quantity/No.	Order no.
7	AGIBEU006W0T1CTXXXXV2XXW0022001	1	
1	CTFS sensor conductivity/temperature/flow complete	1	1081727
2	Industrial pH sensor, without glass	1	1095385
3	Industrial ORP sensor, without glass	1	1095386

Measuring plate PM AEGIS 2 EU - type PM-2, equipment addition to basic version

Item		Quantity/No.	Order no.
7	AGIBEU006W0T1CTXXXXV2XXW0022001	1	
4	Corrosion sensor basic CRS LPR	2	1092242
4	CRS-CS construction steel corrosion tip set	1	1092276
4	CRS-CU copper corrosion tip set	1	1092277

Measuring plate PM AEGIS 2 EU - type PM-3, equipment addition to basic version

Item		Quantity/No.	Order no.
7	AGIBEU006W0T1CTXXXXV2XXW0022001	1	
–	Fluorosensor Little Dipper® (Tracer Sensor)	–	1059104

Measuring plate PM AEGIS 2 EU - type PM-5, equipment addition to basic version

Item		Quantity/No.	Order no.
7	AGIB006W0T1CTXXD1V2AAW0022001	1	1093712
4	Corrosion sensor basic CRS LPR	2	1092242
4	CRS-CS construction steel corrosion tip set	1	1092276
4	CRS-CU copper corrosion tip set	1	1092277
9	CBR 1-mA-2 ppm	1	1038015

Important: The pressure reducing unit Order No. 1095885 is needed with pressures of more than 1 bar!

4.0 Measuring and control system for cooling water treatment

Measuring plate PM AEGIS 2 EU - type PM-6, equipment addition to basic version

Item		Quantity/No.	Order no.
7	AGIBEU006W0T1CTXXXXV2XXW0022001	1	
4	Corrosion sensor basic CRS LPR	2	1092242
4	CRS-CS construction steel corrosion tip set	1	1092276
4	CRS-CU copper corrosion tip set	1	1092277
9	CBR 1-mA-2 ppm	1	1038015

Important: The pressure reducing unit Order No. 1095885 is needed with pressures of more than 1 bar!

Measuring plate PM AEGIS 2 EU - type PM-7 with DULCOnneX, equipment additional to basic version

Item		Quantity/No.	Order no.
7	AGIBEU006W0T1CTXXXXV2XXW0022001	1	
1	CTFS sensor conductivity/temperature/flow complete	1	1081727
2	Industrial pH sensor, without glass	1	1095385
3	Industrial ORP sensor, without glass	1	1095386
5	DULCOnneX gateway AGIb	1	1098723

Pressure reducing unit

Pressure reduction with system pressures of > 1 bar and chlorine sensors

Ready mounted on a PP plate, pre-piped in PVC DN 20, shut-off ball valves at the inlet and outlet side, dimensions: H x W = 200 mm x 600 mm, consisting of the following main components:

	Quantity	Unit	Order no.
Manometer NG 63 0-0006 bar 233.30.	1	EA	1040999
Pressure reducing valve DMV755 DN20 PVC-U FPM	1	EA	1095887

Corrosion sensors

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The corrosion sensors work on the so-called LPR principle: linear polarisation resistance. A sensor consists of the corrosion sensor basic LPR. It is fitted with the metal (corrosion tip set) used in the application. The corresponding alloy factor needs to be set in the monitor. If there is corrosion on the metal then the sensor can measure this electrochemically and the monitor (AEGIS II) can display the value. The measurement is not an absolute measurement, rather it measures a trend. The advantage over gravimetric measurement is that the LPR measurement takes place without any time delay. The value is displayed by the monitor in the unit of measure MPY (mils per year). One mil corresponds to a thousandth of an inch, in metric terms 0.0254 mm.

	Order no.
Corrosion sensor basic CRS LPR	1092242
CRS-AM Admiralty brass corrosion tip set	1092274
CRS-CN Cu/Ni corrosion tip set	1092275
CRS-CS construction steel corrosion tip set	1092276
CRS-CU copper corrosion tip set	1092277
CRS-SS 1.4301/304 SS corrosion tip set	1092278
CRS-ZN zinc corrosion tip set	1092279

4.0 Measuring and control system for cooling water treatment

Fluorosensor

The Turner Designs Little Dipper® is a single-channel fluorosensor for measuring the concentration of fluorophor in process water. The metered chemical needs to contain PTSA for this. The sensor delivers a 4 - 20 mA output signal proportional to the concentration of the PTSA fluorophor in the process water.

Measuring principle: A light source irradiates the process water and stimulates the fluorophor in the solution, which emits light of a different wavelength. The intensity of the emitted light is proportional to the concentration of the PTSA fluorophor in the process water.

	Order no.
Fluorosensor Little Dipper® (Tracer Sensor)	1059104

Retrofit module

	Order no.
mA/mA output modules	1092565
mA/mA sensor input modules	1081806
2x mV/mV temperature sensor input modules	1081807
Modules mA/mV + temperature sensor inputs	1081808
Module Modbus RTU + 2 mA outputs	1094377
DULCOnneX gateway AGIb	1098723
DULCOnneX connector M12x1 Ethernet 100 MHz	1098722
Corrosion sensor basic CRS LPR	1092242
CRS-CS construction steel corrosion tip set	1092276
CRS-CU copper corrosion tip set	1092277
Fluorosensor Little Dipper® (Tracer Sensor)	1059104

5.0 DULCODOS® Pool Swimming Pool Metering Systems

5.0.1 Overview

The metering systems DULCODOS® Pool ensure the best water quality. The systems are available in four different designs. It is easy to work out which type is best suited to your requirements.

Chlorine or active oxygen?

Historically, swimming pool water has always been treated with chlorine. Because it is an effective disinfectant and is highly oxidising, chlorine is also the chemical of choice for public pools. Clear and hygienically safe water is guaranteed.

The metering systems DULCODOS® Pool reliably keep the operating parameters in an optimum range and unpleasant side-effects, such as the smell of chlorine or burning eyes, are very rare.

Active oxygen is less effective than chlorine. It can be used for very gentle and environmentally-sound water treatment in pools with fewer users.

- **Soft**

DULCODOS® Pool Soft is especially suited to private pools used by a small number of people. It works with active oxygen substances, which are less effective than chlorine. Water treatment with active oxygen is a good alternative for ecologically-minded pool owners or if users are allergic to chlorine. DULCODOS® Pool Soft uses no chlorine chemicals.

- **Basic**

DULCODOS® Pool Basic regulates the pH and chlorine content using the redox potential. This is the direct measurement of effective oxidation in the water and is therefore an indication of the disinfectant effect and concentration of the metered chlorine. The concentration of chlorine cannot be determined with accuracy with this process. ORP measurements allow a particular range of chlorine to be set. DULCODOS® Pool Basic is robust and requires little maintenance.

- **Comfort**

DULCODOS® Pool Comfort uses highly specific chlorine sensors to measure the chlorine content. The concentration of chlorine in the water can be determined and set with accuracy. The effectiveness of the swimming pool filter is boosted by an integrated feeder assembly for flocculant – resulting in crystal-clear water! The metering system has become a real customer favourite with a host of comfort specifications, including display of the measured or calibration values via an integral data logger

or remote control via the integrated web server using a PC and also using an iPad or other

tablet PC it is connected to a Wi-Fi access point.

- **Professional**

DULCODOS® Pool Professional comes in three designs:

DULCOMARIN® 3 Compact Unit

is intended for the control of one filtration circuit. It can measure and regulate the measured variables pH, ORP, free chlorine, combined chlorine, total available chlorine and temperature.

DULCOMARIN® 3 Multipool Global Unit

A DULCOMARIN 3 Multipool system consists of a Global Unit with a 7" touch display. It is, as it were, the central control unit via which all controllers of all pools, the Local Units, can be fully controlled. There needs to be one installed in each system and there may only be one.

DULCOMARIN® 3 Multipool Local Unit

A DULCOMARIN 3 Multipool system can control up to 16 filtration circuits, e.g. 16 Local Units with a 7" touch display are needed. The controller is used to operate the local pool.

Every Local Unit controls a filtration circuit. They are connected to the Global Unit via cNet.

- **Choice of pumps**

The metering systems DULCODOS® Pool allow you to choose which metering pump to fit on your complete system. The choice of pump depends entirely on the size of your pool and how often it is used.

- **Peristaltic pumps DULCO®flex** are suited to applications requiring few chemicals, such as small pools or those used infrequently. The pump reliably eliminates bubbles of gas formed during periods of non-use. Depending on the amount of use, the metering hose has to be replaced once or twice a year.

5.0 DULCODOS® Pool Swimming Pool Metering Systems

- **Motor-driven metering pumps alpha** have a higher capacity and longer maintenance intervals. Like peristaltic pumps, they are silent.
- **Solenoid-driven metering pumps Beta®** are not controlled by switching them on and off, like DULCO®flex or alpha, instead, their metering frequency is adjusted continuously, enabling the pump to have an extremely precise control action.
- Pumps with **CAN bus system** can be used in the DULCODOS® Pool Professional series. They communicate all operating messages, such as two-stage monitoring of the chemical reservoir, to the control.

- **Accessories**

Whether you are looking for collecting pans for chemical tanks or portable test devices for measurement parameters – or even software for digital control: optional accessories make it even easier for you to operate the system.

- **Service**

Installation, commissioning, training in how the system works, operation and maintenance: When you buy a DULCODOS® Pool system, it comes with service you can rely on – even if your pool is already quite old.

5.1 DULCODOS® Pool Swimming Pool Metering Systems

5.1.1 Metering System DULCODOS® Pool Soft

Ecologically convincing: chlorine-free water treatment with active oxygen in private swimming pools.

For swimming pools with volumes up to 100 m³

Chlorine-free water treatment system for environmentally operated private pools. Safe water disinfection with active oxygen as a turnkey complete solution.

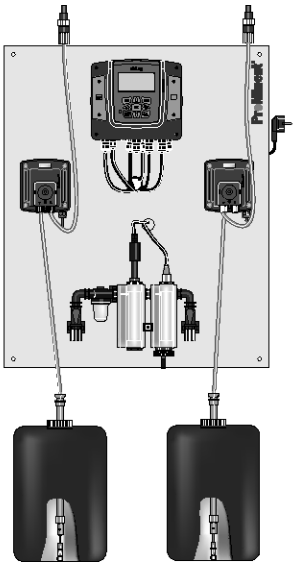
Complete system DULCODOS® Pool Soft for pH value adjustment and chlorine-free disinfection with active oxygen. To prevent any germs in the pool from building up resistance to active oxygen, it is not metered continuously, but injected at intervals controlled by a timer.

Peristaltic pumps of the product range DULCO®flex, motor-driven metering pumps type alpha or solenoid metering pumps type Beta® are used, depending on demand and the circulation volume.

When selecting the metering pump and pump capacity, please consider the concentrate of the hydrogen peroxide used. The concentration of the commercial product has been reduced in Germany by the legislature from wi = 32.8% to wi = 11.8%. The metering time and metering pump size need to be selected correspondingly to be able to meter volumes larger by a factor of 2.8. Depending on the product used, the metering volume is approx. 1.5 l per 10 m³.

Sensors, controllers and metering pumps form a unit with the chemical storage tanks, which can become operational without major installation work on your part.

The control device offers many convenient functions, such as the recording of measured values on an SD memory card or remote access via the integral WEB server and LAN interface (now also optionally available with DULCOnneX).



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Your benefits

- Simple, quick assembly
- Simple, menu-driven operation
- Chlorine-free
- Constantly good water quality
- Versatile monitoring functions

Technical Details

- 2-channel swimming pool controller Splash Control Pro⁺ with measurement/control of the pH value and metering of active oxygen using an integrated timer function, mounted on a wall plate ready for use.
- In-line probe housing with sample water monitoring, sample water filter and sensor for pH value
- Monitoring of the chemical reservoir
- Metering monitor to protect against over-metering
- Data logger with SD card
- Embedded web server with LAN interface (optional)
- Metering pumps alpha, DULCO®flex or Beta® to control the pH value and active oxygen content.
- Sensors used – pH sensor PHES-112-SE SLg100 (1051745)
- Connector for point of injection: Injection valves with 1/2" screw thread
- Connectors for metering pumps/points of injection: PVC hose 12x6 mm
- Sample water connector: PVC hose 12x6 mm
- Digital pause input
- Alarm relay output
- Electrical connection: 230 V AC, 50/60 Hz
- Dimensions with metering pumps alpha or Beta®:
  - 595 x 745 x 150 mm (W x H x D) mounting plate for measuring technology
  - 595 x 400 x 150 mm (W x H x D) mounting plate for pumps
- Dimensions with metering pumps DULCO®flex: 595 x 745 x 150 mm (W x H x D)
- Weight: approx. 10 kg or 6 kg (without pumps)
- Sensors used: Order no. 1051745 pH sensor PHES-112-SE SLg100

