

■ **Novelties**

ProMinent® Equipment Catalogue

Products for:

- **Storage**
- **Transfer**
- **Dosing**
- **Measurement and Control**

ProMaqua® Equipment Catalogue

Products:

- **For Disinfection**
- **For Oxidation**
- **Membrane Technology**
- **Gravity Filters**

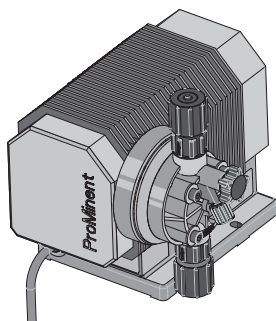
Annex

- **Service**
- **Sales**

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Product Novelties ProMinent 2009

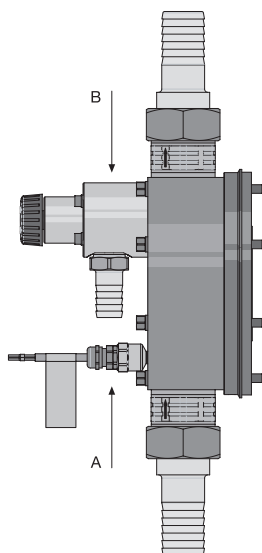
Motor Diaphragm Metering Pumps (Chapter 1)



P_ALP_0004_SW

The motor diaphragm metering pump range **alpha c** offers highest operating safety thanks to the new PVDF pump head. In the material combinations PVDF or plexiglass/PVC with double ball valves on the suction and pressure side as well as coarse/fine bleeding. The capacity of the pump was extended to values of up to 30 l/h, 10 - 2 bar.

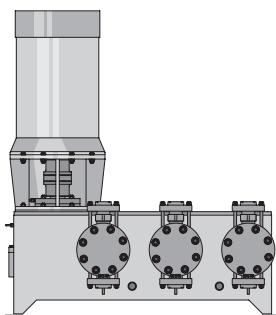
Motor Diaphragm Metering Pumps (Chapter 2)



P_AC_0212_SW

The motor diaphragm metering pumps Sigma in their standard versions are equipped with a multilayer safety diaphragm and a visual diaphragm rupture indicator.

Process Metering Pumps (Chapter 3)

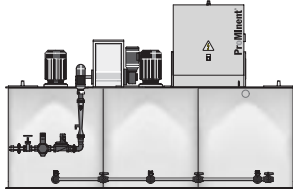


P_TR_0001_SW1

The new process metering pump **TriPower 674**, which is designed in accordance with the American Petrol Institute's guideline API 674, guarantees high performance and high availability with small footprint. The triplex pump is characterised by high operating and environmental safety. This is ensured by the hermetically sealed hydraulic diaphragm unit which effectively prevents the chemicals from leaking, and a PTFE double diaphragm with integrated overflow valve. The standard output range is 4,000 to 38,000 l/h at 415 - 50 bar.

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Metering Systems (Chapter 4)

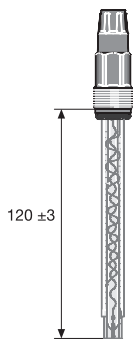


P_UL_0020_SW

The newly developed polymer preparation and metering system **Ultromat® ATR continuous flow system** guarantees a fully automatic operation with a minimum of staff and maintenance. A polymer solution with a concentration of 0.05 to 0.5 % can be safely produced.

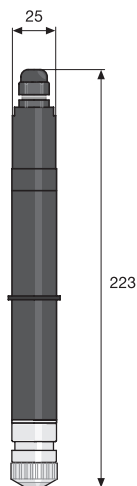
The system consists of 3 round PP tanks which serve as preparation, maturing, and storage tanks. An entrainment of the polymer solution is thus reliably prevented.

DULCOTEST® Sensor Technology (Chapter 7)



pk_6_091

A high operating safety is offered by the new **DULCOTEST® sensors for pH, type PHEK-L, and ORP, type RHEK-L**, even under adverse application conditions. They serve the reliable measurement, specifically in swimming pool water given higher sample water pressures. For the first time it is possible to install the electrodes PHEK-L and RHEK-L unconditionally in vertical to horizontal positions.

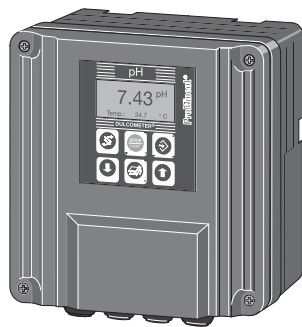


pk_6_083

The new temperature-compensated **chlorine dioxide sensors CDR1-mA** are particularly suitable for the use in contaminated industrial, process and waste water as well as in cooling water or waters containing surfactants. Accurate measurements can be achieved in a pH range between 1 and 10.0.

Product Novelties ProMinent 2009

Measuring And Control Technology (Chapter 8)

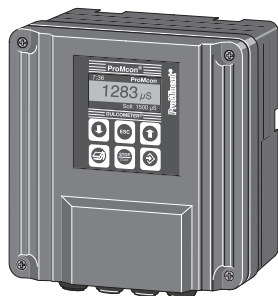


With their high performance, user-friendliness, flexibility and high accuracy, the newly developed controller for applications in drinking water, cooling water, and boiler feed water treatment are a convincing solution.

A high level of flexibility is provided for by the single-channel basic measuring and control unit of the type **D1Cb**. It is equipped for all important measured variables for basic applications in water treatment. Functions can be activated subsequently using an enable code. A safe, comfortable, and clear operation is guaranteed thanks to the large, illuminated graphic display, full text operating menu in 19 operating languages, and sensor monitoring.

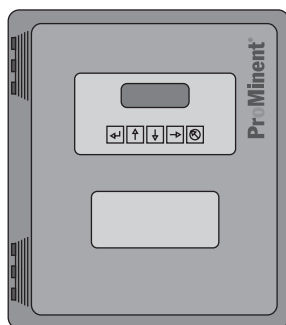
The D1Cb will be available from April 2009.

P_DM_0016_SW



Just as user-friendly is the new cooling tower control **ProMcon**®. This control performs the desalination of a cooling circuit via conductivity measurement or measurement of the make-up water quantity. With metering pumps or a bromine lock, up to 2 biocides can be metered. A corrosion inhibitor can be metered depending on the make-up water quantity. A remote enquiry is possible via an optional modem.

P_DM_0018_SW



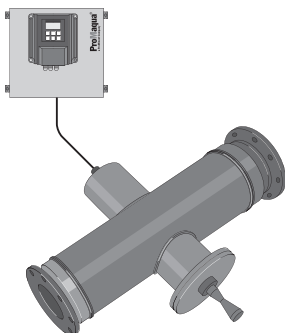
With the **MultiFlex M10** controller, a powerful unit was developed which can simultaneously control up to four cooling circuits or steam generators. The standard integrated Web server and the universal 5 key keypad guarantee that the unit is easy to use. A comfortable configuration and remote control is possible using the optionally available software Trackster. The control has a CE, CSA, and UL approval.

P_DM_0017_SW

Product Novelties ProMinent 2009

Product Novelties ProMaqua 2009

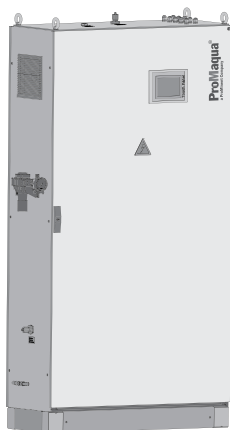
UV Plants Dulcodes S (Chapter 1)



P_PMA_DS_0009_SW

Low capital and operating costs as well as low maintenance effort are only two of the numerous advantages of the new Dulcodes S UV system. It supplements the Dulcodes M range and is specifically made for the photochemical degradation of combined chlorine (chloramine) in swimming pool water. The extremely compact system can be installed in any position and is available in three sizes 1, 2, and 3 kW for a maximum flow rate of 49, 115, and 202 m³/h, respectively. The new system will be available from the 3rd quarter of 2009.

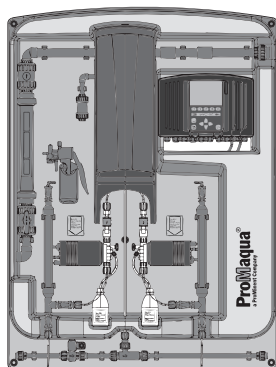
Ozone Generation Plant OZONFILT® OZMa (Chapter 2)



P_PMA_OF_0010_SW

Minimum energy and cooling water consumption as well as the compact design are distinctive features of the new ozone generation plant OZONFILT® OZMa. It produces 70 to 245 g of ozone per hour from compressed air or oxygen. The ozone quantity can be adjusted reproducibly independent of voltage and pressure fluctuations. Minimum compressed air consumption thanks to self-optimising variable pressure drying. Without any additional investment for booster pumps or injectors, ozone can also be directly fed to the water at a backpressure of up to 2 bar. The plant ensures open communication interfaces and easy operation with a PLC with integrated ozone measurement and control as well as a 5.7" touch panel including data logger and screen recorder.

Chlorine Dioxide Plants Bello Zon® CDVc (Chapter 3)



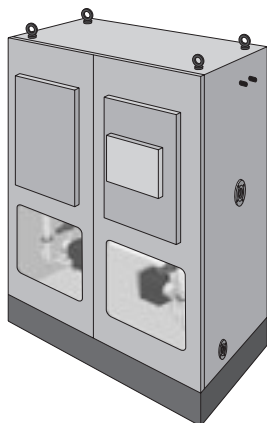
P_PMA_BEZ_0009_SW

Safe and clean into the future - the chlorine dioxide plants Bello Zon® CDVc ready for connection for the production, metering and monitoring of 20 to 2,000 g/h of chlorine dioxide. An innovative, completely newly developed reactor concept ensures efficient production and metering of chlorine dioxide.

Higher operating safety thanks to PVDF as material and online stroke length control of the metering pumps. The extremely high safety is guaranteed by integrated measurement, documentation, and visualisation of ClO₂ and chlorite as well as the automatic monitoring of operating parameters and maintenance dates. The systems work according to the chlorite-acid process in accordance with the DVGW specifications (leaflets W 224 and W 624).

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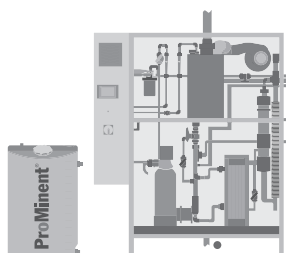
Chlorine Dioxide Plants Type SVP-Pure[®] (Chapter 3)



P_PMA_BEZ_0010_SW

The extremely economic and compact chlorine dioxide plants SVP-Pure[®] produce and meter up to 200 kg/h of chlorine dioxide in a closed control cabinet. Result: a high yield of > 95 % through reaction of sodium chlorate and hydrogen peroxide (Purate[®]) with sulphuric acid. Plants of the AD range use 78 % sulphuric acid. Plants of the MSA range with integrated dilution stage can use 78-98 % sulphuric acid. The simple and safe operation is ensured by the clear menu navigation by large 10.4" colour touch panel as well as the control Siemens Simatic S7.

Electrolysis Plants CHLORINSITU[®] (Chapter 4)



P_PMA_EL_0004_SW

The new electrolysis plants are a highly economic and at the same time a safe alternative to the storage or transportation of hazardous chemicals. The plants with economical salt and energy consumption are available as tubular cell electrolysis or as membrane electrolysis plant. In tubular cell electrolysis (types CHLORINSITU[®] II) the electrochemical reaction takes place in a membrane-free electrolysis cell. In membrane electrolysis CHLORINSITU[®] III, IV and IV plus, it takes place in two electrode chambers separated by a membrane, so that the formation of the chlorine and sodium hydroxide is physically separated. Decisive advantages: high yield and the prevention of entrainment of chloride from the electrolytic cell to the treated water.

Membrane Technology Ultrafiltration Plants Dulcoclean[®] UF eco (Chapter 5)

With minimum energy and water consumption, the ultrafiltration plants Dulcoclean[®] UF eco provide crystal-clear and safe drinking water. A regularly conducted integrity test offers the highest possible safety. The systems are suitable for the removal of turbidity, particles, and microbiological contaminations (bacteria, viruses, parasites). The systems provide consistent filtration quality even in case of temporary turbidity peaks or microbiological contaminations after precipitation - without turbidity and free from pathogens. A microprocessor controller ensures the fully automatic operation of the system. If needed, it can control and manage a complete water treatment system with pre- and post-treatment. The membranes are automatically cleaned by flushing or backwashing, depending on the level of contamination and the water quality.

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Heidelberg, January 2009



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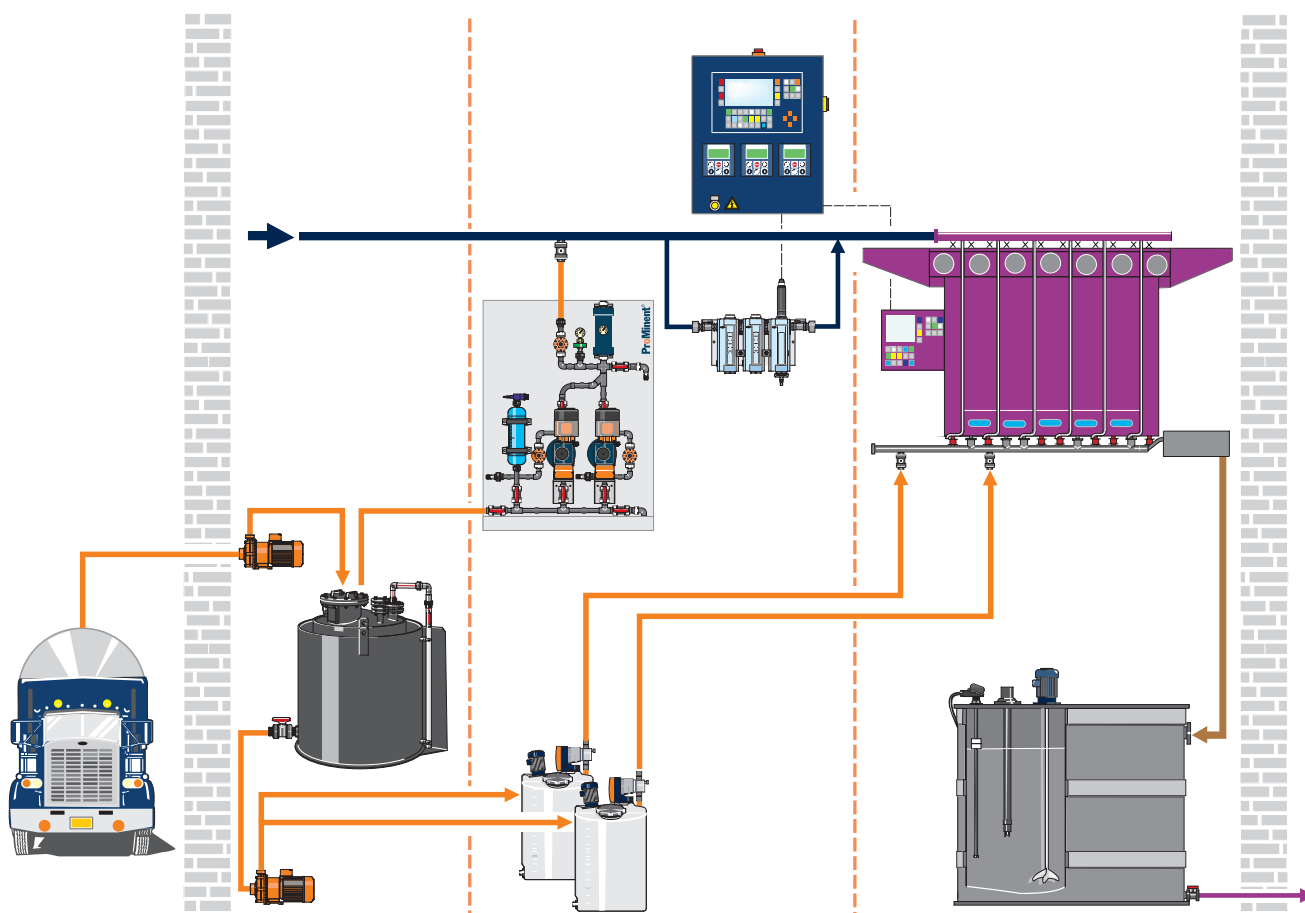
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Overview Chemical Fluid Handling

Optimum Interaction Of All Components



pk_0_001

ProMinent® solutions store, transfer and meter chemicals – in amounts ranging from 0.1 l/h to 40,000 l/h at pressures of 2 to 3,000 bar. In every industrial environment: whether in a simple control loop or a complex field bus application – solutions from ProMinent are simple and efficient.

Automated systems improve the quality of your processes thanks to reliable metering. This increases the quality of your products, saves chemicals, improves environmental compatibility and lowers the costs of wastewater disposal. You also need fewer operating personnel.

Three criteria determine the design of a chemical fluid handling solution: The chemical being handled, the required level of reproducibility and the system control requirements.

- **Storage and transfer**

ProMinent® storage and metering tanks make chemicals available wherever they are required. Matching transfer pumps ensure problem-free transference.

- **Metering/Measuring/Controlling**

ProMinent offers dosing systems with maximum levels of resistance against practically all types and concentrations of chemicals. The accuracy of the metering is determined not just by the pump but also by their interaction with selected accessories. Whether the pump is calibrated once and then meters continuously or whether simple measured variable-dependant metering or integration into a field bus environment is required: thanks to its broad product range ProMinent offers the right pumps, the optimum measurement and control systems and perfectly interacting accessories for all industry requirements.

- **Wastewater treatment**

pH-correction or specialist detoxification ensures that wastewater can be safely disposed of via the public drainage system.

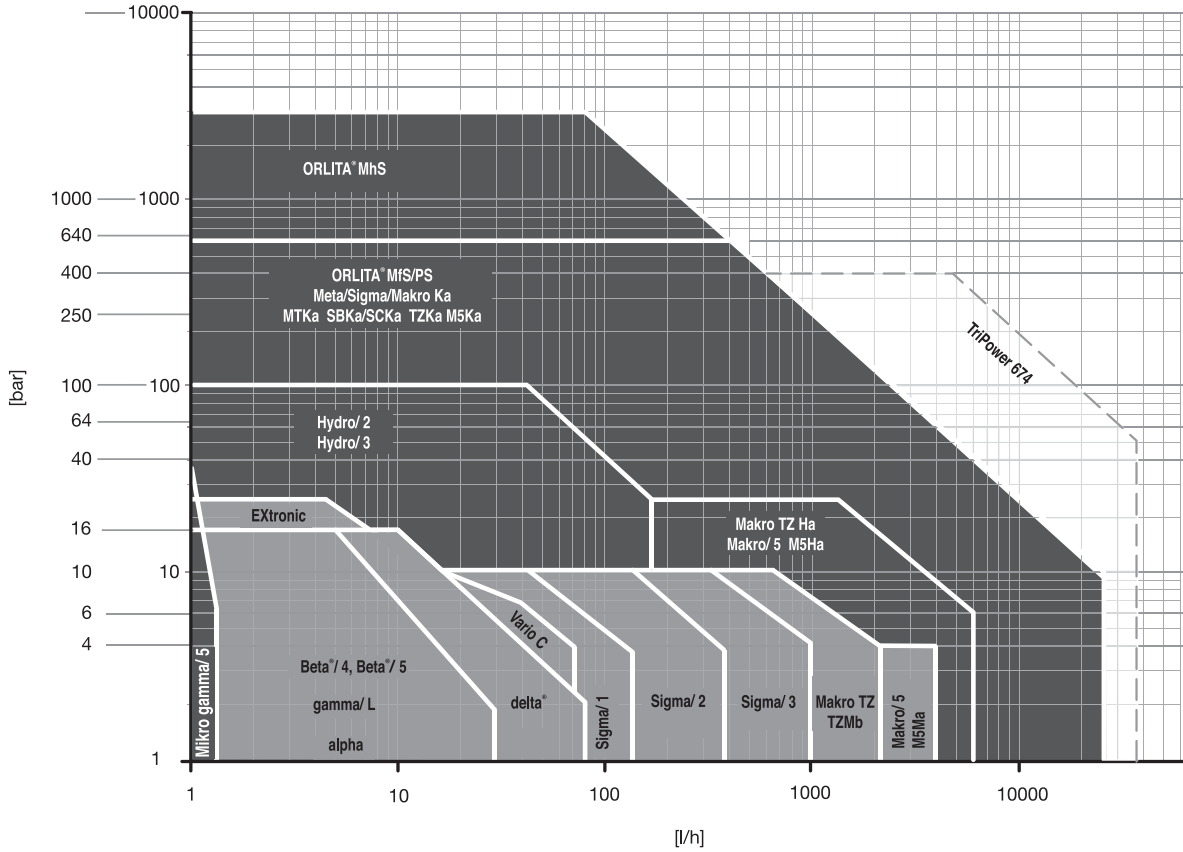
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Capacity Data

Capacity Data Metering Pumps

The following summary of the capacity data for the comprehensive ProMinent® metering pump range facilitates pump selection based on a given back pressure (bar) and feed rate (l/h).

When selecting a pump type, please specify the co-ordinate of the back pressure (bar) and feed rate (l/h).



pk_0_001_4

pressure [bar] over Feed quantity [l/h]

Data Required For Specification Of Dosing Pump And Accessories

Pump Specification Data

Min./max. required feed rate l/h _____
 Available power supply _____ V, _____ Hz
 Min./max. operating temperature °C _____
 Properties of process chemical _____
 Name, concentration % _____
 Solids content % _____
 Dynamic viscosity mPa (= cP) _____
 Vapour pressure at operating temperature bar _____
 Remarks, e.g. abrasive, _____
 gaseous, flammable, _____
 corrosive towards _____

Suction conditions:

Min./max. suction lift m _____
 Min./max. positive suction head m _____
 Pressure in chemical tank bar _____
 Suction line length m _____
 Suction line diameter mm _____

Discharge conditions:

Min./max. back pressure bar _____
 Min./max. discharge head m _____
 Min./max. negative discharge head m _____
 Discharge line length m _____
 Discharge line diameter mm _____
 Number of valves and fittings in suction and discharge line _____

Data required for proportional dosing:

Water flow Q min./max. m³/h _____
 Required final concentration g/m³, ppm _____

Example:

A required dose in mg/l = g/m³ = ppm

(Water flow Q max. 50 m³/h)

Pulse spacing (flow volume per pulse) of water meter 5 l.

Process fluid = sodium hypochlorite solution Na OCl with 12 % chlorine (by weight) = 120 g/kg = 150 g/l = 150 mg/ml

Selected dosing pump GALa 1005 NPB2 with 0.41 ml/per stroke volume, at max. 10800 strokes/h.

Variables: pump type, pulse spacing and concentration. The stroke rate (max. throughput l/h: pulse spacing l/pulse = 50,000 l/h : 5 l/pulse = 10000 pulses/h) must not exceed the max. stroke frequency (10800 strokes/h) of the dosing pump.

$$\text{Feed quantity} = \frac{\text{water throughput Q max. (l/h)} \times \text{stroke volume (l)}}{\text{pulse spacing (l)}} = \frac{50,000 \text{ l} \times 0.00041 \text{ l}}{\text{h} \times 5 \text{ l}} = 4.1 \text{ l/h}$$

$$\begin{aligned} \text{Final dose} &= \frac{\text{concentration (mg/ml)} \times \text{stroke volume (l)}}{\text{pulse spacing (l)}} = \frac{150 \text{ mg} \times 0.41 \text{ ml}}{\text{ml} \times 5 \text{ l}} = 12.3 \text{ mg/l} \\ &= 12.3 \text{ g/m}^3 \\ &= 12.3 \text{ ppm chlorine Cl}_2 \end{aligned}$$

pk_0_002

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, referred 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	$\geq 70\% \text{ H}_2\text{SO}_4 + 5\% \text{ K}_2\text{Cr}_2\text{O}_7 / \text{Na}_2\text{Cr}_2\text{O}_7$
Chromic acid	$\geq 10\% \text{ CrO}_3$
Hydrochloric acid	$\geq 25\% \text{ HCl}$
Sodium hypochlorite (calcium hypochlorite)	$\geq 6\% \text{ NaOCl}$
Hydrogen peroxide	$\geq 5\% \text{ H}_2\text{O}_2$
Hydrofluoric acid	$\geq 0\% \text{ HF}$

Viton® is a registered trademark of DuPont Dow Elastomers

Water pollution classes (WPC):

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.