Field of application

- Private swimming pool

5.1 DULCODOS® Pool Swimming Pool Metering Systems

Identity Code Ordering System for DULCODOS® Pool Soft

DSPa	Measured variable	
	DO2	pH / Timer control H_2O_2
		Hardware-additional functions
		0 Standard
		D DULCOnneX
		Software-additional functions
		1 Archiving of measured data including SD card
		Communication interfaces
		0 none
		7 Embedded web server, LAN
		Electrical connection
		A 230 V, 50/60 Hz, European standard plug
		B 230 V, 50/60 Hz, Swiss plug
		C 230 V, 50/60 Hz, UK plug
		Sensor equipment
		0 with sensors
		1 without sensors
		Version
		0 with ProMinent® logo
		1 without ProMinent® Logo
		Language
		A Swedish
		D German
		E English
		F French
		G Czech
		I Italian
		N Dutch
		P Polish
		R Russian
		S Spanish
		Metering pumps for acids/alkalis
		0 without metering pumps
		1 0.8 l/h (DULCO®flex DF2a 0208)
		2 1.6 l/h (DULCO®flex DF2a 0216)
		3 2.4 l/h (DULCO®flex DF2a 0224)
		4 1.8 l/h (alpha ALPc 1002 PVT)
		5 3.5 l/h (alpha ALPc 1004 PVT)
		6 1.5 l/h (Beta® BT4b 0401 PVT)
		7 2.8 l/h (Beta® BT4b 0402 PVT)
		8 4.5 l/h (Beta® BT4b 0404 PVT)
		Multifunctional valve for acid/alkali pump
		0 without
		1 with MFV (only for alpha and Beta®)
		Metering pumps for disinfection
		0 without metering pumps
		1 0.8 l/h (DULCO®flex DF2a for 0208) for pools up to a volume of 20 m^3
		2 1.6 l/h (DULCO®flex DF2a for 0216) for pools up to a volume of 40 m^3
		3 2.4 l/h (DULCO®flex DF2a for 0224) for pools up to a volume of 60 m^3
		4 1.8 l/h (alpha ALPc 1002 PVT) for pools up to a volume of 45 m^3
		5 3.5 l/h (alpha ALPc 1004 PVT) for pools up to a volume of 90 m^3
		6 1.5 l/h (Beta® BT4b 0401 PVT) for pools up to a volume of 25 m^3
		7 2.8 l/h (Beta® BT4b 0402 PVT) for pools up to a volume of 50 m^3
		8 4.5 l/h (Beta® BT4b 0404 PVT) for pools up to a volume of 100 m^3
		Multifunctional valve for disinfection pump
		0 without
		1 with MFV (only for alpha and Beta®)
		Installation
		0 supplied loose without mounting plate
		1 assembled on a base plate
		Approvals
		0 with CE certification

DSPa	DO2	0	1	0	A	0	0	E	2	0	2	0	1	0	Identity code as a representative example

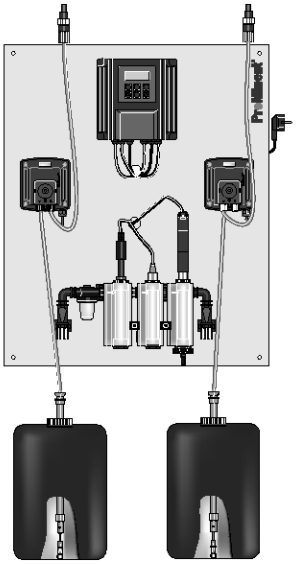
5.1.2 Metering System DULCODOS® Pool Basic

Convenient and simple: pure water in private swimming pools – fully automatically and correctly.

For swimming pools with a circulation capacity of up to 200 m^3/h

The chlorine metering system DULCODOS® Pool Basic is a complete solution for private swimming pools where the chlorine content is controlled using the low-maintenance measurement of the ORP potential.

Complete system for the fully automatic adjustment of pH and chlorine content (using the measured variable redox potential) in swimming pool water. Peristaltic pumps of the product range DULCO®flex or motor-driven metering pumps type alpha are used, depending on demand and the circulation volume. Sensors, controllers and metering pumps form a single perfectly coordinated unit with the chemical storage tanks, which can reliably get to work without a lot of installation effort on your part.



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Your benefits

- Simple, quick assembly
- Simple, menu-driven operation
- Constantly good water quality
- Versatile monitoring functions

Technical Details

- 2-channel swimming pool controller Splash Control with measurement, control and metering functions for pH and redox potential (chlorine metering)
- In-line probe housing with sample water monitoring, sample water filter and measuring probe for pH value and redox potential, fitted on a wall panel.
- 2 metering pumps alpha or DULCO®flex
- Monitoring of the chemical reservoir
- Metering monitor to protect against over-metering
- Sensors used: pH sensor PHES-112-SE SLg100 (1051745), RH sensor RHES-Pt -SE SLg100 (1051746)
- Connectors for points of injection: Injection valves with 1/2" screw thread
- Connectors for metering pumps/points of injection: PVC hose 12x6 mm
- Sample water connector: PVC hose 12x6 mm
- Digital pause input
- Alarm relay output
- Electrical connection: 230 V AC, 50/60 Hz
- Dimensions: 595 x 745 x 150 mm (W x H x D)
- Weight: approx. 10 kg or 6 kg (without pumps)
- Sensors used: pH sensor PHES-112-SE SLg10 (Order no. 1051745), ORP sensor RHES-Pt -SE SLg100 (Order no. 1051746)

Field of application

- Private swimming pool

5.1 DULCODOS® Pool Swimming Pool Metering Systems

Identity Code Ordering System for DULCODOS® Pool Basic

DSPa	Measured variable														
	PR0	pH / ORP													
		Hardware-additional functions													
		0	Standard												
			Software-additional functions												
			0	none											
				Communication interfaces											
				0	none										
					Electrical connection										
					A	230 V, 50/60 Hz, European standard plug									
					B	230 V, 50/60 Hz, Swiss plug									
						Sensor equipment									
						0	with sensors								
						A	without sensors								
							Version								
							0	with ProMinent® logo							
							1	without ProMinent® Logo							
								Language							
								D	German						
								E	English						
								F	French						
								G	Czech						
								I	Italian						
								N	Dutch						
								R	Russian						
								S	Spanish						
									Metering pumps for acids/alkalis						
									0	without metering pumps					
									1	0,8 l/h (DULCO®flex DF2a 0208)					
									2	1,6 l/h (DULCO®flex DF2a 0216)					
									3	2,4 l/h (DULCO®flex DF2a 0224)					
									4	1,8 l/h (alpha ALPc 1002 PVT)					
									5	3,5 l/h (alpha ALPc 1004 PVT)					
										Multifunctional valve for acid/alkali pump					
										0	without				
										1	with MFV (alpha only)				
											Metering pumps for disinfection				
											0	without metering pumps			
											1	0.8 l/h DULCO®flex for up to 45/10 m³/h circulation HB/FB*			
											2	1.6 l/h DULCO®flex for up to 90/20 m³/h circulation HB/FB*			
											3	2.4 l/h DULCO®flex for up to 140/30 m³/h circulation HB/FB*			
											4	1.8 l/h alpha for up to 100/20 m³/h circulation HB/FB*			
											5	3.5 l/h alpha for up to 200/40 m³/h circulation HB/FB*			
												Multifunctional valve for disinfection pump			
												0	without		
												0	with MFV (alpha only)		
													Installation		
													0	supplied loose without mounting plate	
													1	assembled on a base plate	
														Approvals	
														0	with CE certification
DSPa	PRO	0	0	0	A	0	0	E	2	0	2	0	1	0	Identity code as a representative example

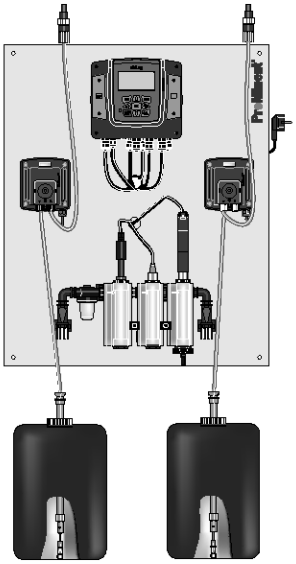
* Calculated for 12 % sodium-calcium hypochlorite
HB = Indoor swimming pool
FB = Outdoor swimming pool

5.1.3 Metering System DULCODOS® Pool Comfort

Convenient and simple: crystal-clear water in private swimming pools.

For swimming pools with a circulation capacity of up to 225 m^3/h

The chlorine metering system DULCODOS® Pool Comfort is the convenient solution for pH adjustment and disinfection of swimming pools with liquid chlorine products. Remote access is possible via LAN interface.



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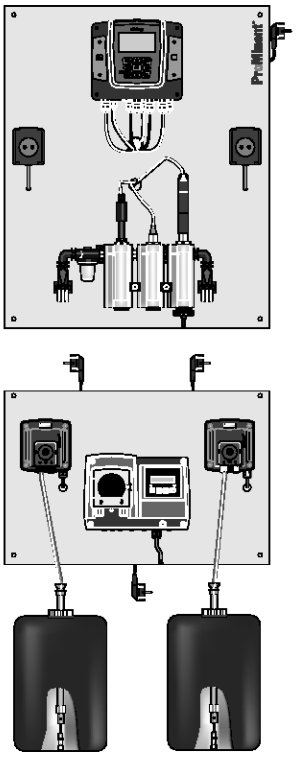

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Complete system DULCODOS® Pool Comfort for pH adjustment and disinfection with liquid chlorine products. Peristaltic pumps of the product range DULCO®flex, motor-driven metering pumps type alpha or solenoid metering pumps type Beta® are used, depending on demand and the circulation volume.

An integrated flocculant metering station (optional) ensures crystal-clear water.

Sensors, controllers and metering pumps form a unit with the chemical storage tanks, which can become operational without major installation work on your part.

The control device offers many convenient functions, such as the recording of measured values on an SD memory card or remote access via the integral WEB server and LAN interface (now also optionally available with DULCOnneX).

Your benefits

- Simple, quick assembly
- Simple, menu-driven operation
- Brilliant water quality
- Versatile monitoring functions

Technical Details

- 2-channel controller (pH/ORP or pH/chlorine) or 3-channel controller (pH/ORP/chlorine) Splash Control Pro+ with measurement, control and metering functions for pH value and chlorine concentration, ready mounted on a wall plate
- Integrated flocculant metering station (optional)
- In-line probe housing with sample water monitoring, sample water filter and measuring probes for pH and chlorine content (DC2 for free chlorine, DC4 for free chlorine in the presence of isocyanuric acid stabiliser)
- Monitoring of the chemical reservoir
- Metering monitor to protect against over-metering
- Data logger with SD card
- Embedded web server with LAN interface (optional)
- Metering pumps alpha, DULCO®flex or Beta® to control the pH value and chlorine content, DULCO®flex for metering flocculant (optional).
- Connector for point of injection: Injection valves with 1/2" screw thread
- Connectors for metering pumps/points of injection: PVC hose 12x6 mm
- Sample water connector: PVC hose 12x6 mm
- Digital pause input
- Alarm relay output
- Electrical connection: 230 V AC, 50/60 Hz
- Dimensions with metering pumps alpha or Beta® and/or with "flocculant metering" option:
  - 595 x 745 x 150 mm (W x H x D) mounting plate for measuring technology
  - 595 x 400 x 150 mm (W x H x D) mounting plate for pumps
- Dimensions with metering pumps DULCO®flex: 595 x 745 x 150 mm (W x H x D)
- Weight: approx. 10 kg or 6 kg (without pumps)

Field of application

- High-end private pool

5.1 DULCODOS® Pool Swimming Pool Metering Systems

Metering System DULCODOS® Pool Comfort

Disinfectant	Type	Measured variables
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	DR2	Comfort pH + ORP
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis, inline electrolysis	DR3	Comfort pH + ORP
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	DC2	Comfort pH + free chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis, inline electrolysis	DC4	Comfort pH + total available chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	DC5	Comfort pH + ORP + free chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis, inline electrolysis	DC6	Comfort pH + ORP + free chlorine
Trichloro-isocyanuric acid, sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	DC7	Comfort pH + free chlorine + combined chlorine

Measured variables and sensors

Type	pH sensor	ORP sensor	Free chlorine sensor	Combined chlorine sensor
DR2	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	–	–
DR3	pH sensor PHES-112-SE SLg100 (Order no. 1051745)	RHES-Au-SE SLg100 (Order no. 1092570)	–	–
DC2	pH sensor PHES-112-SE SLg100 (Order no. 1051745)	–	CLE 3-mA-2 ppm (Order No. 792920)	–
DC4	pH sensor PHES-112-SE SLg100 (Order no. 1051745)	–	CGE 3-mA-2 ppm (Order no. 1047959)	–
DC5	pH sensor PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	CLE 3-mA-2 ppm (Order No. 792920)	–
DC6	pH sensor PHES-112-SE SLg100	RHES-Au-SE SLg100 (Order no. 1092570)	CLE 3-mA-2 ppm (Order No. 792920)	–
DC7	pH sensor PHES-112-SE SLg100 (Order no. 1051745)	–	CLE 3-mA-2 ppm (Order No. 792920)	CTE 1-mA-2 ppm (Order no. 740685)