The data has been 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 for the most part, 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 these data and therefore cannot take the place of the technical documentation on the application.

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Acetaldehyde	CH ₃ CHO	100%	-	-	o	-	+	-	+/o	-	-	+	+	2
Acetamide	CH ₃ CONH ₂	s	+	+	+	+	+	o	+	-	+/o	+	+	1
Acetic Acid	CH ₃ COOH	100%	-	50%	+	+	+	-	o	60%	60%	70%	+	1
Acetic Anhydride	(CH ₃ CO) ₂ O	100%	-	-	o	-	+	-	+/o	-	+	o	+	1
Acetic Ether => Ethyl Acetate														
Acetone	CH ₃ COCH ₃	100%	-	-	+	-	+	-	+	-	-	+	+	1
Acetophenone	C ₆ H ₅ COCH ₃	100%	-	n	+	-	+	-	+	n	n	+	+	1
Acetyl Chloride	CH ₃ COCl	100%	-	+	n	-	o	+	-	-	o	n	+	1
Acetylacetone	CH ₃ COCH ₂ COCH ₃	100%	-	-	+	-	+	-	+	n	n	+	+	1
Acetylene Dichloride => Dichloro Ethylene														
Acetylene Tetrachloride => Tetrachloro Ethane														
Acrylonitril	CH ₂ =CH-CN	100%	-	-	+	+	+	-	-	-	-	+	+	3
Adipic Acid	HOOC(CH ₂) ₄ COOH	s	+	+	+	+	+	+	+	-	+/o	+	+	1
Allyl Alcohol	CH ₂ CHCH ₂ OH	96%	-	o	+	+	+	-	+	-	o	+	+/o	2
Aluminium Acetate	Al(CH ₃ COO) 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 ₃ COONH ₄	s	+	+/o	+	+	+	+	+	+	+	+	+	1
Ammonium Bicarbonate	NH ₄ HCO ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Ammonium Carbonate	(NH ₄) ₂ CO ₃	40%	+	+	+	+	+	+	+	+	+	+	+	1
Ammonium Chloride	NH ₄ Cl	s	+	+	+	+	-	+	+	+	+	+	+/o	1
Ammonium Fluoride	NH ₄ F	s	+	o	+	+	o	+	+	+	+	+	+	1
Ammonium Hydroxide	"NH ₄ OH"	s	+	+	+	o	+	-	+	+	+	+	+	2
Ammonium Nitrate	NH ₄ NO ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Ammonium Oxalate	(COONH ₄) ₂ * H ₂ O	s	+	+	+	+	+	+	+	+	+	+	+	1
Ammonium Perchlorate	NH ₄ ClO ₄	10%	+	+	+	+	+	+	+	+	+	+	+	1
Ammonium Peroxodisulphate	(NH ₄) ₂ S ₂ O ₈	s	+	+	+	+	5%	+	+	+	+	+	5%	2
Ammonium Phosphate	(NH ₄) ₃ PO ₄	s	+	+	+	+	10%	+	+	+	+	+	10%	1
Ammonium Sulphate	(NH ₄) ₂ SO ₄	s	+	+	+	+	10%	+	+	+	+	+	10%	1
Ammonium Sulphide	(NH ₄) ₂ S	s	+	+	+	+	n	+	+	n	n	+	n	2
Ammoniumaluminium Sulphate	NH ₄ Al(SO ₄) ₂	s	+	+	+	+	+	+	+	+	+	+	+	1
Amyl Alcohol	C ₅ H ₁₁ OH	100%	+	+	+	+	+	-	+	-	-	+	+	1
Aniline	C ₆ H ₅ NH ₂	100%	-	-	+	+	+	-	+/o	-	o	+	+	2
Aniline Hydrochloride	C ₆ H ₅ NH 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 ₃ AsO ₄	s	+	+	+	+	+	+	+	20%	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 ₆ H ₅ CHO	100%	-	-	+	-	+	+	+	-	-	o	+	1
Benzene	C ₆ H ₆	100%	-	-	o	+	+	o	-	-	-	o	+	3
Benzene Sulphonic Acid	C ₆ H ₅ SO ₃ H	10%	n	n	+	+	+	-	-	-	-	n	+	2
Benzoic Acid	C ₆ H ₅ COOH	s	+	+	+	+	+	+	+	-	+/o	+	+	1
Benzoyl Chloride	C ₆ H ₅ COCl	100%	-	n	o	n	o	+	+	n	n	o	+	2
Benzyl Alcohol	C ₆ H ₅ CH ₂ OH	100%	-	-	+	+	+	+	-	-	+	+	+	1
Benzyl Benzoate	C ₆ H ₅ COOC ₇ H ₇	100%	-	-	+	o	+	+	-	-	-	+	+	2
Benzyl Chloride	C ₆ H ₅ CH ₂ Cl	90%	-	n	o	+	+	+	-	-	-	o	+	2
Bitter Salt => Magnesium Sulphate														
Bleach => Sodium Hypochlorite														
Blue Vitriol => Copper Sulphate														
Borax => Sodium Tetraborate														
Boric Acid	H ₃ BO ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Brine		s	+	+/o	+	+	+/o	+	+	+	+	+	+	1
Bromine (dry)	Br ₂	100%	-	-	-	+	-	-	-	-	-	-	+	2
Bromine Water	Br ₂ + H ₂ O	s	-	+	-	+	-	-	-	n	n	-	n	(2)
Bromo Benzene	C ₆ H ₅ Br	100%	n	n	o	+	+	o	-	-	-	o	+	2
Bromochloro Methane	CH ₂ BrCl	100%	-	-	-	+	+	n	+/o	-	-	o	+	2
Bromochlorotrifluoro Ethane	HCClBrCF ₃	100%	-	-	o	+	+	+	-	+	+	o	+	(3)
Butanediol	HOC ₄ H ₈ OH	10%	n	+	+	+	+	o	+	+	+	+	+	1
Butanetriol	C ₄ H ₁₀ O ₃	s	+	+	+	+	+	o	+	+	+	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Butanol	C ₄ H ₉ OH	100%	-	+	+	+	+	o	+/o	-	-	+	+	1
Butyl Acetate	C ₇ H ₁₃ O ₂	100%	-	-	+	+	+	-	-	-	+/o	+	+	1
Butyl Acetate	CH ₃ COOC ₄ H ₉	100%	-	-	o	+	+	-	+/o	-	+/o	-	+	1
Butyl Alcohol => Butanol														
Butyl Amine	C ₄ H ₉ NH ₂	100%	n	n	n	-	+	-	-	n	n	+	+	1
Butyl Benzoate	C ₆ H ₅ COOC ₄ H ₉	100%	-	-	o	n	+	+	+	-	-	o	+	2
Butyl Mercaptane	C ₄ H ₉ SH	100%	n	n	n	+	n	+	-	n	n	n	n	3
Butyl Oleate	C ₂₂ H ₄₂ O ₂	100%	n	n	n	+	+	+	+/o	n	n	n	+	1
Butyl Stearate	C ₂₂ H ₄₄ O ₂	100%	o	n	n	+	+	+	-	n	n	n	+	1
Butyraldehyde	C ₃ H ₇ CHO	100%	-	n	+	n	+	-	+/o	-	-	+	+	1
Butyric Acid	C ₃ H ₇ COOH	100%	5%	20%	+	+	+	+	+	-	+/o	+	+	1
Calcium Acetate	(CH ₃ COO) ₂ Ca	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 ₂ O ₃	s	+	+	+	+	-	+	+	+	+	+	+	1
Carbolic Acid => Phenole														
Carbon Disulphide	CS ₂	100%	-	-	o	+	+	+	-	-	-	o	+	2
Carbon Tetrachloride	CCl ₄	100%	-	-	-	+	+	+	-	-	-	o	+	3
Carbonic Acid	"H ₂ CO 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 ₂ O	0.5%	o	+	o	+	-	o	-	o	-	o	+	
Chlorine Water	Cl ₂ + H ₂ O	s	o	+	o	+	-	+	+	o	-	o	+	
Chloro Benzene	C ₆ H ₅ Cl	100%	-	-	+	+	+	+	-	-	-	o	+	2
Chloro Ethanol	ClCH ₂ CH ₂ OH	100%	-	-	+	o	+	-	o	-	+	+	+	3
Chloro Ethylbenzene	C ₆ H ₄ ClC ₂ H ₅	100%	-	-	o	n	+	o	-	-	-	o	+	(2)
Chloro Phenole	C ₆ H ₄ OHCl	100%	-	n	+	+	+	n	-	-	-	+	+	2
Chloro Toluene	C ₇ H ₈ Cl	100%	-	-	n	+	+	+	-	-	-	n	+	2
Chloroacetone	ClCH ₂ COCH ₃	100%	-	-	n	n	+	-	+	-	-	n	+	3
Chlorobutadiene	C ₄ H ₆ Cl	100%	-	-	n	n	+	+	-	-	-	n	+	1
Chloroform	CHCl ₃	100%	-	-	o	+	+	+	-	-	o	-	+	2
Chlorohydrin	C ₃ H ₅ OCl	100%	-	n	+	-	+	+	o	-	+	+	+	3
Chloroprene => Chlorobutadiene														
Chlorosulphonic Acid	SO ₂ (OH)Cl	100%	-	o	-	+	-	-	-	-	-	-	o	1
Chrome-alum => Potassium Chrome Sulphate														
Chromic Acid	H ₂ CrO ₄	50%	-	+	o	+	10%	+	-	o	o	+	10%	3
Chromic-Sulphuric Acid	K ₂ CrO ₄ + H ₂ SO ₄	s	-	+	-	+	n	n	n	-	-	-	n	3
Chromium Sulphate	Cr ₂ (SO ₄) ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Citric Acid	C ₆ H ₈ O ₇	s	+	+	+	+	+	+	+	+	+	+	+	1
Cobalt Chloride	CoCl ₂	s	+	+	+	+	-	+	+	+	+	+	+	2
Copper-II-Acetate	Cu(CH ₃ COO) 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 ₆ H ₄ CH ₃ OH	100%	o	o	+	+	+	+	-	-	-	+	+	2
Crotonaldehyde	CH ₃ C ₂ H ₂ CHO	100%	n	-	+	+	+	-	+	-	-	+	+	3
Cubic Nitre => Sodium Nitrate														
Cumene => Isopropyl Benzene														
Cyclo Hexane	C ₆ H ₁₂	100%	+	-	+	+	+	+	-	-	-	+	o	1
Cyclohexanole	C ₆ H ₁₁ OH	100%	o	+/o	+	+	+	+	-	-	-	+	+	1
Cyclohexanone	C ₆ H ₁₀ O	100%	-	-	+	-	+	-	+/o	-	-	+	+	1
Cyclohexyl Alcohol => Cyclohexanol														
Cyclohexylamine	C ₆ H ₁₁ NH ₂	100%	n	n	n	n	+	-	n	n	n	n	+	2
Decahydronaphthaline	C ₁₀ H ₁₈	100%	-	+/o	o	+	n	o	-	-	-	o	+	2

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Decaline => Decahydronaphthalene														
Dextrose => Glucose														
Diacetonolcohol	C ₆ H ₁₂ O ₂	100%	-	-	+	o	+	-	+	-	-	+	+	1
Dibromoethane	C ₂ H ₄ Br ₂	100%	-	-	n	+	+	+	-	-	-	-	+	3
Dibutyl Ether	C ₄ H ₉ OC ₄ H ₉	100%	-	-	+	+	+	-	o	-	-	+	+	2
Dibutyl Phthalate	C ₁₆ H ₂₂ O ₄	100%	-	-	+	+	+	+	+/o	o	+	o	+	2
Dibutylamine	(C ₄ H ₉) ₂ NH	100%	n	n	+	+	+	-	-	n	n	+	+	1
Dichloro Acetic Acid	Cl ₂ CHCOOH	100%	-	+	+	+	+	-	+	-	o	+	+	1
Dichloro Benzene	C ₆ H ₄ Cl ₂	100%	-	-	o	+	+	+	-	-	-	o	+	2
Dichloro Butan	C ₄ H ₈ Cl ₂	100%	-	-	o	+	+	+	-	-	-	o	+	3
Dichloro Butene	C ₄ H ₆ Cl ₂	100%	-	-	o	+	+	o	-	-	-	o	+	3
Dichloro Ethane	C ₂ H ₄ Cl ₂	100%	-	-	o	+	+	+	+	-	o	-	+	3
Dichloro Ethylene	C ₂ H ₂ Cl ₂	100%	-	-	o	+	+	o	-	-	o	-	+	2
Dichloro Methane	CH ₂ Cl ₂	100%	-	-	o	o	o	+	-	-	o	-	+	2
Dichloroisopropyl Ether	(C ₃ H ₆ Cl) ₂ O	100%	-	-	o	n	+	o	o	-	-	o	+	(2)
Dicyclohexylamine	(C ₆ H ₁₁) ₂ NH	100%	-	-	o	n	+	-	-	-	-	o	+	2
Diethyleneglycol	C ₄ H ₁₀ O ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Diethyleneglycolethyl Ether	C ₈ H ₁₈ O ₃	100%	n	n	+	+	+	n	+/o	-	o	+	+	1
Diethylether	C ₂ H ₅ OC ₂ H ₅	100%	-	-	o	+	+	-	-	-	o	o	+	1
Diglycolic Acid	C ₄ H ₆ O ₅	30%	+	+	+	+	+	+	n	+	+/o	+	+	3
Dihexyl Phthalate	C ₂₀ H ₂₆ O ₄	100%	-	-	+	+	+	-	n	o	+	+	+	(1)
Diisobutylketone	C ₉ H ₁₈ O	100%	-	-	+	+	+	-	+	-	-	+	+	1
Di-iso-nonyl Phthalate	C ₂₆ H ₄₂ O ₄	100%	-	-	+	+	+	n	n	o	+	+	+	1
Diisopropylketone	C ₇ H ₁₄ O	100%	-	-	+	+	+	-	+	-	-	+	+	1
Dimethyl Carbonate	(CH ₃ O) ₂ CO	100%	n	n	+	+	+	+	-	n	n	+	+	1
Dimethyl Ketone => Acetone														
Dimethyl Phthalate	C ₁₀ H ₁₀ O ₄	100%	-	-	+	+	+	-	+/o	o	+	+	+	1
Dimethylformamide	HCON(CH ₃) ₂	100%	-	-	+	-	+	-	+	-	+/o	+	+	1
Dimethylhydrazine	H ₂ NN(CH ₃) ₂	100%	n	n	+	n	+	-	+	n	n	+	+	3
Diocetyl Phthalate	C ₄ H ₄ (COOC ₈ H ₁₇) ₂	100%	-	-	+	+	+	-	+/o	o	+	+	+	1
Dioxane	C ₄ H ₈ O ₂	100%	-	-	o	-	+	-	+/o	-	-	+	+	1
Disodium Hydrogenphosphate	Na ₂ HPO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Disulfur Acid -- Oleum														
Disulphur Dichloride	S ₂ Cl ₂	100%	n	n	n	+	n	+	-	-	-	n	n	
DMF => Dimethylformamide														
Engine Oils		100 %	n	+/o	+	+	+	+	-	-	-	+	+	2
Epsom salts => Magnesium Sulphate														
Ethanol	C ₂ H ₅ OH	100%	-	+	+	+	+	-	+	-	+	+	+	1
Ethanol Amine	HOC ₂ H ₄ NH ₂	100%	o	n	+	-	+	-	+/o	-	o	+	+	1
Ethyl Acetate	CH ₃ COOC ₂ H ₅	100%	-	-	35%	+	+	-	+/o	-	+/o	+	+	1
Ethyl Acrylate	C ₂ H ₃ COOC ₂ H ₅	100%	-	-	+	o	+	-	+/o	-	-	+	+	2
Ethyl Benzene	C ₆ H ₅ -C ₂ H ₅	100%	-	-	o	+	+	o	-	-	-	o	+	1
Ethyl Benzoate	C ₆ H ₅ COOC ₂ H ₅	100%	n	-	+	o	+	+	-	-	-	+	+	1
Ethyl Bromide	C ₂ H ₅ Br	100%	-	n	+	+	n	+	-	-	o	+	+	2
Ethyl Chloroacetate	ClCH ₂ COOC ₂ H ₅	100%	-	o	+	+	+	+	-	-	-	+	+	2
Ethyl Chlorocarbonate	ClCO ₂ C ₂ H ₅	100%	n	n	n	n	n	+	-	n	n	n	n	(2)
Ethyl Cyclopentane	C ₅ H ₄ C ₂ H ₅	100%	+	+	+	+	+	+	-	-	-	+	+	(1)
Ethylacetacetate	C ₆ H ₁₀ O ₃	100%	n	-	+	+	+	-	+/o	-	+/o	+	+	1
Ethylacrylic Acid	C ₄ H ₇ COOH	100%	n	n	+	+	+	n	+/o	n	n	+	+	(1)
Ethylene Diamine	(CH ₂ NH ₂) ₂	100%	o	o	+	-	o	-	+	n	n	+	o	2
Ethylene Dibromide => Dibromoethane														
Ethylene Dichloride => Dichloro Ethane														
Ethylene Glycol => Glycol														
Ethylenglycol Ethylether	HOC ₂ H ₄ OC ₂ H ₅	100%	n	n	+	+	+	n	+/o	-	o	+	+	1
Ethylhexanol	C ₈ H 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
Ferrous Chloride	FeCl ₂	s	+	+	+	+	-	+	+	+	+	+	+/o	1
Ferrous Sulphate	FeSO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Fixing Salt => Sodium Thiosulphate														
Fluoro Benzene	C ₆ H ₅ F	100%	-	-	+	+	+	o	-	-	-	o	+	2
Fluoroboric Acid	HF ₃	35%	+	+	+	+	o	+	+	+	-	+	+	1
Fluorosilicic Acid	H ₂ SiF ₆	100%	+	30%	30%	+	o	+	+	25%	o	40%	+/o	2
Formaldehyde	CH ₂ O	40%	+	+	+	+	+	-	+/o	-	-	+	+	2
Formalin => Formaldehyde														
Formamide	HCONH ₂	100%	+	-	+	+	+	+	+	n	n	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Formic Acid	HCOOH	s	-	+/o	+	+	+	-	-	+/o	+/o	+	+	1
Furane	C ₄ H ₄ O	100%	-	-	+	-	+	-	n	-	-	+	+	3
Furane Aldehyde	C ₅ H ₅ O ₂	100%	n	n	n	o	+	-	+/o	-	-	n	n	2
Furfuryl Alcohol	OC ₄ H ₃ CH ₂ OH	100%	-	-	+	o	+	n	+/o	-	-	+	+	1
Gallic Acid	C ₆ H ₂ (OH) ₃ COOH	5%	+	+	+	+	+	+	+/o	+	+	+	+	1
Gasoline		100 %	-	-	+	+	+	+	-	-	-	+	+	2
Glauber's Salt => Sodium Sulphate														
Glucose	C ₆ H ₁₂ O ₆	s	+	+	+	+	+	+	+	+	+	+	+	1
Glycerol	C ₃ H ₅ (OH) ₃	100%	+	+	+	+	+	+	+	+	+	+	+	1
Glycerol Triacetate	C ₃ H ₅ (CH ₃ COO) ₃	100%	n	n	+	+	+	-	+	n	n	+	+	1
Glycine	NH ₂ CH ₂ COOH	10%	+	+	+	+	+	+	+	+	+	+	+	1
Glycol	C ₂ H ₄ (OH) ₂	100%	+	+	+	+	+	+	+	+	+	+	+	1
Glycolic Acid	CH ₂ OHCOOH	70%	+	37%	+	+	+	+	+	+	+/o	+	+	1
Gypsum => Calcium Sulphate														
Heptane	C ₇ H ₁₆	100%	+	+	+	+	+	-	-	-	-	+	+	1
Hexachloroplatinic Acid	H ₂ PtCl ₆	s	n	+	+	+	-	n	+	n	n	+	-	
Hexanal	C ₅ H ₁₁ CHO	100%	n	n	+	+	+	-	+/o	-	-	+	+	1
Hexane	C ₆ H ₁₄	100%	+	+	+	+	+	-	-	-	-	+	+	1
Hexanol	C ₆ H ₁₃ OH	100%	-	-	+	+	+	n	+	-	o	+	+	1
Hexantriol	C ₆ H ₉ (OH) ₃	100%	n	n	+	+	+	+	+	n	n	+	+	1
Hexene	C ₆ H ₁₂	100%	n	+	+	+	+	+	-	-	-	+	+	1
Hydrazine Hydrate	N ₂ H ₄ * H ₂ O	s	+	+	+	+	+	n	+	-	o	+	+	3
Hydrobromic Acid	HBr	50%	+	+	+	+	-	-	+	+	-	+	o	1
Hydrochloric Acid	HCl	38%	32%	+	+	+	-	+	-	+	o	+	o	1
Hydrofluoric Acid	HF	80%	-	40%*	40%**	+	-	+	o	40%	-	40%	+/o	1
Hydrogen Cyanide	HCN	s	+	+	+	+	+	+	+	+	+	+	+	3
Hydrogen Peroxide	H ₂ O ₂	90%	40%	40%*	30%	+	+	30%	30%	30%	+	+	+	1
Hydroiodic Acid	HI	s	+	+	+	+	-	-	n	+	-	+	n	1
Hydroquinone	C ₆ H ₄ (OH) ₂	s	o	+	+	+	+	+	-	+	+/o	+	+	2
Hydroxylamine Sulphate	(NH ₂ OH) ₂ * H ₂ SO 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 ₂ H ₅ CH(OH)CH ₃	100%	-	+	+	+	+	+	+	-	o	+	+	1
Isopropanol => Isopropyl Alcohol														
Isopropyl Acetate	CH ₃ COOCH(CH ₃) ₂	100%	-	-	+	+	+	-	+/o	-	+/o	+	+	1
Isopropyl Alcohol	(CH ₃) ₂ CHOH	100%	-	+/o	+	+	+	+	+	-	o	+	+	1
Isopropyl Benzene	C ₆ H ₅ CH(CH ₃) ₂	100%	-	-	o	+	+	+	-	-	-	o	+	1
Isopropyl Chloride	CH ₃ CHClCH ₃	80%	-	-	o	+	+	+	-	-	o	o	+/o	2
Isopropyl Ether	C ₆ H ₁₄ O	100%	-	-	o	+	+	-	-	-	o	o	+	1
Kitchen Salt => Sodium Chloride														
Lactic Acid	C ₃ H ₆ O ₃	100%	-	+	+	+	+/o	+	10%	-	+/o	+	+	1
Lead Acetate	Pb(CH ₃ COO) 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 ₂ H ₅) ₄	100%	+	+	+	+	+	+	-	n	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 ₄ H ₄ O ₄	s	+	+	+	+	+	+	+	-	o	+	+	1
Malic Acid	C ₄ H ₆ O ₅	s	+	+	+	+	+	+	+	+	+	+	+	1
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 ₆ H ₁₀ O	100%	-	-	n	n	+	-	+/o	-	-	n	+	1
Methacrylic Acid	C ₃ H ₅ COOH	100%	n	n	+	+	+	o	+/o	-	+/o	+	+	1