5.1 DULCODOS® Pool Swimming Pool Metering Systems

Identity Code Ordering System for DULCODOS® Pool Comfort

DSPa	Measured variable														
	DR2	pH/ORP (platinum)													
	DR2	pH/ORP (gold)													
	DC2	pH/free chlorine (chlorine sensor CLE 3-mA-2 ppm)													
	DC4	pH/free chlorine also in the presence of the stabiliser isocyanuric acid (chlorine sensor CGE 3-mA-2 ppm)													
	DC5	pH/ORP (platinum)/ chlorine (chlorine sensor CLE 3-mA-2 ppm)													
	DC6	pH/ORP (gold)/free chlorine (chlorine sensor CLE 3-mA-2 ppm)													
	DC7	pH/Cl free/Cl combined (chlorine sensors CLE 3-mA-2ppm, CTE 1-mA-2 ppm)													
		Hardware-additional functions													
		0	Standard												
		D	DULCOnneX												
			Software-additional functions												
			1	Archiving of measured data including SD card											
				Communication interfaces											
				0	none										
				7	Embedded web server, LAN										
					Electrical connection										
					A	230 V, 50/60 Hz, European standard plug									
					B	230 V, 50/60 Hz, Swiss plug									
					C	230 V, 50/60 Hz, UK plug									
						Sensor equipment									
						0	with sensors								
						B	Measured variable DC2 without sensors								
						C	Measured variable DC4 without sensors								
							Version								
							0	with ProMinent® logo							
							1	without ProMinent® Logo							
								Language							
								A	Swedish	I	Italian				
								D	German	N	Dutch				
								E	English	P	Polish				
								F	French	R	Russian				
								G	Czech	S	Spanish				
									Metering pumps for acids/alkalis						
									0	without metering pumps					
									1	0,8 l/h (DULCO®flex DF2a 0208)					
									2	1,6 l/h (DULCO®flex DF2a 0216)					
									3	2,4 l/h (DULCO®flex DF2a 0224)					
									4	1,8 l/h (alpha ALPc 1002 PVT)					
									5	3,5 l/h (alpha ALPc 1004 PVT)					
									6	1,5 l/h (Beta® BT4b 0401 PVT)					
									7	2,8 l/h (Beta® BT4b 0402 PVT)					
									8	4,5 l/h (Beta® BT4b 0404 PVT)					
										Multifunctional valve for acid/alkali pump					
										0	without				
										1	with MFV (only for alpha and Beta®)				
											Metering pumps for disinfection				
											0	without metering pumps			
											1	0.8 l/h DULCO®flex for up to 45/10 m³/h circulation HB/FB*			
											2	1.6 l/h DULCO®flex for up to 90/20 m³/h circulation HB/FB*			
											3	2.4 l/h DULCO®flex for up to 140/30 m³/h circulation HB/FB*			
											4	1.8 l/h alpha for up to 100/20 m³/h circulation HB/FB*			
											5	3.5 l/h alpha for up to 200/40 m³/h circulation HB/FB*			
											6	1.5 l/h Beta® for up to 85/20 m³/h circulation HB/FB*			
											7	2.8 l/h Beta® for up to 160/35 m³/h circulation HB/FB*			
											8	4.5 l/h Beta® for up to 260/55 m³/h circulation HB/FB*			
												Multifunctional valve for disinfection pump			
												0	without		
												1	with MFV (only for alpha and Beta®)		
													Installation		
													0	supplied loose without mounting plate	
													1	assembled on a base plate	
													B	Base plate with flocculant pump DF4a fitted	
														Approvals	
														0	with CE certification

DSPa	DC4	0	1	0	A	0	0	E	2	0	2	0	1	0	Identity code as a representative example

* Calculated for 12 % sodium-calcium hypochlorite
HB = Indoor swimming pool
FB = Outdoor swimming pool

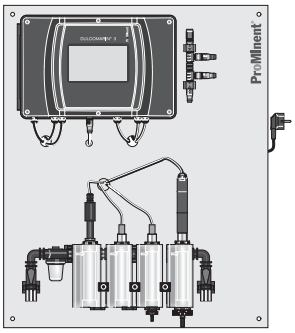
5.1 DULCODOS® Pool Swimming Pool Metering Systems

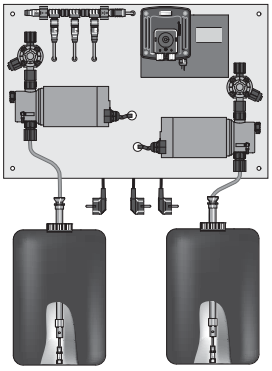
5.1.4 Metering System DULCODOS® Pool Professional

Professional and demanding: crystal-clear water in public swimming pools.

For swimming pools with a circulation capacity of up to 350 m³/h

Chlorine metering system for individual adjustment and monitoring of all common hygiene auxiliary parameters in public pools. DULCODOS® Pool Professional ensures crystal-clear water quality and lowers operating costs thanks to Eco!Mode.





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Complete system DULCODOS® Pool Professional for individual adjustment and monitoring of all common hygiene auxiliary parameters in public pools, such as pH, ORP and free and combined chlorine. Peristaltic pumps of the product range DULCO®flex, motor-driven metering pumps type alpha or solenoid metering pumps type Beta® are used, depending on demand and the circulation volume.

An integrated flocculant metering station (optional) ensures crystal-clear water.

In Eco!Mode, the circulating volume of the swimming pool pumps is optimised depending on the water quality, enabling you to efficiently save energy.

The system can be easily integrated into a PLC or building control system, thanks to the standard Modbus RTU interface. Operation is easily possible by VNC server via LAN and optional Wi-Fi.

Sensors, controllers, metering pumps and the process chemical storage tanks form a single unit with the other peripheral swimming pool technology used, which can handle your work without a lot of installation effort on your part.

Your benefits

- Simple, quick assembly
- Brilliant water quality
- Eco!Mode helps cut operating costs
- Versatile communication interfaces
- Central control of peripheral devices and functions too

Technical Details

- Multi-channel, multi-parameter controller DULCOMETER® DULCOMARIN® 3 with measuring, control and metering functions for pH value, redox potential, free and combined chlorine in various combinations depending on the type, ready-wired for use and mounted on a wall plate
- Optional integrated flocculant metering station
- In-line probe housing with sample water monitoring, sample water filter and all sensors
- Monitoring of the chemical supply with pre-alarm
- Metering monitor to protect against over-metering
- Screen plotter for graphic mapping of measured values, data logger with USB connector
- Standard LAN interface with optional Wi-Fi interface for operation of the unit by VNC app
- Modbus RTU for integration into building management systems, alarm function by text or e-mail (optional)
- Metering pumps alpha, DULCO®flex or Beta® for the regulation of pH value and chlorine content, DULCO®flex for flocculant metering (optional)
- Connector for point of injection: Injection valves with 1/2" screw thread
- Connectors for metering pumps/points of injection: PVC hose 12x6 mm
- Sample water connector: PVC hose 12x6 mm.
- Digital pause input
- 8 digital control inputs, for Pause control, sample water errors and connection of chemical level switches
- CANbus for connection of chlorine measuring cells and metering pumps Beta® and DULCO®flex DF4a
- Temperature measuring input Pt 100/Pt 1000
- 6 output relay outputs, freely configurable
- 4 analogue outputs 0/4-20 mA, freely configurable (option B)
- Electrical connection: 230 VAC, 50/60 Hz.
- Dimensions with metering pumps DULCO®flex DF2a, alpha, Beta® or DULCO®flex DF4a or with “flocculant metering” option:
  - 595 x 745 x 150 mm (W x H x D) mounting plate for measuring technology
  - 595 x 400 x 150 mm (W x H x D) mounting plate for pumps
- Weight: approx. 12 kg or 7 kg (without pumps)

Field of application

- High-end private pool
- Public swimming pool
- Therapy pool

5.1 DULCODOS® Pool Swimming Pool Metering Systems

Type	Measured variables: pH	ORP	Chlorine	Chlorine/isocyanuric acid	Combined chlorine
PD5	x	x			
PD6	x		x		
PD7	x	x	x		
PD8	x	x	x		x
PD9	x			x	
PDA	x	x		x	
PDD	x	x		x	x

Type PD5: pH value and ORP (chlorine metering)

Type PD6: pH value and free chlorine

Type PD7: pH value, ORP potential and free chlorine

Type PD8: pH value, ORP potential, free chlorine and combined chlorine

Type PD9: pH value and free chlorine in the presence of the stabiliser isocyanuric acid

Type PDA: pH value, ORP potential and free chlorine in the presence of the stabiliser isocyanuric acid

Type PDD: pH value, ORP potential, free chlorine in the presence of the stabiliser isocyanuric acid and combined chlorine

DSPa - Pool Comfort - disinfectant, measured variable and sensors used

Disinfectant	Type	Measured variables
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PD5	Professional pH + ORP
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PD6	Professional pH + chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PD7	Professional pH + free chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PD8	Professional pH + free chlorine + combined chlorine
Trichloro-isocyanuric acid, sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PD9	Professional pH + free chlorine
Trichloro-isocyanuric acid, sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PDA	Professional pH + ORP + free chlorine
Sodium-calcium hypochlorite, chlorine gas, calcium hypochlorite, membrane electrolysis	PDO	Professional pH + ORP + free chlorine

Measured variables and sensors

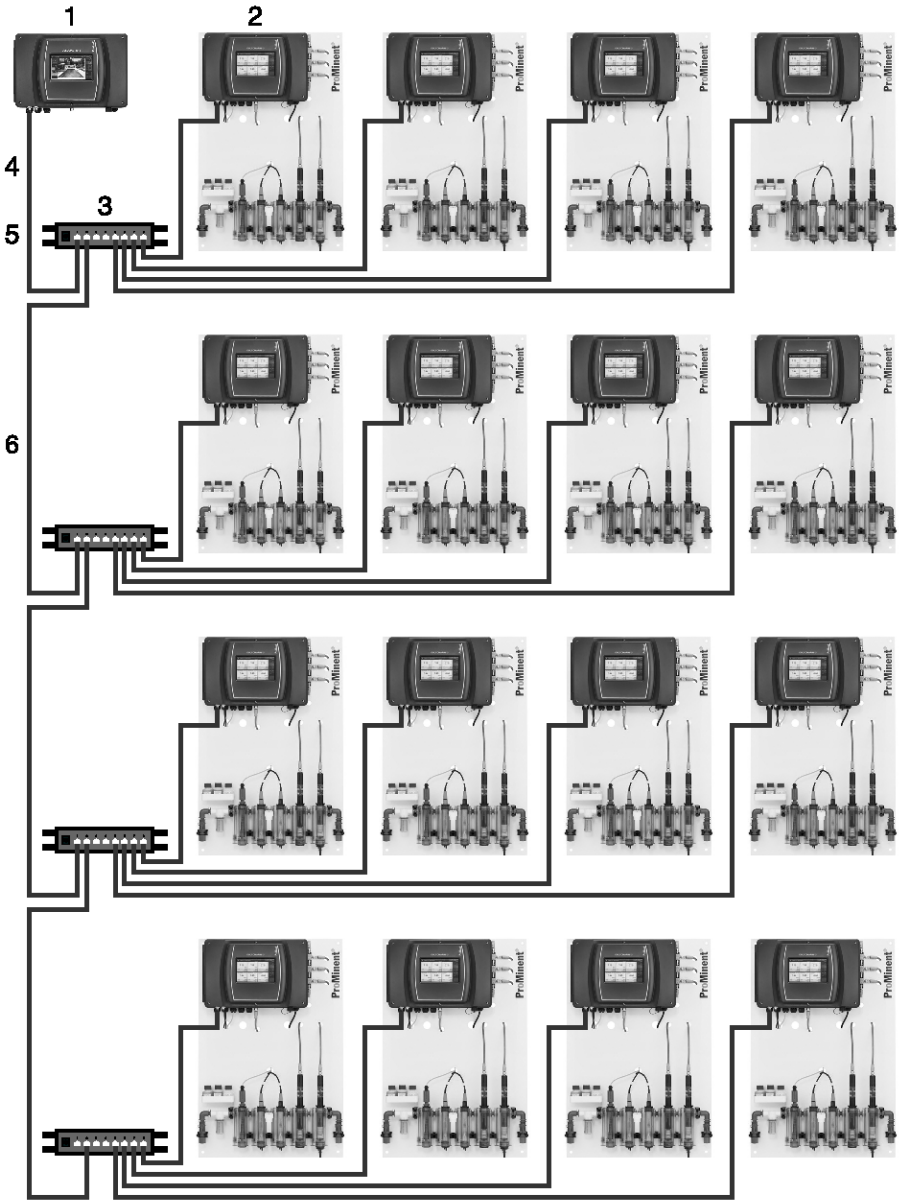
Type	pH sensor	ORP sensor	Free chlorine sensor	Combined chlorine sensor
PD5	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	–	–
PD6	PHES-112-SE SLg100 (Order no. 1051745)	–	CLE 3-CAN-P-10 ppm (Order no. 1083209)	–
PD7	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	CLE 3-CAN-P-10 ppm (Order no. 1083209)	–
PD8	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	CLE 3-CAN-P-10 ppm (Order no. 1083209)	CTE 1-CAN-P-10 ppm (Order no. 1083210)
PD9	PHES-112-SE SLg100 (Order no. 1051745)	–	CGE 3-CAN-P-10ppm (Order no. 1083211)	–
PDA	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	CGE 3-CAN-P-10ppm (Order no. 1083211)	–
PDO	PHES-112-SE SLg100 (Order no. 1051745)	RHES-Pt-SE SLg100 (Order no. 1051746)	CLO 1-CAN-P-10 ppm (Order no. 1083134)	

We recommend the use of ORP sensors with gold electrodes RHES-Au-SE SLg100 (Order no. 1092570) when using inline electrolysis systems.