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Methanol	CH ₃ OH	100%	-	-	+	+	+	o	+	-	+/o	+	+	1
Methoxybutanol	CH ₃ O(CH ₂) ₄ OH	100%	-	-	+	+	+	+	o	-	o	+	+	(1)
Methyl Acetate	CH ₃ COOCH ₃	60%	-	-	+	+	+	-	+/o	-	+/o	+	+	2
Methyl Acrylate	C ₂ H ₃ COOCH ₃	100%	-	-	+	+	+	-	+/o	-	o	+	+	2
Methyl Benzoate	C ₆ H ₅ COOCH ₃	100%	-	-	+	o	+	+	-	-	-	+	+	2
Methyl Catechol	C ₆ H ₃ (OH) ₂ CH ₃	s	+	+	+	+	+	+	-	+	+o	+	+	(1)
Methyl Cellulose		s	+	+	+	+	+	+	+	+	+	+	+	1
Methyl Chloroacetate	ClCH ₂ COOCH ₃	100%	-	o	+	+	+	o	-	-	-	+	+	2
Methyl Cyclopentane	C ₅ H ₉ CH ₃	100%	+	+	+	+	+	+	-	-	-	+	+	(1)
Methyl Dichloroacetate	Cl ₂ CHCOOCH ₃	100%	-	-	+	n	+	-	n	-	-	+	+	2
Methyl Ethyl Ketone	CH ₃ COC ₂ H ₅	100%	-	-	+	-	+	-	+	-	-	+	+	1
Methyl Glycol	C ₂ H ₆ O ₂	100%	+	+	+	+	+	-	+/o	+	+	+	+	1
Methyl Isobutyl Ketone	CH ₃ COC ₄ H ₉	100%	-	-	+	-	+	-	o	-	-	+	+	1
Methyl Isopropyl Ketone	CH ₃ COC ₃ H ₇	100%	-	-	+	-	+	-	+/o	-	-	+	+	1
Methyl Methacrylate	C ₃ H ₅ COOCH ₃	100%	-	-	+	+	+	-	-	-	-	+	+	1
Methyl Oleate	C ₁₇ H ₃₃ COOCH ₃	100%	n	n	+	+	+	+	+/o	n	n	+	+	1
Methyl Salicylate	HOC ₆ H ₄ COOCH ₃	100%	-	-	+	+	+	n	+/o	-	-	+	+	1
Methylacetyl Acetate	C ₅ H ₈ O ₃	100%	-	-	+	+	+	-	+/o	-	o	+	+	2
Methylamine	CH ₃ NH ₂	32%	+	o	+	o	+	-	+	+	+	+	+	2
Methylene Chloride => Dichloro Methane														
Mirabilit => Sodium Sulphate														
Morpholine	C ₄ H ₉ ON	100%	-	-	+	-	+	n	n	-	-	+	+	2
Muriatic Acid => Hydrochloric Acid														
Natron => Sodium Bicarbonate														
Nickel-II-Acetate	(CH ₃ COO) ₂ Ni	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%	35%	50%	65%	1
Nitro Methane	CH ₃ NO ₂	100%	-	-	+	o	+	-	+/o	-	-	+	+	2
Nitro Propane	(CH ₃) ₂ CHNO ₂	100%	-	-	+	n	+	-	+/o	-	-	+	+	2
Nitro Toluene	C ₆ H ₄ NO ₂ CH ₃	100%	-	-	+	+	+	o	-	-	-	+	+	2
Octane	C ₈ H ₁₈	100%	o	+	+	+	+	+	-	-	-	+	+	1
Octanol	C ₈ H ₁₇ OH	100%	-	-	+	+	+	+	+	-	-	+	+	1
Octyl Cresol	C ₁₅ H ₂₄ O	100%	-	-	+	+	+	o	n	-	-	+	+	(1)
Oil => Engine Oils														
Oleum	H ₂ SO ₄ + SO ₃	s	n	-	-	-	+	+	-	+	+	-	+	2
Orthophosphoric Acid => Phosphoric Acid														
Oxalic Acid	(COOH) ₂	s	+	+	+	+	10%	+	+	+/o	+/o	+	+/o	1
Pentane	C ₅ H ₁₂	100%	+	+	+	+	+	+	-	-	-	+	+	1
Pentanol => Amyl Alcohol														
Perchloric Acid	HClO ₄	70%	n	10%	10%	+	-	+	+/o	o	+	+	n	1
Perchloroethylene => Tetrachloro Ethylene														
Perhydrol => Hydrogen Peroxide														
Petroleum Ether	C _n H _{2n+2}	100%	+	+/o	+	+	+	+	-	-	-	+	+	1
Phenole	C ₆ H ₅ OH	100%	-	-	+	+	+	+	-	10%	+	+	+	2
Phenyl Ethyl Ether	C ₆ H ₅ OC ₂ H ₅	100%	-	-	+	n	+	-	-	-	-	+	+	2
Phenyl Hydrazine	C ₆ H ₅ NHNH ₂	100%	-	-	o	+	+	o	-	-	-	o	+	2
Phosphoric Acid	H ₃ PO ₄	85%	50%	+	+	+	+	+	+	+	+	+	+	1
Phosphorous Oxychloride	POCl ₃	100%	-	-	+	+	n	+	+	n	n	+	+	1
Phosphorous Trichloride	PCl ₃	100%	-	-	+	+	+	o	+	+	+/o	+	+	1
Phthalic Acid	C ₆ H ₄ (COOH) ₂	s	+	+	+	+	+	+	+	-	+	+	+	1
Picric Acid	C ₆ H ₂ (NO ₃) ₃ OH	s	+	+	+	+	+	+	+	+	-	+	+	2
Piperidine	C ₅ H ₁₁ N	100%	-	-	n	n	+	-	-	-	-	n	+	2
Potash Alum => Potassium Aluminium Sulphate														
Potassium Acetate	CH ₃ COOH	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
Potassium Bisulphate	KHSO ₄	5%	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Bitartrate	KC ₄ H ₅ O 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 ₂ CO ₃	s	+	+	+	+	+	+	+	55%	55%	+	+	1
Potassium Chlorate	KClO ₃	s	+	+	+	+	+	+	+	+	+	+	+	2
Potassium Chloride	KCl	s	+	+	+	+	-	+	+	+	+	+	+/o	1
Potassium Chromate	K ₂ CrO ₄	10%	+	+	+	+	+	+	+	+	+	+	+	3

ProMinent® Chemical Resistance List

Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
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 ₄ Fe(CN) ₆	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Cyanoferrate III	K ₃ Fe(CN) ₆	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Dichromate	K ₂ Cr ₂ O ₇	s	+	+	+	+	25%	+	+	+	+	+	10%	3
Potassium Fluoride	KF	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Hydroxyde	KOH	50%	+	+	+	-	+	-	+	10%	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%	6%	+	+	2
Potassium Persulphate	K ₂ S ₂ O ₈	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Phosphate	KH ₂ PO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Pyrochromate => Potassium Dichromate														
Potassium Sulphate	K ₂ SO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Potassium Sulphite	K ₂ SO ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Propionic Acid	C ₂ H ₅ COOH	100%	o	+	+	+	+	+	+	-	+/o	+	+	1
Propionitrile	CH ₃ CH ₂ CN	100%	n	n	+	+	+	+	-	-	-	+	+	2
Propyl Acetate	CH ₃ COOC ₃ H ₇	100%	-	-	+	+	+	-	+/o	-	-	+	+	1
Propylene Glycol	CH ₃ CHOHCH ₂ OH	100%	+	+	+	+	+	+	+	+	+	+	+	1
Prussic Acid => Hydrogen Cyanide														
Pyridine	C ₅ H ₅ N	100%	-	-	o	-	+	-	-	-	o	+	+	2
Pyrrrole	C ₄ H ₄ NH	100%	n	n	+	n	+	-	-	-	-	+	+	2
Roman Vitriol => Copper Sulphate														
Salicylic Acid	HOC ₆ H ₄ COOH	s	+	+	+	+	+	+	+	+	+	+	+/o	1
Salmiac => Ammonium Chloride														
Saltpeter => Potassium Nitrate														
Silic Acid	SiO ₂ * x H ₂ O	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 ₃ COO	s	+	+	+	+	+	+	+	+	+	+	+	1
Sodium Benzoate	C ₆ H ₅ COONa	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 ₂ CO 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 ₂ CrO ₄	s	+	+	+	+	+	+	+	+	+	+	+	3
Sodium Cyanide	NaCN	s	+	+	+	+	+	+	+	+	+	+	+	3
Sodium Dichromate	Na ₂ Cr ₂ O ₇	s	+	+	+	+	+	+	+	+	+	+	+	3
Sodium Dithionite	Na ₂ S ₂ O ₄	s	+	10%	10%	+	+	n	n	+	+	10%	+/o	1
Sodium Fluoride	NaF	s	+	+	+	+	10%	+	+	+	+	+	+	1
Sodium Hydrogen Sulphate => Sodium Bisulphate														
Sodium Hydroxide	NaOH	45% (25 °C)	+	+	+	+	+	-	+	10%	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 ₂ C ₂ O ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Sodium Perborate	NaBO ₂ *H ₂ O ₂	s	+	+/o	+	+	+	+	+	+	+	+	+/o	1
Sodium Perchlorate	NaClO ₄	s	+	+	+	+	10%	+	+	+	+	+	10%	1
Sodium Peroxide	Na ₂ O ₂	s	+	+	+	+	+	+	+	n	n	-	+	1
Sodium Persulphate	Na ₂ S ₂ O ₈	s	n	+	+	+	+	+	+	+	+	+	+	1
Sodium Pyrosulphite	Na ₂ S ₂ O ₅	s	+	+	+	+	+	n	n	+	+	+	+	1
Sodium Salicylate	C ₆ H ₄ (OH)COONa	s	+	+/o	+	+	+	+	+	+	+	+	+	1
Sodium Silicate	Na ₂ SiO ₃	s	+	+	+	+	+	+	+	+	+	+	+	1
Sodium Sulphate	Na ₂ SO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Sodium Sulphide	Na ₂ S	s	+	+	+	+	+	+	+	+	+	+	+	2

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Chemical	Formula	Conc	Acryl	PVC	PP	PVDF	1.4404	FPM	EPDM	Tygon	Pharmed	PE	HastelloyC	WPC
Sodium Sulphite	Na ₂ SO ₃	s	+	+	+	+	50%	+	+	+	+	+	50%	1
Sodium Tetraborate	Na ₂ B ₄ O ₇ * 10 H ₂ O	s	+	+	+	+	+	+	+	+	+	+	+	1
Sodium Thiosulphate	Na ₂ S ₂ O ₃	s	+	+	+	+	25%	+	+	+	+	+	25%	1
Sodium Tripolyphosphate	Na ₅ P ₃ O ₁₀	s	+	+	+	+	+	+/o	+	+	+	+	+	1
Starch	(C ₆ H ₁₀ O ₅) _n	s	+	+	+	+	+	+	n	+	+	+	+	1
Starch Gum		s	+	+	+	+	+	+	+	+	+	+	+	1
Styrene	C ₆ H ₅ CHCH ₂	100%	-	-	o	+	+	o	-	-	-	o	+	2
Sublimate => Mercury-II-Chloride														
Succinic Acid	C ₄ H ₆ O ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Sugar Syrup		s	+	+	+	+	+	+	+	+	+	+	+	1
Sulphur Chloride => Disulphur Dichloride														
Sulphuric Acid	H ₂ SO ₄	98%	30%	50%	85%	+	20%	+	+	30%	30%	80%	+	1
Sulphuric Acid, fuming --> Oleum														
Sulphurous Acid	H ₂ SO ₃	s	+	+	+	+	10%	+	+	+	+	+	+	(1)
Sulphuryl Chloride	SO ₂ Cl ₂	100%	-	-	-	o	n	+	o	-	-	-	n	1
Tannic Acid	C ₇₆ H ₅₂ O ₄₆	50%	+	+	+	+	+	+	+	+	+	+	+	1
Tartaric Acid	C ₄ H ₆ O ₆	s	50%	+	+	+	+	+	+/o	+	+	+	+	1
Tetrachloro Ethane	C ₂ H ₂ Cl ₄	100%	-	-	o	+	+	o	-	-	o	o	+	3
Tetrachloro Ethylene	C ₂ Cl ₄	100%	-	-	o	+	+	o	-	-	o	o	+	3
Tetrachloromethane => Carbon Tetrachloride														
Tetrahydro Furane	C ₄ H ₈ O	100%	-	-	o	-	+	-	-	-	-	o	+	1
Tetrahydro Naphthalene	C ₁₀ H ₁₂	100%	-	-	-	+	+	+	-	-	-	o	+	3
Tetralin => Tetrahydro Naphthalene														
THF => Tetrahydrofuran														
Thionyl Chloride	SOCl ₂	100%	-	-	-	+	n	+	+	+	+	-	n	1
Thiophene	C ₄ H ₄ S	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	n	1
Toluene	C ₆ H ₅ CH ₃	100%	-	-	o	+	+	o	-	-	-	o	+	2
Toluene Diisocyanate	C ₇ H ₃ (NCO) ₂	100%	n	n	+	+	+	-	+/o	n	n	+	+	2
Tributyl Phosphate	(C ₄ H ₉) ₃ PO ₄	100%	n	-	+	+	+	-	+	o	+	+	+	1
Trichloro Ethane	CCl ₃ CH ₃	100%	-	-	o	+	+	+	-	-	o	o	+	3
Trichloro Ethylene	C ₂ HCl ₃	100%	-	-	o	+	+/o	o	-	-	o	o	+	3
Trichloro Methane => Chloroform														
Trichloroacetaldehyde Hydrate	CCl ₃ CH(OH) ₂	s	-	-	o	-	+	o	o	n	n	+	+	2
Trichloroacetic Acid	CCl ₃ COOH	50%	-	+	+	+	-	-	o	+	+/o	+	+	1
Tricresyl Phosphate	(C ₇ H ₇) ₃ PO ₄	90%	-	-	+	n	+	o	+	o	+	+	+	2
Triethanol Amine	N(C ₂ H ₄ OH) ₃	100%	+	o	+	n	+	-	+/o	-	o	+	+	1
Trilene => Trichloro Ethane														
Trioctyl Phosphate	(C ₈ H ₁₇) ₃ PO ₄	100%	n	-	+	+	+	o	+	o	+	+	+	2
Trisodium Phosphate	Na ₃ PO ₄	s	+	+	+	+	+	+	+	+	+	+	+	1
Urea	CO(NH ₂) ₂	s	+	+/o	+	+	+	+	+	20%	20%	+	+	1
Vinyl Acetate	CH ₂ =CHOOCCH ₃	100%	-	-	+	+	+	n	n	-	+/o	+	+	2
Water Glass => Sodium Silicate														
Xylene	C ₆ H ₄ (CH ₃) ₂	100%	-	-	-	+	+	o	-	-	-	o	+	2
Zinc Acetate	(CH ₃ COO) ₂ Zn	s	+	+	+	+	+	-	+	+	+	+	+	1
Zinc Chloride	ZnCl ₂	s	+	+	+	+	-	+	+	+	+	+	n	1
Zinc Sulphate	ZnSO ₄	s	+	+	+	+	+	+	+	+	+	+	+/o	1

ProMinent® Chemical Resistance List

1 Solenoid-Driven Metering Pumps

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1 Solenoid-Driven Metering Pumps

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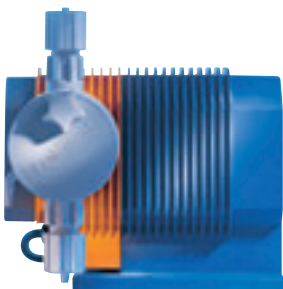
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1.0 Overview Of Solenoid-Driven Metering Pumps

1.0.1 Product Overview

alpha Motor-Driven Diaphragm Metering Pump



pk_1_135

Output range 1.0 - 30.6 l/h, 10 - 2 bar,

This metering pump is designed for simple applications. The pump is ideal for tasks involving continuous metering.

- Control via power ON/OFF
- Stroke length adjustment in steps of 10%

Beta® Solenoid-Driven Diaphragm Metering Pump



pk_1_136

Output range 0.74 – 32 l/h, 16 – 2 bar

This metering pump is convincing not only in terms of its versatility and reliability but also by the ideal price/performance ratio this allrounder offers.

- Manual operation and external contact activation
- Continuous stroke length adjustment
- Connection for 2-stage level switch

gamma/ L Solenoid-Driven Diaphragm Metering Pump



pk_1_137

Output range 0.74 – 32 l/h, 16 – 2 bar

This metering pump satisfies the most demanding requirements: Varied adjustment and activation options for standalone applications or use in complex bus-networked systems.

- Manual operation, external contact and analogue activation
- Continuous stroke length adjustment
- Connection for 2-stage level switch
- Optional PROFIBUS® interface and 14-day process timer

delta® Solenoid-Driven Diaphragm Metering Pump



pk_1_138

Output range 7.5 – 75 l/h, 16 – 2 bar

delta® Series with optoDrive® technology for highly effective adaptation to the metering task and monitoring of hydraulic periphery.

- Optional continuous or pulsating metering
- Integrated hydraulic monitoring functions
- Manual operation, external contact and analogue activation
- Continuous stroke length adjustment
- Connection for 2-stage level switch
- Large backlit graphic display
- Optional interfaces for PROFIBUS® or CAN-bus
- Optional 14-day process timer for time and event-dependent metering tasks

1.0 Overview Of Solenoid-Driven Metering Pumps



pk_1_141

mikro g/ 5a

Output range 150 – 1,500 ml/h, 40 – 6 bar

mikro g/ 5a is a solenoid-driven, microprocessor-controlled precision metering pump for all metering tasks in the microlitre range. The self-monitoring function of the electronics and the identification of external fault sources ensure maximum metering reliability.

- Manual operation, external contact and analogue activation
- Continuous stroke length adjustment, resolution < 1 %
- Connection for 2-stage level switch
- Micrometering as from 1 µl/stroke

Pneumados b

Capacity range 0.76 - 16.7 l/h, 16 - 2 bar.

Pneumados is a pneumatically-operated metering pump in the capacity range of max. 0.76 - 16.7 l/h at a maximum backpressure of 16 - 2 bar.

The metering stroke is effected by a pneumatically actuated diaphragm, the suction stroke by spring force. The metering capacity can be varied via the stroke length and the stroke frequency.

- Continuous stroke length adjustment
- Material version PVDF and stainless steel
- Stroke frequency up to 180 strokes/min



P_PN_0007_C

DULCO®flex Peristaltic Pumps

DF2a

Output range: 0.4 – 2.4 l/h, 1.5 bar

Typical applications include processes requiring loose delivery pressure such as in docent conditioners in private swimming pools. Spring-loaded rollers ensure a consistent rolling pressure while extending the service life of the pump.

- Rotor in cover mounted in ball bearings for longer service life
- Reliable dosing of small quantities, including gas-emitting chemicals
- Virtually silent operation



pk_1_143

DF3a

Output range: 0.4 – 2.4 l/h, 1.5 bar

The DF3a was specifically developed for the purpose of dosing fragrances. It is equipped with relay outputs for two further metering pumps and three solenoid valves for the diluting water. Spring-loaded rollers ensure a consistent rolling pressure while extending the service life of the pump.

- Viton® hose material, used specifically for dosing fragrances in wellness application
- Program control for the pump and two further peristaltic pumps
- Virtually silent operation



P_DX_0004_C

1.0 Overview Of Solenoid-Driven Metering Pumps



DF4a

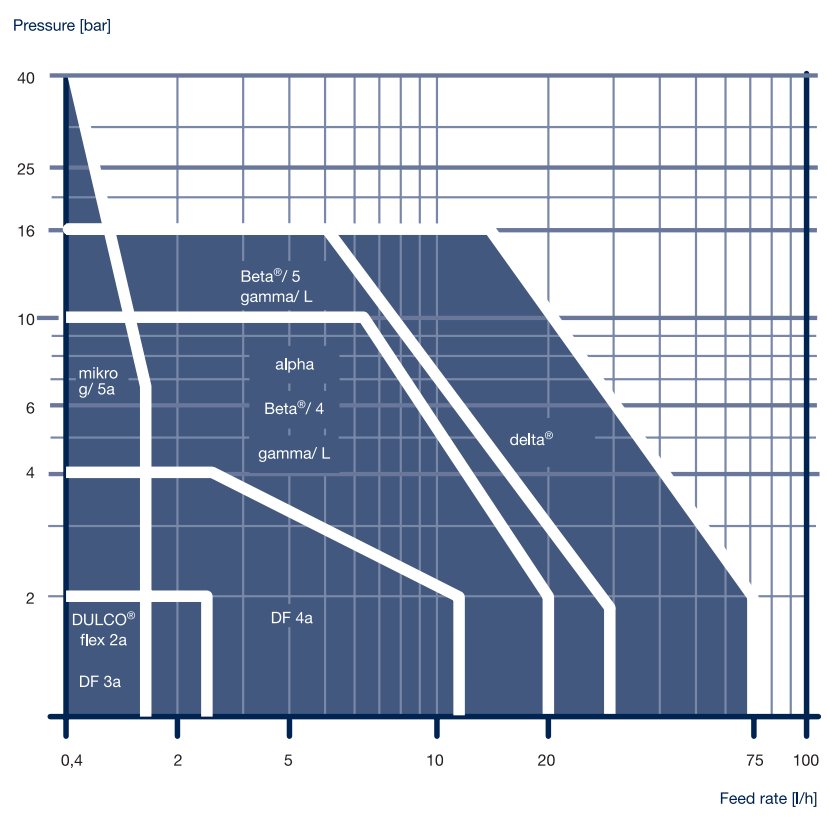
Output range 1.5 - 12 l/h, 4 - 2 bar

Stepper motor-actuated peristaltic pump for metering chemicals. It is available in three versions which are geared to the respective application:

- metering of flocculants
- metering of activated carbon
- metering of chemicals in general

P_DX_0005_C

1.0.2 Selection Guide



pk_1_999

Back pressure [bar] as a function of feed rate [l/h]

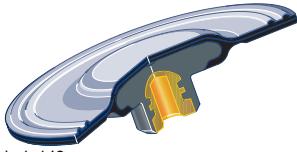
ProMinent offers a wide range of solenoid-driven metering pumps in the output range from 0.74 to 75 l/h at a backpressure of 16 – 2 bar. ProMinent solenoid-driven diaphragm pumps perform their metering task reliably even under the toughest operating conditions. Maintenance and repair costs are therefore kept low. With a wide range of different materials, these metering pumps are suitable for practically all liquid chemicals.

1.0 Overview Of Solenoid-Driven Metering Pumps

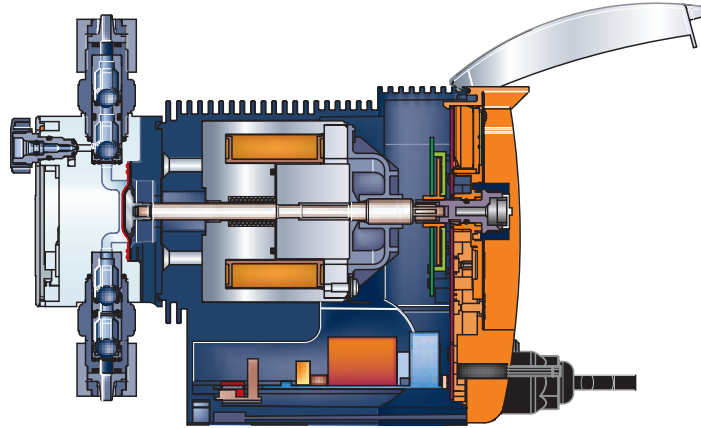
Functional Principle/Features

A solenoid is switched on and off to move the magnetic spindle forward and backward. This stroke motion is transmitted to the metering diaphragm in the liquid end. Two non-return valves prevent the metered medium flowing back during pump operation. The metering capacity of a solenoid-driven diaphragm-type metering pump can be adjusted by way of the stroke length and the stroke rate.