5.1 DULCODOS® Pool Swimming Pool Metering Systems

1	Global Unit
2	up to 16 Local Units
3	LAN switch, e.g. TP-Link 8 Port Switch
4	Connecting cable LAN M12 - RJ45 5.0 m
5	LAN coupling IP68
6	Customer's LAN cable, up to 100 m in length

Configuration example: Multipool system



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5.1 DULCODOS® Pool Swimming Pool Metering Systems

Identity Code Ordering System for DULCODOS® Pool Professional

DSPa	Measured variable														
	PD6	DM3, pH, free chlorine (CLE 3-CAN-P-10 ppm)													
	PD7	DM3, pH, ORP (platinum), free chlorine (CLE 3-CAN-P-10 ppm)													
	PD8	DM3, pH, ORP, free chlorine+combined chlorine (CLE 3-CAN-P-10 ppm+CTE 1-CAN-P-10 ppm)													
	PD9	DM3, pH, free chlorine, (CGE 3-CAN-P-10 ppm)													
	PDA	DM3, pH, ORP (platinum), free chlorine, (CGE 3-CAN-P-10 ppm)													
	PDD	DM3, pH, ORP (gold), free chlorine (CGE 3-CAN-P-10 ppm)													
	PDO	DM3, pH, ORP (gold), free chlorine (CLO 1-CAN-P-10 ppm)													
		Hardware-additional functions													
		0	Standard					B	4 standard signal outputs, 0/4-20 mA						
			Software-additional functions												
			X	Single pool: Compact Unit, 7"											
			G	Multipool: cNet, Global Unit, 7"											
			H	Multipool: cNet, Local Unit, 7"											
				Communication interfaces											
				0	none										
				W	LAN/Ethernet+Wi-Fi, Compact and Global Unit										
					Electrical connection										
					A	230 V, 50/60 Hz, European standard plug									
					B	230 V, 50/60 Hz, Swiss plug									
						Sensor equipment									
						0	with sensors			G	Measured variable PD8 without sensors				
						A	Measured variable PD5 without sensors			H	Measured variable PD9 without sensors				
						E	Measured variable PD6 without sensors			I	Measured variable PCA without sensors				
						F	Measured variable PD7 without sensors								
							Version								
							0	with ProMinent® logo							
							1	without ProMinent® Logo							
								Language							
								D	German	I	Italian				
								E	English	P	Polish				
								F	French	S	Spanish				
									Metering pumps for acids/alkalis						
									0	without metering pumps					
									1	0,8 l/h (DULCO®flex DF2a 0208)					
									2	1,6 l/h (DULCO®flex DF2a 0216)					
									3	2,4 l/h (DULCO®flex DF2a 0224)					
									4	1,8 l/h (alpha ALPc 1002 PVT)					
									5	3,5 l/h (alpha ALPc 1004 PVT)					
									A	1.5 l/h (Beta® CANopen BT4a 0401 PVT)					
									B	2.8 l/h (Beta® CANopen BT4a 0402 PVT)					
									C	5.3 l/h (Beta® CANopen BT4a 0405 PVT)					
									D	1.5 l/h (DULCO®flex DF4a 04015 CAN Bus)					
									E	6.0 l/h (DULCO®flex DF4a 03060 CAN Bus)					
									F	8.3 l/h (Beta® CANopen BT4a 0408 PVT)					
										Multifunctional valve for acid/alkali pump					
										0	without				
										1	with MFV (only for alpha and Beta®)				
											Metering pumps for disinfection				
											0	without metering pumps			
											1	0.8 l/h DULCO®flex DF2a for up to 45/10 m³/h circulation HB/FB*			
											2	1.6 l/h DULCO®flex DF2a for up to 90/20 m³/h circulation HB/FB*			
											3	2.4 l/h DULCO®flex DF2a for up to 140/30 m³/h circulation HB/FB*			
											4	1.8 l/h alpha for up to 100/20 m³/h circulation HB/FB*			
											5	3.5 l/h alpha for up to 200/40 m³/h circulation HB/FB*			
											A	1.5 l/h Beta® CANopen for up to 85/20 m³/h circulation HB/FB*			
											B	2.8 l/h Beta® CANopen for up to 160/35 m³/h circulation HB/FB*			
											C	5.3 l/h Beta® CANopen for up to 300/65 m³/h circulation HB/FB*			
											D	1.5 l/h DULCO®flex DF4a CANopen for up to 85/20 m³/h circulation HB/FB*			
											E	6.0 l/h DULCO®flex DF4a CANopen for up to 340/70 m³/h circulation HB/FB*			
											F	19.5 l/h Beta® CANopen for up to 1050/225 m³/h circulation HB/FB*			
												Multifunctional valve for disinfection pump			
												0	without		
												1	with MFV (only for alpha and Beta®)		
													Installation		
													0	supplied loose without mounting plate	
													1	assembled on a base plate	
													C	Base plate with flocculant pump DF4a fitted	
														Approvals	
														0	with CE certification

DSPa	PC7	A	1	5	A	0	0	E	B	0	B	0	1	0	Identity code as a representative example

* Calculated for 12% sodium-calcium hypochlorite HB = Indoor swimming pool FB = Outdoor swimming pool

5.2 Maintenance Kits

The following are needed for the maintenance of a measuring, control and metering system DULCODOS® Pool:

- 2 pc. maintenance kits for metering pumps
- 1 pc. maintenance kit for the measured variable

5.2.1 Maintenance Kits for Metering Pumps

The following table shows the assignment of the maintenance kits to the types of metering pumps used.

	Product range	Type	Order no.
Hose, complete 4.8 x 8.0 PharMed	DF2a	0208, 0216, 0224	1009480
Hose, complete 1.6 x 4.8 PharMed	DF4a	04015	1030722
Hose, complete 3.2 x 6.4 PharMed	DF4a	03060	1030723
Spare parts kit 1005-2/1605-2 PVT	ALPc, BT4a	1002PVT/ 1004PVT (ALPc), 0405PVT (BT4a)	1023110
Spare parts kits 1601 – 2 PVT, PPT, NPT	BT4a, BT4b	0401PVT (BT4a), 0401PVT (BT4b)	1023108
Spare parts kits 1602 – 2 PVT, PPT, NPT	BT4a, BT4b	0402PVT (BT4a), 0402PVT (BT4b)	1023109
Spare parts kits 0708 – 2/1008 – 2 PVT, PPT, NPT	BT4a	0408PVT	1023111
Spare parts kit 9.2/33.5/12 x 9 PVT	BT4a	0220PVT	1023113
Spare parts kits 1604 – 2 PVT, PPT, NPT	BT4b	0404PVT	1035332

5.2.2 Maintenance Kits for Measured Variables

The following table shows the assignment of the maintenance kits to the types of DULCODOS® Pool.

Maintenance kits are put together for the measured variables of the DSPa. Depending on the measured variable, the maintenance kits consist of:

- Buffer solutions
- Electrolytes
- Diaphragm caps
- 1 stainless steel screen 300 µm for the water filter
- 1 NBR flat seal for the water filter

	Type	Order no.
DSPA maintenance kit PR0, PC5/PD5, 333, 335, 735, 736	Basic, Professional PC5/PD5	1050631
DSPA maintenance kit DO2	Soft	1050632
DSPA maintenance kit DC2, PC6/PD6, 640, 645, 745	Comfort DC2, Professional PC6/PD6	1050633
DSPA maintenance kit DC4, PC9/PD9	Comfort DC4, Professional PC9/PD9	1050644
DSPA maintenance kit PC7/ PD7, PCB, 781, 785, 786	Professional PC7/PD7	1050645
DSPA maintenance kit PC8/ PD8	Professional PC8/PD8	1050646
DSPA maintenance kit PCA/ PDA	Professional PCA/PDA	1050647
DSPA maintenance kit PCD/ PDD	Professional PCD//PDD	1050648

5.2.3 Buffer Solutions

Quality buffer solutions are provided for calibration of pH and ORP sensors.

The following table shows the assignment of the buffer solutions to the sensors.

	Measured variable	Order no.
Buffer solution pH 4, 50 ml, red	pH	506251
Buffer solution pH 7, 50 ml, green	pH	506253
Pufferlösung Redox 220 mV, 50 ml	ORP	506244

5.3 Test Equipment

5.3.1 Portable Meter Portamess® – Measured Variable pH/ORP

Robust manual measuring instrument to withstand the most severe mechanical and chemical loading.

Measuring range pH -2.00 to + 16.00, ORP -1,300 … +1,300 mV

pH and ORP measurement with Portamess® pH/ORP - battery-powered, hand-held meter with automatic or manual temperature compensation.

pk_5_099

The Portamess® pH/ORP is used to measure the pH and ORP value in the industrial, environmental, food and waste water sectors. The unit complies with the requirements of the EMC Act and the NAMUR NE 21 recommendations. Calibration can be done with buffer solutions made of different, pre-selectable buffer sets.

Your benefits

- Robust and protected against ingress (IP 66 protection)
- Long lifespan: Over 2,000 h operating time with only 3 x AA batteries
- Always in sight: Large LC display
- Hard-wearing membrane keypad
- Integrated sensor quiver to protect the sensor
- Robust, watertight, gold-plated sockets

Technical Details

- **Measuring ranges pH:** -2.00 … +16.00, ORP: -1,300 … +1,300 mV
- **Measuring errors pH:** < 0.01, ORP: < 0.1% of the measured value ±0.3 mV
- **Sensor adaptation:** 8 buffer sets to choose from
- **Temperature compensation:** manual
- **Protection class:** IP 66
- **Operating time:** 2,000 hours with 3 x AA cells
- **Dimensions:** H x W x D 160 x 133 x 30
- **Weight:** 560 g with batteries
- **Scope of delivery:** Measuring instrument, field case, operating instructions in German, English and French.

Field of application

- Industry
- Environmental protection
- Food production
- Water or waste water inspection

	Order no.
Portamess® 911 pH	1008710

Accessories

	Capacity ml	Order no.
PHEKT-014F	–	1036537
Coaxial cable Ø 5 mm, 0.8 m - SD*	–	305098
Buffer pH 7.0	50	506253
Buffer pH 4.0	50	506251

* fits all ProMinent pH and ORP sensors with SN6 connector

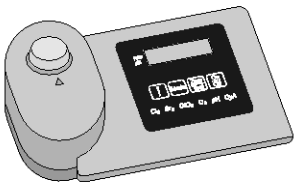
Sensor quiver see p. → 2-69

5.3 Test Equipment

5.3.2 Photometer

Precise measurement results through high-quality interference filters

Photometers measure nearly all disinfectants and the pH value based on the photometric principle. They are portable, compact and make safe, simple measurement possible.



P_DT_0074_SW
Photometer

The photometers DT1B, DT3B and DT4B are used, among other things, as a reference method for calibrating the electrochemical sensors for chlorine, chlorine dioxide, chlorite, H_2O_2, bromine and ozone. They have been adapted to today's requirements and can be used in almost all areas of water analysis. High-quality interference filters and long-term stable LEDs are used as the light source in the high-precision optics. The entire measuring unit is maintenance-free. Precise and reproducible analysis results are achieved with minimum time and effort. The units are winning customers over with their excellent operating convenience, ergonomic design, compact dimensions and ease of use.

Your benefits

- Portable and compact
- Simple to operate with text support
- safe, simple measurement of chlorine, chlorine dioxide, chlorite, H_2O_2, bromine, ozone, pH and trichloro-isocyanuric acid
- Can be calibrated
- Memory function for the last measurements
- Backlit display
- Real-time clock
- Countdown
- Watertight, degree of protection IP 68

Technical Details

Measuring ranges of the DT1B:

- 0.05 ... 6.0 mg/l free chlorine (DPD1) + total chlorine (DPD1+3)
- 5 ... 200 mg/l free chlorine (high range)
- 0.1 … 13.0 mg/l bromine (DPD1)
- 0.05 … 11 mg/l chlorine dioxide (DPD1)
- 0.03 … 4.0 mg/l ozone (DPD4)
- 6.5 … 8.4 pH (phenol red)
- 1 … 80 mg/l cyanuric acid

Measuring ranges of the DT3B:

- 1 … 50 / 40 … 500 mg/l hydrogen peroxide (H_2O_2)

Measuring ranges of the DT4B:

- 0.03 … 2.5 mg/l chlorite
- 0.05 … 11 mg/l chlorine dioxide
- 0.05 … 6 mg/l chlorine

Measuring tolerance: depending on the measured value and measuring method

Battery: 4 x AA/LR6

Permissible ambient temperature range: 5…40 °C

Relative humidity: 30 ... 90% (non-condensing)

Degree of protection: IP 68

Housing material: ABS

Keypad: polycarbonate film

Dimensions: 190 x 110 x 55 mm (L x W x H)

Weight: 0.4 kg

Field of application

- Swimming pools
- Potable water
- Process water

5.3 Test Equipment

	Order no.
Photometer DT1B	1039315
Photometer DT3B hydrogen peroxide	1039317
Photometer DT4B	1039318

Photometers supplied with accessories, container vessels and reagents.