- Virtually wear-free drive as there is only one moving part. Pump operates without lubricated bearings or shafts
- Outstanding continuous operation properties



pk_1_140



pk_1_139

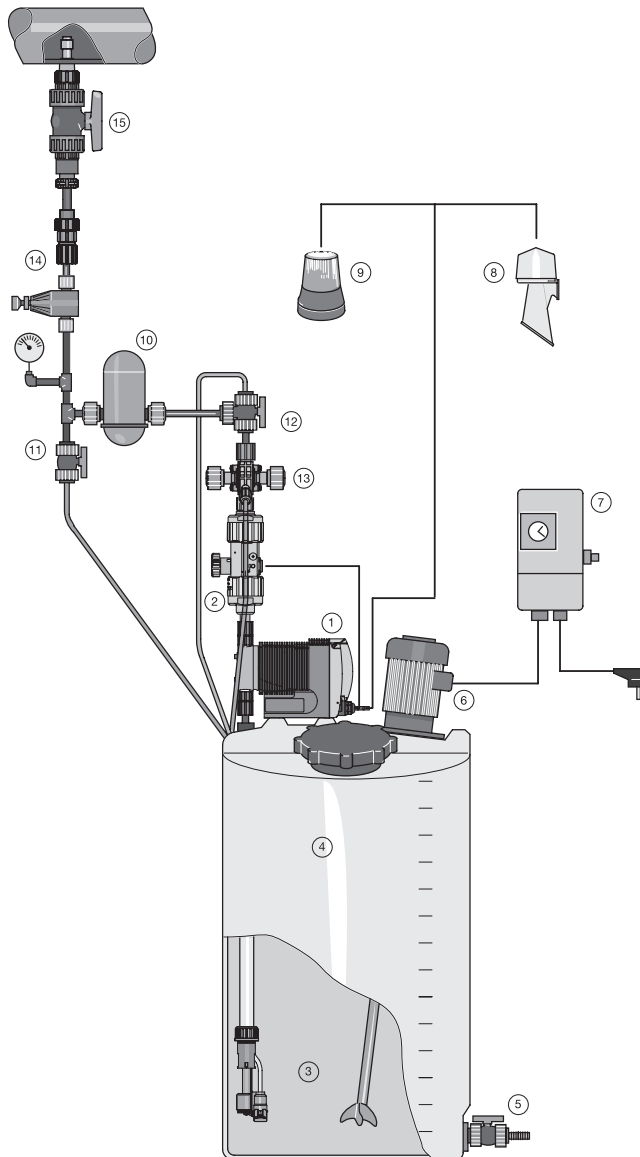
1.0 Overview Of Solenoid-Driven Metering Pumps

1.0.3 Installation Option

ProMinent® Dosing Station

Comprehensive Accessory Range Ensures Processing Safety

Note: Excessive pressure can built up if solenoid metering pumps are used where a discharge line is blocked, or a line is closed off via a stop valve. In these conditions, therefore, we strongly advise the use of a multifunction valve (13).
When metering at atmospheric pressure the pump can achieve several times the stated feed rate. For this reason we recommend installing a multi-function valve (13).



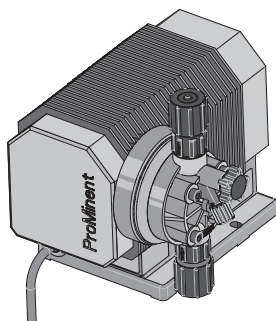
- 1 gamma/ L metering pump with alarm relay
- 2 Flow control monitor
- 3 Suction assembly with float switch
- 4 ProMinent® chemical tank
- 5 Drainage tap
- 6 Electric stirrer
- 7 ProMinent® timer
- 8 Warning siren
- 9 Warning light
- 10 Accumulator, pulsation dampener
- 11 Vent valve for accumulator
- 12 Aeration valve for accumulator
- 13 Multi-function valve
- 14 Back pressure valve if pulsation dampener installed
- 15 Injection lance or injection valve

pk_1_001_1

1.0 Overview Of Solenoid-Driven Metering Pumps

1.1 alpha Motor Driven Diaphragm Metering Pumps

1.1.1 alpha Motor Driven Diaphragm Metering Pumps



P_ALP_0004_SW

- Output range 1.0 - 30.6 l/h, 10 - 2 bar
- Stroke length adjustment in steps of 10% from 0 - 100 %
- Material versions PVDF and Acrylic/PVC
- Patented coarse / fine bleed valve
- Constant stroke rate
- Control via mains supply ON/OFF

The alpha is a metering pump designed for simple operations. It is ideal for continuous metering.

It is an oscillating motor diaphragm metering pump for liquid chemicals and consists of drive and delivery unit as main components. The drives are available in 2 gear ratios, delivery units in 4 sizes and in the materials acrylic/PVC. It is therefore possible to specify the required output and the material combination. The alpha pumps are switched on/off via the mains power supply, the metering output can be changed via the stroke length adjustment between 100 % and 0.

The drive consists of a powerful split pole motor with gearbox, eccentric shaft and connecting rod as driving rod. The housing is made of glass fibre reinforced plastic and is resistant to shock and chemicals. The eccentric for the stroke movement is guided in an eccentric cam. Suction and pressure stroke are positively driven.

The stroke length adjustment is carried out by varying the eccentricity in 10 % steps via a notched slide when the pump is not working. This means that the diaphragm deflection is always made from the neutral centre position.

During operation, the alpha pump with its positively driven suction and metering strokes as well as the stroke length adjustment by varying the eccentricity produces a smooth, sinusoidal stroke action for suction and metering stroke with diaphragm deflection from the centre position.

The result is good suction performance, smooth metering stroke and consistently accurate metering with low mechanical load on the metering diaphragm.

The delivery unit consists of liquid end, metering diaphragm and head disc. The liquid end in the material combinations PVDF or plexiglass/PVC is equipped with double ball valves on the suction and pressure side as well as coarse/fine bleeding. The bleed valve facilitates suctioning and bleeding at full operating pressure without having to interrupt and de-pressurise the metering line. For media of higher viscosity, the valves can be spring-loaded.

1.1 alpha Motor Driven Diaphragm Metering Pumps

Technical data

Pump type	Delivery rate at max. backpressure			Delivery rate at medium backpressure			Number of strokes Strokes/min	Stroke length mm	Connection size o ∅ x i ∅ mm	Suction head mWC	Shipping weight kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke					
50 Hz version											
ALPc 1001	10	1.0	0.29	5	1.1	0.32	58	2	6 x 4	5.1	3.0
ALPc 1002	10	1.8	0.52	5	2.1	0.60	58	2	6 x 4	5.1	3.0
ALPc 1004	10	3.5	1.01	5	3.9	1.12	58	3	8 x 5	5.1	3.0
ALPc 1008	10	7.7	1.00	5	8.6	1.12	128	3	8 x 5	5.1	3.0
ALPc 0708	7	6.0	2.27	3	7.7	2.53	58	3	8 x 5	4.1	3.0
ALPc 0417	4	17.0	2.51	2	18.3	2.76	128	3	8 x 5	4.1	3.0
ALPc 0230	2	30.6	3.98	1	32.7	4.26	128	3	12 x 9	3.1	3.0
60 Hz version											
ALPc 1001	10	1.2	0.29	5	1.3	0.31	69	2	6 x 4	5.1	3.0
ALPc 1002	10	2.2	0.53	5	2.6	0.63	69	2	6 x 4	5.1	3.0
ALPc 1003	10	4.1	0.99	5	4.7	1.14	69	3	8 x 5	5.1	3.0
ALPc 1008	10	8.9	0.96	5	10.4	1.13	154	3	8 x 5	5.1	3.0
ALPc 0708	7	8.3	2.27	3	9.2	2.56	69	3	8 x 5	4.1	3.0
ALPc 0417	4	20.6	2.45	2	21.9	2.75	154	3	8 x 5	4.1	3.0
ALPc 0230	2	34.4	3.72	1	39.2	4.24	154	3	12 x 9	3.1	3.0

Materials in contact with medium

	Liquid end	Suction/pressure port	Gaskets	Balls
NPE	Plexiglass	PVC	EPDM	Ceramic
NPB	Plexiglass	PVC	FPM	Ceramic
PVT	PVDF	PVDF	PTFE	Ceramic

Metering diaphragm with PTFE coating for all types.

FPM = fluororubber.

Scope of delivery: Metering pump with mains cable (2 m) and connector, connecting kit for hose/pipe connection according to table.

Motor Data

Type:	Split pole motor with integrated thermal overload protection
Power supply:	220-240 V, 50/60 Hz (version A)
Power input:	50 W (at 230 V/50 Hz)
Power consumption:	0.4 A (at 230 V/50 Hz)

Guarantee: The warranties given under "General Commercial Terms and Conditions" apply. The alpha pump drive is, however, supplied with a 12 month warranty.

1.1 alpha Motor Driven Diaphragm Metering Pumps

1.1.2 Identcode Ordering System

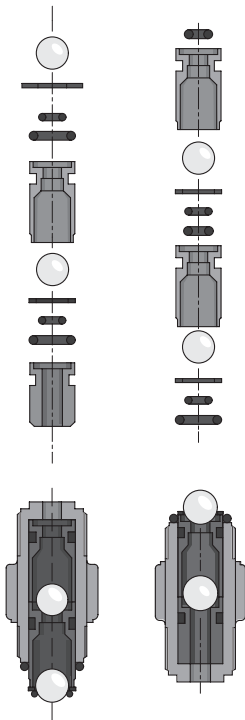
Series alpha, version c

ALPc	Type	Capacity 50 Hz		Capacity 60 Hz	
		l/h	bar	l/h	bar
	1001	1.0	10	1.2	10
	1002	1.8	10	2.2	10
	1004	3.5	10	4.1	10
	1008	7.7	10	8.9	10
	0708	6.9	7	8.3	7
	0417	17.0	4	20.6	4
	0230	30.6	2	34.4	2
Liquid end material					
	NPE	Acrylic/PVC/EPDM			
	NPB	Acrylic/PVC/FPM			
	PVT	PVDF/PVDF/PTFE			
Valve springs					
	2	without valve spring, with bleeding			
	3	with 2 valve springs approx. 0.1 bar, material 1.4571, with bleeding			
Hydraulic connectors					
	0	Standard according to technical data			
Version					
	0	With ProMinent® logo			
Electrical connection					
	A	230 V, 50/60 Hz, 2 m, Euro. plug			
	B	230 V, 50/60 Hz, 2 m, Swiss plug			
	C	230 V, 50/60 Hz, 2 m, Austral. plug			
	D	115 V, 50/60 Hz, 2 m, USA plug			
Accessories					
	0	No ancillary equipment			
	1	with foot and metering valve, 2 m PVC suction line, 5 m PE metering line			

FPM = Fluorine Rubber

1.1 alpha Motor Driven Diaphragm Metering Pumps

1.1.3 Spare Parts Kits, Replacement Diaphragms

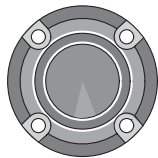


Spare parts kits for alpha, consisting of

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 1 seal set
- 1 connector set

Spare parts kits alpha

Type	Materials in contact with medium	Order no.
for alpha c, type 1001	NPE	1001715
	NPB	1001723
	PVT	1023109
for alpha c, type 1002, 1004, 1008	NPE	1001716
	NPB	1001724
	PVT	1023110
for alpha c, type 0708, 0417	NPE	1001718
	NPB	1001726
	PVT	1023112
for alpha c, type 0230	NPE	1001719
	NPB	1001727
	PVT	1023113



pk_1_008

Replacement diaphragms

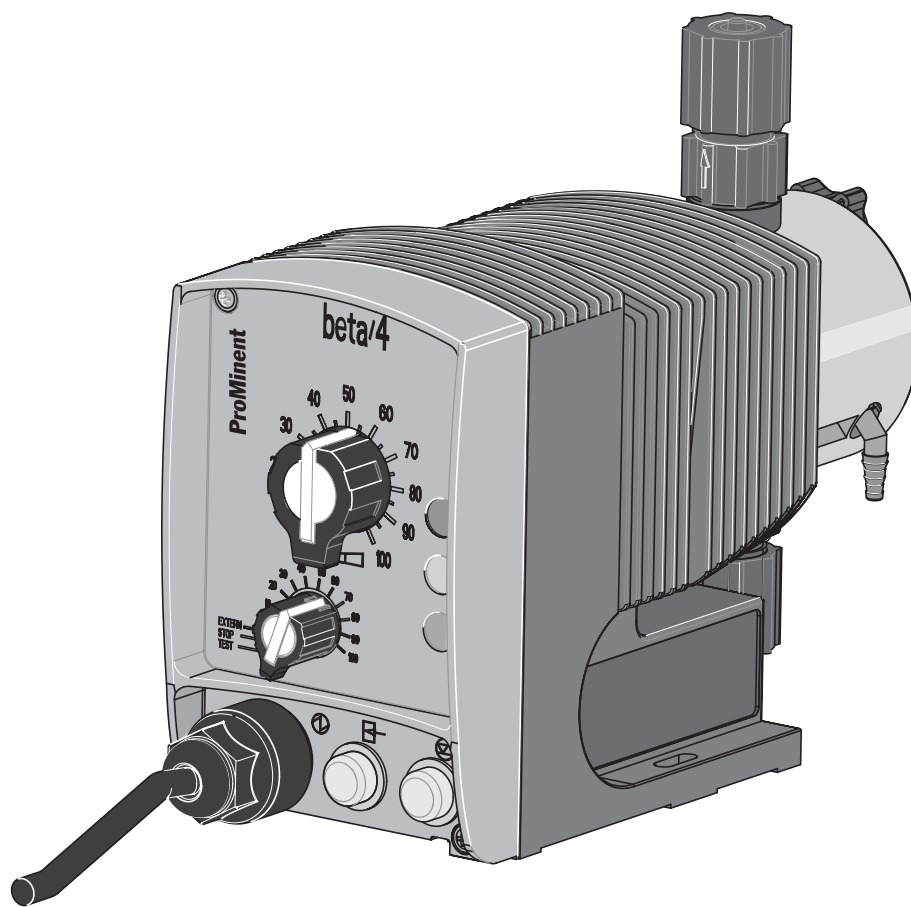
Type	Order no.
for alpha c 1001	1000246
for alpha c 1002, 1004, 1008	1000247
for alpha c 0708, 0419	1000249
for alpha c 0230	1000250