Consumable items

	Order no.
DPD1 tablets, 100 pieces *	1061892
DPD3 tablets, 100 pieces **	1061893
Glycine tablets, 20 pieces	1061944
Phenol red tablets 100 pieces	305532
Cyanuric acid tablets, 100 no.	1039744
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l, for calibration of the photometer during fluoride determination	1010382
3 pieces replacement cuvettes; round cuvettes with lid for DPD, phenol red and cyanuric acid detection (DT1, DT1B, DT4, DT4B, DT2B, DT2C)	1007566
3 pieces replacement cuvettes for fluoride detection (DT2B and DT2C)	1010396
Chlorine dioxide tablets No. 1, 250 no.	1039732
Chlorine dioxide tablets No. 2, 250 no.	1039733
Chlorine HR tablets, 100 pieces	1075056
Acidifying tablets, 100 pieces	1075057

* replaces DPD1 buffer, 15 ml (1002857) and DPD1 reagent, 15 ml (1002858)

** replaces DPD3 solution, 15 ml (1002859)

Spare parts

Chlorite measurement

	Order no.
Stirrer for purging of chlorine dioxide (DT4)	1022754
3 pieces replacement cuvettes; round cuvettes with lid for DPD, phenol red and cyanuric acid detection (DT1, DT1B, DT4, DT4B, DT2B, DT2C)	1007566

H_2O_2 measurement

	Order no.
Reagent for H_2O_2 (DT3), 15 ml	1023636
Replacement cuvettes, 5 pieces, for H_2O_2 (DT3)	1024072

5.3 Test Equipment

ProMinent® Chemical Resistance List

Resistance of Materials Used in Liquid Ends to the Chemicals Most Frequently Used

The data apply to standard conditions (20 °C, 1,013 mbar).

s	=	saturated solution in water
+	=	resistant
+/o	=	largely resistant
o	=	conditionally resistant
-	=	not resistant
n	=	resistance not known
=>	=	see
*	=	for bonded connections, the resistance of the adhesive (e.g. Tangit) is to be considered. (Materials of the types 'o' and '-' are not recommended!)
**	=	does not apply to glass fibre reinforced material

Concentration data are stated in weight percent, relative to aqueous solutions. If percentages are stated for the level of resistance, this level of resistance is only valid up to this concentration.

NOTE:

The elastomers **CSM (Hypalon®)** and **IIR (butyl rubber)** used as diaphragm materials in pulsation dampers have properties similar to **EPDM**.

PTFE is resistant to all chemicals in this list.

PTFE filled with carbon,however, is attacked by strong oxidants such as bromine (anhydrous) or concentrated acids (phosphoric acid, sulphuric acid, chromic acid).

The resistance of PVC-U adhesive joints with Tangit deviates from the list below with regard to the following chemicals:

Medium	Concentration range
Sulfochromic acid	≥ 70% H_2SO_4+ 5% $K_2Cr_2O_7$/$Na_2Cr_2O_7$
Chromic acid	≥ 10% CrO_3
Hydrochloric acid	≥ 25% HCl
Hydrogen peroxide	≥ 5% H_2O_2
Hydrofluoric acid	≥ 0% HF

Explanation of abbreviations used as column headings:

PMMA:	Polymethylmethacrylate (Acrylic resistance)
PVC:	Polyvinylchloride, rigid, (PVC-U) resistance
PP:	Polypropylene resistance
PVDF:	Polyvinylidene fluoride
1.4404:	Stainless steel 1.4404 & 1.4571 resistance
FKM:	Fluorine Rubber (e.g. Viton® A & B) resistance
EPDM:	Ethylene-Propylene-Dien-rubber resistance
PharMed®:	PharMed® resistance
PE:	Polyethylene resistance
2.4819:	Hastelloy C-276 resistance
WGK:	Water endangering class

Viton® is a registered trademark of DuPont Dow Elastomers

Water endangering classes (WGK):

1	=	slightly hazardous to water
2	=	hazardous to water
3	=	severely hazardous to water
(X)	=	no classification. Classification according to conclusion by analogy. To be used under reserve.

Safety data sheets

Safety data sheets on our products in a number of different languages are provided on our website.

www.prominent.com/MSDS

ProMinent® Chemical Resistance List

The data is taken from relevant manufacturer´s documentation and our own tests. Resistance of materials is also dependant on other factors, e.g. operating conditions, conditions of surfaces etc, and so this list must be treated as an initial guide only. It cannot claim to offer any guarantees. It should be taken into consideration in particular that usual dosing media are compounds, and their corrosiveness cannot be deducted simply by adding the corrosiveness of each single component. In such cases the chemical producers' data of the material compatibility are to be considered as a matter of prime importance for the material choice. A safety data sheet does not give this data and therefore cannot take the place of the technical documentation on the application.

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Acetaldehyde	CH_3CHO	100%	-	-	o	-	+	-	+/o	-	+	+	2
Acetamide	CH_3CONH_2	s	+	+	+	+	+	o	+	+/o	+	+	1
Acetic Acid	CH_3COOH	100%	-	50%	+	+	+	-	o	60%	70%	+	1
Acetic Anhydride	$(CH_3CO)_2O$	100%	-	-	o	-	+	-	+/o	+	o	+	1
Acetic Ether => Ethyl Acetate													
Acetone	CH_3COCH_3	100%	-	-	+	-	+	-	+	-	+	+	1
Acetophenone	$C_6H_5COCH_3$	100%	-	n	+	-	+	-	+	n	+	+	
Acetyl Chloride	CH_3COCl	100%	-	+	n	-	o	+	-	o	n	+	1
Acetylacetone	$CH_3COCH_2COCH_3$	100%	-	-	+	-	+	-	+	n	+	+	1
Acetylene Dichloride => Dichloro Ethylene													
Acetylene Tetrachloride => Tetrachloro Ethane													
Acrylonitril	CH_2=CH-CN	100%	-	-	+	+	+	-	-	-	+	+	3
Adipic Acid	$HOOC(CH_2)_4COOH$	s	+	+	+	+	+	+	+	+/o	+	+	1
Allyl Alcohol	CH_2CHCH_2OH	96%	-	o	+	+	+	-	+	o	+	+/o	2
Aluminium Acetate	$Al(CH_3COO)_3$	s	+	+	+	+	+	+	+	+	+	+/o	1
Aluminium Bromide	$AlBr_3$	s	+	+	+	+	n	+	+	+	+	+	2
Aluminium Chloride	$AlCl_3$	s	+	+	+	+	-	+	+	+	+	+	1
Aluminium Fluoride	AlF_3	10%	+	+	+	+	-	+	+	+	+	+/o	1
Aluminium Hydroxide	$Al(OH)_3$	s	+	+	+	+	+	+	+	+	+	+	1
Aluminium Nitrate	$Al(NO_3)_3$	s	+	+	+	+	+	+	+	+	+	+	1
Aluminium Phosphate	$AlPO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Aluminium Sulphate	$Al_2(SO_4)_3$	s	+	+	+	+	+	+	+	+	+	+	1
Ammonium Acetate	CH_3COONH_4	s	+	+/o	+	+	+	+	+	+	+	+	1
Ammonium Bicarbonate	NH_4HCO_3	s	+	+	+	+	+	+	+	+	+	+	1
Ammonium Carbonate	$(NH_4)_2CO_3$	40%	+	+	+	+	+	+	+	+	+	+	1
Ammonium Chloride	NH_4Cl	s	+	+	+	+	-	+	+	+	+	+/o	1
Ammonium Fluoride	NH_4F	s	+	o	+	+	o	+	+	+	+	+	1
Ammonium Hydroxide	"NH_4OH"	30%	+	+	+	+ (25 °C)	+	-	+	+	+	+	2
Ammonium Nitrate	NH_4NO_3	s	+	+	+	+	+	+	+	+	+	+	1
Ammonium Oxalate	$(COONH_4)_2 * H_2O$	s	+	+	+	+	+	+	+	+	+	+	1
Ammonium Perchlorate	NH_4ClO_4	10%	+	+	+	+	+	+	+	+	+	+	1
Ammonium Peroxodisulphate	$(NH_4)_2S_2O_8$	s	+	+	+	+	5%	+	+	+	+	5%	2
Ammonium Phosphate	$(NH_4)_3PO_4$	s	+	+	+	+	10%	+	+	+	+	10%	1
Ammonium Sulphate	$(NH_4)_2SO_4$	s	+	+	+	+	10%	+	+	+	+	10%	1
Ammonium Sulphide	$(NH_4)_2S$	s	+	+	+	+	n	+	+	n	+	n	2
Ammoniumaluminium Sulphate	$NH_4Al(SO_4)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Amyl Alcohol	$C5H_{11}OH$	100%	+	+	+	+	+	-	+	-	+	+	1
Aniline	$C_6H_5NH_2$	100%	-	-	+	+	+	-	+/o	o	+	+	2
Aniline Hydrochloride	$C_6H_5NH_2 * HCl$	s	n	+	+	+	-	+/o	+/o	o	+	+	2
Antimony Trichloride	$SbCl_3$	s	+	+	+	+	-	+	+	+	+	n	2
Aqua Regia	$3\ HCl + HNO_3$	100%	-	+	-	+	-	-	o	-	-	-	2
Arsenic Acid	H_3AsO_4	s	+	+	+	+	+	+	+	o	+	+	3
Barium Carbonate	$BaCO_3$	s	+	+	+	+	+	+	+	+	+	+	1
Barium Chloride	$BaCl_2$	s	+	+	+	+	-	+	+	+	+	+	1
Barium Hydroxide	$Ba(OH)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Barium Nitrate	$Ba(NO_3)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Barium Sulphate	$BaSO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Barium Sulphide	BaS	s	+	+	+	+	+	+	+	+	+	+	(1)
Benzaldehyde	C_6H_5CHO	100%	-	-	+	-	+	+	+	-	o	+	1
Benzene	C_6H_6	100%	-	-	o	+	+	o	-	-	o	+	3
Benzene Sulphonic Acid	$C_6H_5SO_3H$	10%	n	n	+	+	+	+	-	-	n	+	2
Benzoic Acid	C_6H_5COOH	s	+	+	+	+	+	+	+	+/o	+	+	1
Benzoyl Chloride	C_6H_5COCl	100%	-	n	o	n	o	+	+	n	o	+	2
Benzyl Alcohol	$C_6H_5CH_2OH$	100%	-	-	+	+	+	+	-	+	+	+	1
Benzyl Benzoate	$C_6H_5COOC_7H_7$	100%	-	-	+	o	+	+	-	-	+	+	2
Benzyl Chloride	$C_6H_5CH_2Cl$	90%	-	n	o	+	+	+	-	-	o	+	2
Bitter Salt => Magnesium Sulphate													
Bleach => Sodium Hypochlorite													
Blue Vitriol => Copper Sulphate													
Borax => Sodium Tetraborate													

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Boric Acid	H_3BO_3	s	+	+	+	+	+	+	+	+	+	+	1
Brine		s	+	+/o	+	+	+/o	+	+	+	+	+	1
Bromine (dry)	Br_2	100%	-	-	-	+	-	-	-	-	-	+	2
Bromine Water	$Br_2 + H_2O$	s	-	+	-	+	-	-	-	n	-	n	(2)
Bromo Benzene	C_6H_5Br	100%	n	n	o	+	+	o	-	-	o	+	2
Bromochloro Methane	CH_2BrCl	100%	-	-	-	+	+	n	+/o	-	o	+	2
Bromochlorotrifluoro Ethane	$HCClBrCF_3$	100%	-	-	o	+	+	+	-	+	o	+	(3)
Butanediol	HOC_4H_8OH	10%	n	+	+	+	+	o	+	+	+	+	1
Butanetriol	$C_4H_{10}O_3$	s	+	+	+	+	+	o	+	+	+	+	1
Butanol	C_4H_9OH	100%	-	+	+	+	+	o	+/o	-	+	+	1
Butyl Acetate	$C_7H_{13}O_2$	100%	-	-	+	+	+	-	-	+/o	+	+	1
Butyl Acetate	$CH_3COOC_4H_9$	100%	-	-	o	+	+	-	+/o	+/o	-	+	1
Butyl Alcohol => Butanol													
Butyl Amine	$C_4H_9NH_2$	100%	n	n	n	-	+	-	-	n	+	+	1
Butyl Benzoate	$C_6H_5COOC_4H_9$	100%	-	-	o	n	+	+	+	-	o	+	2
Butyl Mercaptane	C_4H_9SH	100%	n	n	n	+	n	+	-	n	n	n	3
Butyl Oleate	$C_{22}H_{42}O_2$	100%	n	n	n	+	+	+	+/o	n	n	+	1
Butyl Stearate	$C_{22}H_{44}O_2$	100%	o	n	n	+	+	+	-	n	n	+	1
Butyraldehyde	C_3H_7CHO	100%	-	n	+	n	+	-	+/o	-	+	+	1
Butyric Acid	C_3H_7COOH	100%	5%	20%	+	+	+	+	+	+/o	+	+	1
Calcium Acetate	$(CH_3COO)_2Ca$	s	+	+	+	+	+	+	+	+	+	+	1
Calcium Bisulphite	$Ca(HSO_3)_2$	s	+	+	+	+	+	+	+	+	+	+	(1)
Calcium Carbonate	$CaCO_3$	s	+	+	+	+	+	+	+	+	+	+	1
Calcium Chloride	$CaCl_2$	s	+	+	+	+	-	+	+	+	+	+	1
Calcium Cyanide	$Ca(CN)_2$	s	+	+	+	+	n	+	+	+	+	n	3
Calcium Hydroxide	$Ca(OH)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Calcium Hypochlorite	$Ca(OCl)_2$	s	+	+	o	+	-	o	+	+	+	+	2
Calcium Nitrate	$Ca(NO_3)_2$	s	+	50%	50%	+	+	+	+	+	+	+	1
Calcium Phosphate	$Ca_3(PO_4)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Calcium Sulphate	$CaSO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Calcium Sulphide	CaS	s	+	+	+	+	n	+	+	+	+	+	(2)
Calcium Sulphite	$CaSO_3$	s	+	+	+	+	+	+	+	+	+	+	(1)
Calcium Thiosulphate	CaS_2O_3	s	+	+	+	+	-	+	+	+	+	+	1
Carbolic Acid => Phenole													
Carbon Disulphide	CS_2	100%	-	-	o	+	+	+	-	-	o	+	2
Carbon Tetrachloride	CCl_4	100%	-	-	-	+	+	+	-	-	o	+	3
Carbonic Acid	"H_2CO_3"	s	+	+	+	+	+	+	+	+	+	+	1
Caustic Potash => Potassium Hydroxide													
Caustic Soda => Sodium Hydroxide													
Chloric Acid	$HClO_3$	20%	+	+	-	+	-	o	o	+	10%	+	2
Chlorinated Lime => Calcium Hypochlorite													
Chlorine Dioxide Solution	$ClO_2 + H_2O$	0.5%	o	+	o	+ [1)]	-	o	-	-	o	+	
Chlorine Water	$Cl_2 + H_2O$	s	+	+	o	+	-	+	+	-	o	+	
Chloro Benzene	C_6H_5Cl	100%	-	-	+	+	+	+	-	-	o	+	2
Chloro Ethanol	$ClCH_2CH_2OH$	100%	-	-	+	o	+	-	o	+	+	+	3
Chloro Ethylbenzene	$C_6H_4ClC_2H_5$	100%	-	-	o	n	+	o	-	-	o	+	(2)
Chloro Phenole	C_6H_4OHCl	100%	-	n	+	+	+	n	-	-	+	+	2
Chloro Toluene	C_7H_8Cl	100%	-	-	n	+	+	+	-	-	n	+	2
Chloroacetone	$ClCH_2COCH_3$	100%	-	-	n	n	+	-	+	-	n	+	3
Chlorobutadiene	C_4H_5Cl	100%	-	-	n	n	+	+	-	-	n	+	1
Chloroform	$CHCl_3$	100%	-	-	o	+	+	+	-	o	-	+	2
Chlorohydrin	C_3H_5OCl	100%	-	n	+	-	+	+	o	+	+	+	3
Chloroprene => Chlorobutadiene													
Chlorosulphonic Acid	$SO_2(OH)Cl$	100%	-	o	-	+	-	-	-	-	-	o	1
Chrome-alum => Potassium Chrome Sulphate													
Chromic Acid	H_2CrO_4	50%	-	+*	o	+	10%	+	-	o	+	10%	3
Chromic-Sulphuric Acid	$K_2CrO_4 + H_2SO_4$	s	-	+*	-	+	n	n	n	-	-	n	3
Chromium Sulphate	$Cr_2(SO_4)_3$	s	+	+	+	+	+	+	+	+	+	+	1
Citric Acid	$C_6H_8O_7$	s	+	+	+	+	+	+	+	+	+	+	1
Cobalt Chloride	$CoCl_2$	s	+	+	+	+	-	+	+	+	+	+	2
Copper-II-Acetate	$Cu(CH_3COO)_2$	s	+	+	+	+	+	+	+	+	+	+	3
Copper-II-Arsenite	$Cu_3(AsO_3)_2$	s	+	+	+	+	+	+	+	+	+	+	3
Copper-II-Carbonate	$CuCO_3$	s	+	+	+	+	+	+	+	+	+	+	2
Copper-II-Chloride	$CuCl_2$	s	+	+	+	+	1%	+	+	+	+	+	2
Copper-II-Cyanide	$Cu(CN)_2$	s	+	+	+	+	+	+	+	+	+	+	(3)
Copper-II-Fluoride	CuF_2	s	+	+	+	+	+	+	+	+	+	+	(2)
Copper-II-Nitrate	$Cu(NO_3)_2$	s	+	+	+	+	+	+	+	+	+	+/o	2
Copper-II-Sulphate	$CuSO_4$	s	+	+	+	+	+	+	+	+	+	+	2
Cresols	$C_6H_4CH_3OH$	100%	o	o	+	+	+	+	-	-	+	+	2

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Crotonaldehyde	$CH_3C_2H_2CHO$	100%	n	-	+	+	+	-	+	-	+	+	3
Cubic Nitre => Sodium Nitrate													
Cumene => Isopropyl Benzene													
Cyclo Hexane	C_6H_{12}	100%	+	-	+	+	+	+	-	-	+	o	1
Cyclohexanole	$C_6H_{11}OH$	100%	o	+/o	+	+	+	+	-	-	+	+	1
Cyclohexanone	$C_6H_{10}O$	100%	-	-	+	-	+	-	+/o	-	+	+	1
Cyclohexyl Alcohol => Cyclohexanol													
Cyclohexylamine	$C_6H_{11}NH_2$	100%	n	n	n	n	+	-	n	n	n	+	2
Decahydronaphthaline	$C_{10}H_{18}$	100%	-	+/o	o	+	n	o	-	-	o	+	2
Decaline => Decahydronaphthalene													
Dextrose => Glucose													
Diacetonalcohol	$C_6H_{12}O_2$	100%	-	-	+	o	+	-	+	-	+	+	1
Dibromoethane	$C_2H_4Br_2$	100%	-	-	n	+	+	+	-	-	-	+	3
Dibutyl Ether	$C_4H_9OC_4H_9$	100%	-	-	+	+	+	-	o	-	+	+	2
Dibutyl Phthalate	$C_{16}H_{22}O_4$	100%	-	-	+	+	+	+	+/o	+	o	+	2
Dibutylamine	$(C_4H_9)_2NH$	100%	n	n	+	+	+	-	-	n	+	+	1
Dichloro Acetic Acid	$Cl_2CHCOOH$	100%	-	+	+	+	+	-	+	o	+	+	1
Dichloro Benzene	$C_6H_4Cl_2$	100%	-	-	o	+	+	+	-	-	o	+	2
Dichloro Butan	$C_4H_8Cl_2$	100%	-	-	o	+	+	+	-	-	o	+	3
Dichloro Butene	$C_4H_6Cl_2$	100%	-	-	o	+	+	o	-	-	o	+	3
Dichloro Ethane	$C_2H_4Cl_2$	100%	-	-	o	+	+	+	-	o	-	+	3
Dichloro Ethylene	$C_2H_2Cl_2$	100%	-	-	o	+	+	o	-	o	-	+	2
Dichloro Methane	CH_2Cl_2	100%	-	-	o	o	o	+	-	o	-	+	2
Dichloroisopropyl Ether	$(C_3H_6Cl)_2O$	100%	-	-	o	n	+	o	o	-	o	+	(2)
Dicyclohexylamine	$(C_6H_{12})_2NH$	100%	-	-	o	n	+	-	-	-	o	+	2
Diethyleneglycol	$C_4H_{10}O_3$	s	+	+	+	+	+	+	+	+	+	+	1
Diethyleneglycolethyl Ether	$C_8H_{18}O_3$	100%	n	n	+	+	+	n	+/o	o	+	+	1
Diethylether	$C_2H_5OC_2H_5$	100%	-	-	o	+	+	-	-	o	o	+	1
Diglycolic Acid	$C_4H_6O_5$	30%	+	+	+	+	+	+	n	+/o	+	+	3
Dihexyl Phthalate	$C_{20}H_{26}O_4$	100%	-	-	+	+	+	-	n	+	+	+	(1)
Diisobutylketone	$C_9H_{18}O$	100%	-	-	+	+	+	-	+	-	+	+	1
Di-iso-nonyl Phthalate	$C_{26}H_{42}O_4$	100%	-	-	+	+	+	n	n	+	+	+	1
Diisopropylketone	$C_7H_{14}O$	100%	-	-	+	+	+	-	+	-	+	+	1
Dimethyl Carbonate	$(CH_3O)_2CO$	100%	n	n	+	+	+	+	-	n	+	+	1
Dimethyl Ketone => Acetone													
Dimethyl Phthalate	$C_{10}H_{10}O_4$	100%	-	-	+	+	+	-	+/o	+	+	+	1
Dimethylformamide	$HCON(CH_3)_2$	100%	-	-	+	-	+	-	+	+/o	+	+	1
Dimethylhydrazine	$H_2NN(CH_3)_2$	100%	n	n	+	n	+	-	+	n	+	+	3
Dioctyl Phthalate	$C_4H_4(COOC_8H_{17})_2$	100%	-	-	+	+	+	-	+/o	+	+	+	1
Dioxane	$C_4H_8O_2$	100%	-	-	o	-	+	-	+/o	-	+	+	1
Disodium Hydrogenphosphate	Na_2HPO_4	s	+	+	+	+	+	+	+	+	+	+	1
Disulfur Acid -- Oleum													
Disulphur Dichloride	S_2Cl_2	100%	n	n	n	+	n	+	-	-	n	n	
DMF => Dimethylformamide													
Engine Oils		100%	n	+/o	+	+	+	+	-	-	+	+	2
Epsom salts => Magnesium Sulphate													
Ethanol	C_2H_5OH	100%	-	+	+	+	+	-	+	+	+	+	1
Ethanol Amine	$HOC_2H_4NH_2$	100%	o	n	+	-	+	-	+/o	o	+	+	1
Ethyl Acetate	$CH_3COOC_2H_5$	100%	-	-	35%	+	+	-	+/o	+/o	+	+	1
Ethyl Acrylate	$C_2H_3COOC_2H_5$	100%	-	-	+	o	+	-	+/o	-	+	+	2
Ethyl Benzene	C_6H_5-C_2H_5	100%	-	-	o	+	+	o	-	-	o	+	1
Ethyl Benzoate	$C_6H_5COOC_2H_5$	100%	n	-	+	o	+	+	-	-	+	+	1
Ethyl Bromide	C_2H_5Br	100%	-	n	+	+	n	+	-	o	+	+	2
Ethyl Chloroacetate	$ClCH_2COOC_2H_5$	100%	-	o	+	+	+	+	-	-	+	+	2
Ethyl Chlorocarbonate	$ClCO_2C_2H_5$	100%	n	n	n	n	n	+	-	n	n	n	(2)
Ethyl Cyclopentane	$C5H_4C_2H_5$	100%	+	+	+	+	+	+	-	-	+	+	(1)
Ethylacetoacetate	$C_6H_{10}O_3$	100%	n	-	+	+	+	-	+/o	+/o	+	+	1
Ethylacrylic Acid	C_4H_7COOH	100%	n	n	+	+	+	n	+/o	n	+	+	(1)
Ethylene Diamine	$(CH_2NH_2)_2$	100%	o	o	+	-	o	-	+	n	+	o	2
Ethylene Dibromide => Dibromoethane													
Ethylene Dichloride => Dichloro Ethane													
Ethylene Glycol => Glycol													
Ethylenglycol Ethylether	$HOC_2H_4OC_2H_5$	100%	n	n	+	+	+	n	+/o	o	+	+	1
Ethylhexanol	$C_8H_{16}O$	100%	n	+/o	+	+	+	+	+	-	+	+	2
Fatty Acids	R-COOH	100%	+	+	+	+	+	+	o	o	+	+	1
Ferric Chloride	$FeCl_3$	s	+	+	+	+	-	+	+	+	+	+/o	1
Ferric Nitrate	$Fe(NO_3)_3$	s	+	+	+	+	+	+	+	+	+	+	1
Ferric Phosphate	$FePO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Ferric Sulphate	$Fe_2(SO_4)_3$	s	+	+	+	+	o	+	+	+	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Ferrous Chloride	$FeCl_2$	s	+	+	+	+	-	+	+	+	+	+/o	1
Ferrous Sulphate	$FeSO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Fixing Salt => Sodium Thiosulphate													
Fluoro Benzene	C_6H_5F	100%	-	-	+	+	+	o	-	-	o	+	2
Fluoroboric Acid	HBF_4	35%	+	+	+	+	o	+	+	-	+	+	1
Fluorosilicic Acid	H_2SiF_6	100%	+	30%	30%	+	o	+	+	o	40%	+/o	2
Formaldehyde	CH_2O	40%	+	+	+	+	+	-	+/o	-	+	+	2
Formalin => Formaldehyde													
Formamide	$HCONH_2$	100%	+	-	+	+	+	+	+	n	+	+	1
Formic Acid	HCOOH	s	-	+/o	+	+	+	-	-	+/o	+	+	1
Furane	C_4H_4O	100%	-	-	+	-	+	-	n	-	+	+	3
Furane Aldehyde	$C_5H_5O_2$	100%	n	n	n	o	+	-	+/o	-	n	n	2
Furfuryl Alcohol	$OC_4H_3CH_2OH$	100%	-	-	+	o	+	n	+/o	-	+	+	1
Gallic Acid	$C_6H_2(OH)_3COOH$	5%	+	+	+	+	+	+	+/o	+	+	+	1
Gasoline		100%	-	-	+	+	+	+	-	-	+	+	2
Glauber´s Salt => Sodium Sulphate													
Glucose	$C_6H_{12}O_6$	s	+	+	+	+	+	+	+	+	+	+	1
Glycerol	$C_3H_5(OH)_3$	100%	+	+	+	+	+	+	+	+	+	+	1
Glycerol Triacetate	$C_3H_5(CH_3COO)_3$	100%	n	n	+	+	+	-	+	n	+	+	1
Glycine	NH_2CH_2COOH	10%	+	+	+	+	+	+	+	+	+	+	1
Glycol	$C_2H_4(OH)_2$	100%	+	+	+	+	+	+	+	+	+	+	1
Glycolic Acid	$CH_2OHCOOH$	70%	+	37%	+	+	+	+	+	+/o	+	+	1
Gypsum => Calcium Sulphate													
Heptane	C_7H_{16}	100%	+	+	+	+	+	+	-	-	+	+	1
Hexachloroplatinic Acid	H_2PtCl_6	s	n	+	+	+	-	n	+	n	+	-	
Hexanal	$C_5H_{11}CHO$	100%	n	n	+	+	+	-	+/o	-	+	+	1
Hexane	C_6H_{14}	100%	+	+	+	+	+	+	-	-	+	+	1
Hexanol	$C_6H_{13}OH$	100%	-	-	+	+	+	n	+	o	+	+	1
Hexantriol	$C_6H_9(OH)_3$	100%	n	n	+	+	+	+	+	n	+	+	1
Hexene	C_6H_{12}	100%	n	+	+	+	+	+	-	-	+	+	1
Hydrazine Hydrate	$N_2H_4 * H_2O$	s	+	+	+	+	+	n	+	o	+	+	3
Hydrobromic Acid	HBr	50%	+	+	+	+	-	-	+	-	+	o	1
Hydrochloric Acid	HCl	38%	32%	+ *	+	+	-	+	o	o	+	o	1
Hydrofluoric Acid	HF	80%	-	40%*	40%**	+	-	+	o	-	40%	+/o	1
Hydrogen Cyanide	HCN	s	+	+	+	+	+	+	+	+	+	+	3
Hydrogen Peroxide	H_2O_2	90%	40%	40%*	30%	+	+	30%	30%	+	+	+	1
Hydroiodic Acid	HI	s	+	+	+	+	-	-	n	-	+	n	1
Hydroquinone	$C_6H_4(OH)_2$	s	o	+	+	+	+	+	-	+/o	+	+	2
Hydroxylamine Sulphate	$(NH_2OH)_2 * H_2SO_4$	10%	+	+	+	+	+	+	+	+	+	+	2
Hypochlorous Acid	HOCl	s	+	+	o	+	-	+	+/o	+	o	+	(1)
Iodine	I_2	s	o	-	+	+	-	+	+/o	+	o	+/o	
Iron Vitriol => Ferrous Sulphate													
Isobutanol => Isobutyl Alcohol													
Isobutyl Alcohol	$C_2H_5CH(OH)CH_3$	100%	-	+	+	+	+	+	+	o	+	+	1
Isopropanol => Isopropyl Alcohol													
Isopropyl Acetate	$CH_3COOCH(CH_3)_2$	100%	-	-	+	+	+	-	+/o	+/o	+	+	1
Isopropyl Alcohol	$(CH_3)_2CHOH$	100%	-	+/o	+	+	+	+	+	o	+	+	1
Isopropyl Benzene	$C_6H_5CH(CH_3)_2$	100%	-	-	o	+	+	+	-	-	o	+	1
Isopropyl Chloride	$CH_3CHClCH_3$	80%	-	-	o	+	+	+	-	o	o	+/o	2
Isopropyl Ether	$C_6H_{14}O$	100%	-	-	o	+	+	-	-	o	o	+	1
Kitchen Salt => Sodium Chloride													
Lactic Acid	$C_3H_6O_3$	100%	-	+	+	+	+/o	+	10%	+/o	+	+	1
Lead Acetate	$Pb(CH_3COO)_2$	s	+	+	+	+	+	+	+	+	+	+	2
Lead Nitrate	$Pb(NO_3)_2$	50%	+	+	+	+	+	+	+	+	+	+	2
Lead Sugar => Lead Acetate													
Lead Sulphate	$PbSO_4$	s	+	+	+	+	+	+	+	+	+	+	(2)
Lead Tetraethyl	$Pb(C_2H_5)_4$	100%	+	+	+	+	+	+	-	n	+	+	3
Lime Milk => Calcium Hydroxide													
Liquid Ammonia => Ammonium Hydroxide													
Lithium Bromide	LiBr	s	+	+	+	+	+	+	+	+	+	+	1
Lithium Chloride	LiCl	s	+	+	+	+	-	+	+	+	+	n	1
Lunar Caustic => Silver Nitrate													
Magnesium Carbonate	$MgCO_3$	s	+	+	+	+	+	+	+	+	+	+/o	1
Magnesium Chloride	$MgCl_2$	s	+	+	+	+	o	+	+	+	+	+	1
Magnesium Hydroxide	$Mg(OH)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Magnesium Nitrate	$Mg(NO_3)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Magnesium Sulphate	$MgSO_4$	s	+	+	+	+	+	+	+	+	+	+/o	1
Maleic Acid	$C_4H_4O_4$	s	+	+	+	+	+	+	+	o	+	+	1
Malic Acid	$C_4H_6O_5$	s	+	+	+	+	+	+	+	+	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Manganese-II-Chloride	$MnCl_2$	s	+	+	+	+	-	+	+	+	+	+	1
Manganese-II-Sulphate	$MnSO_4$	s	+	+	+	+	+	+	+	+	+	+	1
MEK => Methyl Ethyl Ketone													
Mercury	Hg	100%	+	+	+	+	+	+	+	+	+	+	3
Mercury-II-Chloride	$HgCl_2$	s	+	+	+	+	-	+	+	+	+	+	3
Mercury-II-Cyanide	$Hg(CN)_2$	s	+	+	+	+	+	+	+	+	+	+	3
Mercury-II-Nitrate	$Hg(NO_3)_2$	s	+	+	+	+	+	+	+	+	+	+	3
Mesityl Oxide	$C_6H_{10}O$	100%	-	-	n	n	+	-	+/o	-	n	+	1
Methacrylic Acid	C_3H_5COOH	100%	n	n	+	+	+	o	+/o	+/o	+	+	1
Methanol	CH_3OH	100%	-	-	+	+	+	o	+	+/o	+	+	1
Methoxybutanol	$CH_3O(CH_2)_4OH$	100%	-	-	+	+	+	+	o	o	+	+	(1)
Methyl Acetate	CH_3COOCH_3	60%	-	-	+	+	+	-	+/o	+/o	+	+	2
Methyl Acrylate	$C_2H_3COOCH_3$	100%	-	-	+	+	+	-	+/o	o	+	+	2
Methyl Benzoate	$C_6H_5COOCH_3$	100%	-	-	+	o	+	+	-	-	+	+	2
Methyl Catechol	$C_6H_3(OH)_2CH_3$	s	+	+	+	+	+	+	-	+o	+	+	(1)
Methyl Cellulose		s	+	+	+	+	+	+	+	+	+	+	1
Methyl Chloroacetate	$ClCH_2COOCH_3$	100%	-	o	+	+	+	o	-	-	+	+	2
Methyl Cyclopentane	$C_5H_9CH_3$	100%	+	+	+	+	+	+	-	-	+	+	(1)
Methyl Dichloroacetate	$Cl_2CHCOOCH_3$	100%	-	-	+	n	+	-	n	-	+	+	2
Methyl Ethyl Ketone	$CH_3COC_2H_5$	100%	-	-	+	-	+	-	+	-	+	+	1
Methyl Glycol	$C_3H_8O_2$	100%	+	+	+	+	+	-	+/o	+	+	+	1
Methyl Isobutyl Ketone	$CH_3COC_4H_9$	100%	-	-	+	-	+	-	o	-	+	+	1
Methyl Isopropyl Ketone	$CH_3COC_3H_7$	100%	-	-	+	-	+	-	+/o	-	+	+	1
Methyl Methacrylate	$C_3H_5COOCH_3$	100%	-	-	+	+	+	-	-	-	+	+	1
Methyl Oleate	$C_{17}H_{33}COOCH_3$	100%	n	n	+	+	+	+	+/o	n	+	+	1
Methyl Salicylate	$HOC_6H_4COOCH_3$	100%	-	-	+	+	+	n	+/o	-	+	+	1
Methylacetyl Acetate	$C_5H_8O_3$	100%	-	-	+	+	+	-	+/o	o	+	+	2
Methylamine	CH_3NH_2	32%	+	o	+	o	+	-	+	+	+	+	2
Methylene Chloride => Dichloro Methane													
Mirabilit => Sodium Sulphate													
Morpholine	C_4H_9ON	100%	-	-	+	-	+	n	n	-	+	+	2
Muriatic Acid => Hydrochloric Acid													
Natron => Sodium Bicarbonate													
Nickel-II-Acetate	$(CH_3COO)_2Ni$	s	+	+	+	+	+	-	+	+	+	+	(2)
Nickel-II-Chloride	$NiCl_2$	s	+	+	+	+	-	+	+	+	+	+	2
Nickel-II-Nitrate	$Ni(NO_3)_2$	s	+	+	+	+	+	+	+	+	+	+/o	2
Nickel-II-Sulphate	$NiSO_4$	s	+	+	+	+	+	+	+	+	+	+/o	2
Nitrate of Lime => Calcium Nitrate													
Nitric Acid	HNO_3	99%	10%	10%*	50%	65%	50%	65%	10%	35%	50%	65%	1
Nitro Methane	CH_3NO_2	100%	-	-	+	o	+	-	+/o	-	+	+	2
Nitro Propane	$(CH_3)_2CHNO_2$	100%	-	-	+	n	+	-	+/o	-	+	+	2
Nitro Toluene	$C_6H_4NO_2CH_3$	100%	-	-	+	+	+	o	-	-	+	+	2
Octane	C_8H_{18}	100%	o	+	+	+	+	+	-	-	+	+	1
Octanol	$C_8H_{17}OH$	100%	-	-	+	+	+	+	+	-	+	+	1
Octyl Cresol	$C_15H_{24}O$	100%	-	-	+	+	+	o	n	-	+	+	(1)
Oil => Engine Oils													
Oleum	$H_2SO_4 + SO_3$	s	n	-	-	-	+	+	-	+	-	+	2
Orthophosphoric Acid => Phosphoric Acid													
Oxalic Acid	$(COOH)_2$	s	+	+	+	+	10%	+	+	+/o	+	+/o	1
Pentane	C_5H_{12}	100%	+	+	+	+	+	+	-	-	+	+	1
Pentanol => Amyl Alcohol													
Perchloric Acid	$HClO_4$	70%	n	10%	10%	+	-	+	+/o	+	+	n	1
Perchloroethylene => Tetrachloro Ethylene													
Perhydrol => Hydrogen Peroxide													
Petroleum Ether	CnH_{2n+2}	100%	+	+/o	+	+	+	+	-	-	+	+	1
Phenole	C_6H_5OH	100%	-	-	+	+	+	+	-	+	+	+	2
Phenyl Ethyl Ether	$C_6H_5OC_2H_5$	100%	-	-	+	n	+	-	-	-	+	+	2
Phenyl Hydrazine	$C_6H5NHNH_2$	100%	-	-	o	+	+	o	-	-	o	+	2
Phosphoric Acid	H_3PO_4	85%	50%	+	+	+	+	+	+	+	+	+	1
Phosphorous Oxychloride	$POCl_3$	100%	-	-	+	+	n	+	+	n	+	+	1
Phosphorous Trichloride	PCl_3	100%	-	-	+	+	+	o	+	+/o	+	+	1
Phthalic Acid	$C_6H_4(COOH)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Picric Acid	$C_6H_2(NO_3)_3OH$	s	+	+	+	+	+	+	+	-	+	+	2
Piperidine	$C_5H_{11}N$	100%	-	-	n	n	+	-	-	-	n	+	2
Potash Alum => Potassium Aluminium Sulphate													
Potassium Acetate	CH_3COOK	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Aluminium Sulphate	$KAl(SO_4)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Bicarbonate	$KHCO_3$	40%	+	+	+	+	+	+	+	+	+	+/o	1
Potassium Bifluoride	KHF_2	s	n	+	+	+	+	+	+	+	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Potassium Bisulphate	$KHSO_4$	5%	+	+	+	+	+	+	+	+	+	+	1
Potassium Bitartrate	$KC_4H_5O_6$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Borate	KBO_2	s	+	+	+	+	+	+	+	+	+	+	(1)
Potassium Bromate	$KBrO_3$	s	+	+	+	+	+	+	+	+	+	+	2
Potassium Bromide	KBr	s	+	+	+	+	10%	+	+	+	+	0.1	1
Potassium Carbonate	K_2CO_3	s	+	+	+	+	+	+	+	55%	+	+	1
Potassium Chlorate	$KClO_3$	s	+	+	+	+	+	+	+	+	+	+	2
Potassium Chloride	KCl	s	+	+	+	+	-	+	+	+	+	+/o	1
Potassium Chromate	K_2CrO_4	10%	+	+	+	+	+	+	+	+	+	+	3
Potassium Chrome Sulphate	$KCr(SO_4)_2$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Cyanate	KOCN	s	+	+	+	+	+	+	+	+	+	+	2
Potassium Cyanide	KCN	s	+	+	+	+	5%	+	+	+	+	5%	3
Potassium Cyanoferrate II	$K_4Fe(CN)_6$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Cyanoferrate III	$K_3Fe(CN)_6$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Dichromate	$K_2Cr_2O_7$	s	+	+	+	+	25%	+	+	+	+	10%	3
Potassium Fluoride	KF	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Hydroxyde	KOH	50%	+	+	+	+ (25 °C)	+	-	+	10%	+	+	1
Potassium Iodide	KI	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Nitrate	KNO_3	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Perchlorate	$KClO_4$	s	+	+	+	+	n	+	+	+	+	+	1
Potassium Permanganate	$KMnO_4$	s	+	+	+	+	+	+	+	6%	+	+	2
Potassium Persulphate	$K_2S_2O_8$	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Phosphate	KH_2PO_4	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Pyrochromate => Potassium Dichromate													
Potassium Sulphate	K_2SO_4	s	+	+	+	+	+	+	+	+	+	+	1
Potassium Sulphite	K_2SO_3	s	+	+	+	+	+	+	+	+	+	+	1
Propionic Acid	C_2H_5COOH	100%	o	+	+	+	+	+	+	+/o	+	+	1
Propionitrile	CH_3CH_2CN	100%	n	n	+	+	+	+	-	-	+	+	2
Propyl Acetate	$CH_3COOC_3H_7$	100%	-	-	+	+	+	-	+/o	-	+	+	1
Propylene Glycol	$CH_3CHOHCH_2OH$	100%	+	+	+	+	+	+	+	+	+	+	1
Prussic Acid => Hydrogen Cyanide													
Pyridine	C_5H_5N	100%	-	-	o	-	+	-	-	o	+	+	2
Pyrrole	C_4H_4NH	100%	n	n	+	n	+	-	-	-	+	+	2
Roman Vitriol => Copper Sulphate													
Salicylic Acid	HOC_6H_4COOH	s	+	+	+	+	+	+	+	+	+	+/o	1
Salmiac => Ammonium Chloride													
Saltpeter => Potassium Nitrate													
Silic Acid	$SiO_2 * x H_2O$	s	+	+	+	+	+	+	+	+	+	+	1
Silver Bromide	AgBr	s	+	+	+	+	+/o	+	+	+	+	+	1
Silver Chloride	AgCl	s	+	+	+	+	-	+	+	+	+	+/o	1
Silver Nitrate	$AgNO_3$	s	+	+	+	+	+	+	+	+	+	+/o	3
Slaked Lime => Calcium Hydroxide													
Soda => Sodium Carbonate													
Sodium Acetate	$NaCH_3COO$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Benzoate	C_6H_5COONa	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Bicarbonate	$NaHCO_3$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Bisulphate	$NaHSO_4$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Bisulphite	$NaHSO_3$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Borate	$NaBO_2$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Bromate	$NaBrO_3$	s	+	+	+	+	+	+	+	+	+	+	3
Sodium Bromide	NaBr	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Carbonate	Na_2CO_3	s	+	+	+	+	+/o	+	+	+	+	+	1
Sodium Chlorate	$NaClO_3$	s	+	+	+	+	+	+	+	+	+	+	2
Sodium Chloride	NaCl	s	+	+	+	+	-	+	+	+	+	+	1
Sodium Chlorite	$NaClO_2$	24%	+	+	+	+	10%	+	+	+	+	10%	2
Sodium Chromate	Na_2CrO_4	s	+	+	+	+	+	+	+	+	+	+	3
Sodium Cyanide	NaCN	s	+	+	+	+	+	+	+	+	+	+	3
Sodium Dichromate	$Na_2Cr_2O_7$	s	+	+	+	+	+	+	+	+	+	+	3
Sodium Dithionite	$Na_2S_2O_4$	s	+	10%	10%	+	+	n	n	+	10%	+/o	1
Sodium Fluoride	NaF	s	+	+	+	+	10%	+	+	+	+	+	1
Sodium Hydrogen Sulphate => Sodium Bisulphate													
Sodium Hydroxide	NaOH	50%	+	+	+	+ (60%/ 25 °C)	+	-	+	30%	+	+	1
Sodium Hypochlorite	NaOCl + NaCl	12%	+	+	o	+	-	+	+	+	o	> 10%	2
Sodium Iodide	NaI	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Metaphosphate	$(NaPO_3)_n$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Nitrate	$NaNO_3$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Nitrite	$NaNO_2$	s	+	+	+	+	+	+	+	+	+	+	2
Sodium Oxalate	$Na_2C_2O_4$	s	+	+	+	+	+	+	+	+	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	PMMA	PVC	PP	PVDF	1.4404	FKM	EPDM	PharMed®	PE	2.4819	WPC
Sodium Perborate	$NaBO_2*H_2O_2$	s	+	+/o	+	+	+	+	+	+	+	+/o	1
Sodium Perchlorate	$NaClO_4$	s	+	+	+	+	10%	+	+	+	+	10%	1
Sodium Peroxide	Na_2O_2	s	+	+	+	+	+	+	+	n	-	+	1
Sodium Persulphate	$Na_2S_2O_8$	s	n	+	+	+	+	+	+	+	+	+	1
Sodium Pyrosulphite	$Na_2S_2O_5$	s	+	+	+	+	+	n	n	+	+	+	1
Sodium Salicylate	$C_6H_4(OH)COONa$	s	+	+/o	+	+	+	+	+	+	+	+	1
Sodium Silicate	Na_2SiO_3	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Sulphate	Na_2SO_4	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Sulphide	Na_2S	s	+	+	+	+	+	+	+	+	+	+	2
Sodium Sulphite	Na_2SO_3	s	+	+	+	+	50%	+	+	+	+	50%	1
Sodium Tetraborate	$Na_2B_4O_7 * 10\ H_2O$	s	+	+	+	+	+	+	+	+	+	+	1
Sodium Thiosulphate	$Na_2S_2O_3$	s	+	+	+	+	25%	+	+	+	+	25%	1
Sodium Tripolyphosphate	$Na_5P_3O_{10}$	s	+	+	+	+	+	+/o	+	+	+	+	1
Starch	$(C_6H_{10}O_5)_n$	s	+	+	+	+	+	+	n	+	+	+	1
Starch Gum		s	+	+	+	+	+	+	+	+	+	+	1
Styrene	$C_6H_5CHCH_2$	100%	-	-	o	+	+	o	-	-	o	+	2
Sublimate => Mercury-II-Chloride													
Succinic Acid	$C_4H_6O_4$	s	+	+	+	+	+	+	+	+	+	+	1
Sugar Syrup		s	+	+	+	+	+	+	+	+	+	+	1
Sulphur Chloride => Disulphur Dichloride													
Sulphuric Acid	H_2SO_4	98%	30%	50%	85%	+	20%	+	80%	30%	80%	+	1
Sulphuric Acid, fuming --> Oleum													
Sulphurous Acid	H_2SO_3	s	+	+	+	+	10%	+	+	+	+	+	(1)
Sulphuryl Chloride	SO_2Cl_2	100%	-	-	-	o	n	+	o	-	-	n	1
Tannic Acid	$C_{76}H_{52}O_{46}$	50%	+	+	+	+	+	+	+	+	+	+	1
Tartaric Acid	$C_4H_6O_6$	s	50%	+	+	+	+	+	+/o	+	+	+	1
Tetrachloro Ethane	$C_2H_2Cl_4$	100%	-	-	o	+	+	o	-	o	o	+	3
Tetrachloro Ethylene	C_2Cl_4	100%	-	-	o	+	+	o	-	o	o	+	3
Tetrachloromethane => Carbon Tetrachloride													
Tetrahydro Furane	C_4H_8O	100%	-	-	o	-	+	-	-	-	o	+	1
Tetrahydro Naphthalene	$C_{10}H_{12}$	100%	-	-	-	+	+	+	-	-	o	+	3
Tetralin => Tetrahydro Naphthalene													
THF => Tetrahydrofurane													
Thionyl Chloride	$SOCl_2$	100%	-	-	-	+	n	+	+	+	-	n	1
Thiophene	C_4H_4S	100%	n	-	o	n	+	-	-	-	o	+	3
Tin-II-Chloride	$SnCl_2$	s	+	o	+	+	-	+	+	+	+	+/o	1
Tin-II-Sulphate	$SnSO_4$	s	n	+	+	+	+	+	+	+	+	+/o	(1)
Tin-IV-Chloride	$SnCl_4$	s	n	+	+	+	-	+	+	+	+	+	1
Titanium Tetrachloride	$TiCl_4$	100%	n	n	n	+	n	o	-	n	n	n	1
Toluene	$C_6H_5CH_3$	100%	-	-	o	+	+	o	-	-	o	+	2
Toluene Diisocyanate	$C_7H_3(NCO)_2$	100%	n	n	+	+	+	-	+/o	n	+	+	2
Tributyl Phosphate	$(C_4H_9)_3PO_4$	100%	n	-	+	+	+	-	+	+	+	+	1
Trichloro Ethane	CCl_3CH_3	100%	-	-	o	+	+	+	-	o	o	+	3
Trichloro Ethylene	C_2HCl_3	100%	-	-	o	+	+/o	o	-	o	o	+	3
Trichloro Methane => Chloroform													
Trichloroacetaldehyde Hydrate	$CCl_3CH(OH)_2$	s	-	-	o	-	+	o	o	n	+	+	2
Trichloroacetic Acid	CCl_3COOH	50%	-	+	+	+	-	-	o	+/o	+	+	1
Tricresyl Phosphate	$(C_7H_7)_3PO_4$	90%	-	-	+	n	+	o	+	+	+	+	2
Triethanol Amine	$N(C_2H_4OH)_3$	100%	+	o	+	n	+	-	+/o	o	+	+	1
Trilene => Trichloro Ethane													
Trioctyl Phosphate	$(C_8H_{17})_3PO_4$	100%	n	-	+	+	+	o	+	+	+	+	2
Trisodium Phosphate	Na_3PO_4	s	+	+	+	+	+	+	+	+	+	+	1
Urea	$CO(NH_2)_2$	s	+	+/o	+	+	+	+	+	20%	+	+	1
Vinyl Acetate	$CH_2=CHOOCCH_3$	100%	-	-	+	+	+	n	n	+/o	+	+	2
Water Glass => Sodium Silicate													
Xylene	$C_6H_4(CH_3)_2$	100%	-	-	-	+	+	o	-	-	o	+	2
Zinc Acetate	$(CH_3COO)_2Zn$	s	+	+	+	+	+	-	+	+	+	+	1
Zinc Chloride	$ZnCl_2$	s	+	+	+	+	-	+	+	+	+	n	1
Zinc Sulphate	$ZnSO_4$	s	+	+	+	+	+	+	+	+	+	+/o	1

[1] **Chlorine dioxide is capable of penetrating through PVDF without destroying it. This can lead to damage to PVDF-coated parts.**

Overview of the Resistance of Soft PVC Hoses (Guttasyn®) to the Most Common Chemicals

This data applies to standard conditions (20 °C, 1013 mbar).

+	=	resistant
o	=	conditionally resistant
-	=	not resistant

The data is taken from relevant manufacturers' literature and supplemented by our own tests and experience. As the resistance of a material also depends on other factors, especially pressure and operating conditions etc, this list should merely be regarded as an initial guide and does not claim to offer any guarantees. Take into consideration the fact that conventional dosing agents are largely compounds, the corrosiveness of which cannot simply be calculated by adding together the corrosiveness of each individual component. In cases such as these the material compatibility data produced by the chemical manufacturer must be read as a matter of priority when selecting a material. Safety data sheets do not provide this information and cannot therefore replace application-specific documentation.

Corrosive agent	Concentration in %	Evaluation
Acetone	all	-
Acetylene tetrabromide	100	-
Alums of all kinds, aqueous	all	+
Aluminium salts, aqueous	all	+
Ammonium, aqueous	15	-
Ammonium, aqueous	saturated	-
Ammonium salts	all	+
Aniline	100	-
Benzene	100	-
Bisulphite, aqueous	40	+
Borax solution	all	+
Boric acid, aqueous	10	+
Bromine, vaporous and liquid		-
Hydrogen bromide	10	+
Butanol	100	+
Butyric acid, aqueous	20	+
Butyric acid, aqueous	conc.	-
Butyl acetate	100	-
Calcium chloride, aqueous	all	+
Chlorinated hydrocarbons	all	-
Chrome-alum, aqueous	all	+
Chromic acid, aqueous	50	-
Dextrin, aqueous	saturated	+
Diesel oils, compressed oils	100	o
Diethyl ether	100	-
Fertilizing manure salt, aqueous	all	+
Ferric chloride, aqueous	all	+
Glacial acetic acid	100	-
Acetic ester	100	-
Acetic acid, aqueous	10	+
Acetic acid	50	o
Acetic acid (wine vinegar)		o
Acetic acid anhydride	100	-
Ethanol	96	-
Ethyl acetate	100	-
Ethylene glycol	30	+
Formaldehyde, aqueous	30	o
Difluorodichloromethane	100	-
Glycerol	100	-
Glucose, aqueous	saturated	+
Halogens	all	-
Urea, aqueous	all	+
Caustic potash	15	+
Potassium bichromate, aqueous	saturated	+
Potassium persulphate, aqueous	saturated	+

ProMinent® Chemical Resistance List

Corrosive agent	Concentration in %	Evaluation
Creosote		-
Sodium chloride, aqueous	all	+
Carbonic acid	all	+
Copper sulphate, aqueous	all	+
Magnesium salts, aqueous	all	+
Methyl alcohol	100	+
Methylene chloride	100	-
Sodium hypochlorite	15	+
Sodium salts => sodium chloride		
Sodium hydroxide	aqueous	+
Oils => fats, diesel oil, Lubricating oil and similar		
Perchloric acid	all	o
Phenol, aqueous	all	o
Phosphoric acid, aqueous	100	-
Nitric acid, aqueous	25	+
Hydrochloric acid	15	+
Sulphur dioxide, gaseous	all	+
Carbon disulphide	100	-
Sulphuric acid	30	+
Hydrogen sulphide, gaseous	100	-
Silver nitrate	10	+
Tetrachloromethane	100	-
Ink		+
Toluene	100	-
Trichloroethylene	100	-
Hydrogen peroxide	to 10	+
Xylene	100	-
Zinc salts	all	+

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