1.2 Beta® Solenoid Diaphragm Metering Pumps

1.2.1

Beta® Solenoid Diaphragm Metering Pumps

- Capacity range 0.74-32 l/h, 16-2 bar
- Continuous stroke length adjustment from 0-100 % (recommended 30-100 %)
- Supplied in PP, PVDF, Acrylic/PVC, PVDF, PTFE, stainless steel
- Patented coarse/fine deaeration for PP, Acrylic/PVC and PVDF
- Self-deaerating dosing head type in PP and Acrylic/PVC
- HV liquid end for highly viscous media
- 10-setting stroke frequency adjustment from 10-100 %
- External control via volt-free contacts
- Connector for 2-stage level switch
- 12-24 V DC, 24 V AC low voltage version
- 3 LED display for operation, warning and fault indication
- CANopen bus interface for DULCOMARIN® II



pk_1_004_1

1.2 Beta® Solenoid Diaphragm Metering Pumps

Technical data

Pump type	Delivery rate at max. backpressure			Delivery rate at medium backpressure			Number of strokes Strokes/min	Conne- ction size o Ø x i Ø mm	Suction head mWC	Shipping weight	
	bar	l/h	ml/ stroke	bar	l/h	ml/ stroke				PP, NP, PC, TT kg	SS kg
Beta®											
BT4a 1000***	10.0	0.74	0.07	5.0	0.82	0.08	180	6 x 4	6.0**	2.9	3.6
BT4a 1601***	16.0	1.10	0.10	8.0	1.40	0.13	180	6 x 4	6.0**	2.9	3.6
BT4a 1602***	16.0	2.10	0.19	8.0	2.50	0.24	180	6 x 4	6.0**	2.9	3.6
BT4a 1005***	10.0	4.40	0.41	5.0	5.00	0.46	180	8 x 5****	6.0**	3.1	3.9
BT4a 0708***	7.0	7.10	0.66	3.5	8.40	0.78	180	8 x 5	6.0**	3.1	3.9
BT4a 0413	4.0	12.30	1.14	2.0	14.20	1.31	180	8 x 5	3.0**	3.1	3.9
BT4a 0220	2.0	19.00	1.76	1.0	20.90	1.94	180	12 x 9	2.0**	3.3	4.4
BT5a 1605	16.0	4.10	0.38	8.0	4.90	0.45	180	8 x 5****	6.0**	4.5	5.3
BT5a 1008	10.0	6.80	0.63	5.0	8.30	0.76	180	8 x 5	6.0**	4.5	5.3
BT5a 0713	7.0	11.00	1.02	3.5	13.10	1.21	180	8 x 5	4.0**	4.5	5.3
BT5a 0420	4.0	17.10	1.58	2.0	19.10	1.77	180	12 x 9	3.0**	4.7	5.8
BT5a 0232	2.0	32.00	2.96	1.0	36.20	3.35	180	12 x 9	2.0**	5.1	6.6
Beta® metering pumps with self-degassing dosing head®											
BT4a 1601	16.0	0.59	0.06	8.0	0.78	0.07	180	6 x 4	1.8**	2.9	
BT4a 1602	16.0	1.40	0.13	8.0	1.70	0.16	180	6 x 4	2.1**	2.9	
BT4a 1005	10.0	3.60	0.33	5.0	4.00	0.37	180	8 x 5	2.7**	3.1	
BT4a 0708	7.0	6.60	0.61	3.5	7.50	0.69	180	8 x 5	2.0**	3.1	
BT4a 0413	4.0	10.80	1.00	2.0	12.60	1.17	180	8 x 5	2.0**	3.1	
BT4a 0220	2.0	16.20	1.50	1.0	18.00	1.67	180	12 x 9	2.0**	3.3	
BT5a 1605	16.0	3.30	0.31	8.0	3.80	0.35	180	8 x 5	3.0**	4.5	
BT5a 1008	10.0	6.30	0.58	5.0	7.50	0.69	180	8 x 5	3.0**	4.5	
BT5a 0713	7.0	10.50	0.97	3.5	12.30	1.14	180	8 x 5	2.5**	4.5	
BT5a 0420	4.0	15.60	1.44	2.0	17.40	1.61	180	12 x 9	2.5**	4.7	

Beta® pumps with liquid ends for highly viscous media have 10-20 % less metering capacity and are not self-priming. G 3/4-DN connector with d16-DN10 nozzle union.

* The values given in the capacity data tables are guaranteed minimum values, using medium hardness water at room temperature. Bypass connection on self-venting dosing head 6x4 mm.

** Suction lift readings when liquid end and suction tubing are full, or for self-degassing liquid end when the suction tubing contains air.

*** Reduced pressure 4, 7 and 10 bar pump types are available for specialised applications, e.g. for use in swimming pool systems. Further information on request.

****6 mm inner diameter in stainless steel version.

Materials in contact with medium

	dosing head	suction/pressure connector	seals	balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	FPM	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	FPM	ceramic
PVT	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	stainless steel no 1.4404	stainless steel no 1.4404	PTFE	ceramic

Self-degassing version available in PP and NP only. Supplied with Hastelloy valve springs, PVDF valve core. Dosing diaphragm with PTFE-coating.

FPM = Fluorine Rubber

Reproducible dosing accuracy ± 2 % under correct conditions (see operating instructions).

Ambient temperature -10 °C to +45 °C.

Medium power consumption Type 1000-0220: 17 W, Type 1605-0232: 22 W

Type of enclosure: IP 65, insulation class F

Metering pumps supplied with mains power cable (2 m) and plug, hose/pipe connector set as tables.

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1.2 Beta® Solenoid Diaphragm Metering Pumps

1.2.2 Identcode Ordering System

Beta® Version a

BT4a	Type	Capacity		BT5a	Type	Capacity	
		bar	l/h			bar	l/h
	1000	10.0	0.74		1605	16.0	4.10
	1601	16.0	1.10		1008	10.0	6.80
	1602	16.0	2.10		0713	7.0	11.00
	1005	10.0	4.40		0420	4.0	17.10
	0708	7.0	7.10		0323	2.0	32.00
	0413	4.0	12.30				
	0220	2.0	19.00				
Dosing head/valves material							
	PP	Polypropylene/Polypropylene					
	NP	Acrylic glass/PVC					
	PV	PVDF/PVDF					
	TT	PTFE/PTFE					
	SS	Stainless steel 1.4404/1.4404					
Seals/diaphragm material							
	E	EPDM/PTFE coated, only for PP and NP					
	B	FPM-B/PTFE coated, only on PP and NP					
	T	PTFE/PTFE coated, only on PV, TT and SS					
	S	Diaphragm additionally with FPM coating for siliceous media, FPMB seals on PP and NP, PTFE on TT, PV and SS					
Liquid end version							
	0	Non-bleed version, no valve spring, for TT, SS and type 0232 NP, PP and PC only					
	1	Non-bleed version, with valve spring, for TT, SS and type 0232 NP, PP and PC only					
	2	With deaerator, no valve spring, PP, PVT, NP only, not type 0232					
	3	With deaerator, with valve spring, PP, PVT, NP only, not type 0232					
	4	Version for highly viscous media, only PVT, types 1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420					
	9	Self-degassing for PP, NP only, not for types 1000 and 0232					
Hydraulic connections							
	0	Standard according to technical data					
	5	Connector for 12/6 hose, delivery side only					
	9	Connector for 10/4 hose, delivery side only					
Version							
	0	With ProMinent® logo					
Power supply							
	A	200-230 V ± 10 %, 50/60 Hz					
	B	100-115 V ± 10 %, 50/60 Hz					
	U	100-230 V ± 10 %, 50/60 Hz					
	M	12-24 V DC ± 10 %, types 1000-0220 only, with 2 m open ended connection cable only					
	N	24 V DC ± 10 %, types 1605-0232 only, with 2 m open ended connection cable only					
	P	24 AC ± 10 % all types					
Cable and plug							
	A	2 m European					
	B	2 m Swiss					
	C	2 m Australian					
	D	2 m USA					
	1	2 m, open-ended					
Relay							
	0	No relay					
	1	Fault indicating relay, normally energised, 1 x changeover contact 230 V - 2 A					
	3	Fault indicating relay, normally de-energised, 1 x changeover contact 230 V - 2 A					
	4	as 1 + pacing relay 2 x normally open contacts 24 V - 100 m					
	5	as 3 + pacing relay 2 x normally open contacts 24 V - 100 mA					
Accessories							
	0	No accessories					
	1	With foot and dosing valve, 2 m PVC suction tubing, 5 m PE discharge tubing					
Control type							
	0	No lock					
	1	With lock: manual operation locked when external cable plugged in					
Control Variants							
	0	Standard					
	D	With CANopen interface for DULCOMARIN®					
Options on request							
	0 0	No options					

1.2 Beta® Solenoid Diaphragm Metering Pumps

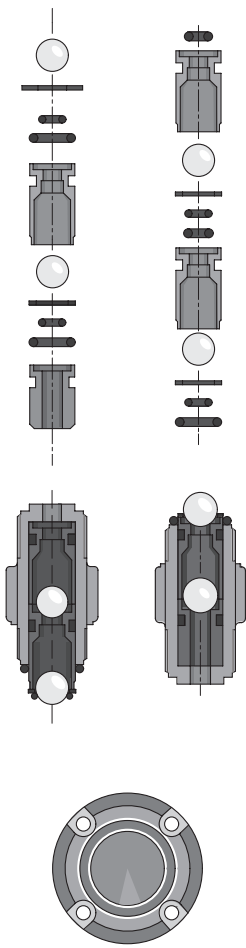
1.2.3 Spare Parts Kits, Replacement Diaphragms

Spare parts kits for Beta® consisting of:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 1 set seals
- 1 connector set

Suction and pressure valve set not included with stainless steel version.

Spare parts kits Beta®



Type	Materials in contact with medium	Order no.
Type 1000	PPE	1001644
	PPB	1001652
	NPE	1001713
	NPB	1001712
	PVT	1023107
	TTT	1001737
Type 1601	SST	1001729
	PPE	1001645
	PPB	1001653
	NPE	1001714
	NPB	1001722
	PVT	1023108
Type 1602	TTT	1001738
	SST	1001730
	PPE	1001646
	PPB	1001654
	NPE	1001715
	NPB	1001723
Type 1005 and Type 1605	PVT	1023109
	TTT	1001739
	SST	1001731
	PPE	1001647
	PPB	1001655
	NPE	1001716
	NPB	1001724
	PVT	1023110
	PVT HV	1019066
Type 0708 and Type 1008	TTT	1001740
	SST	1001732
	PPE	1001648
	PPB	1001656
	NPE	1001717
	NPB	1001725
Type 0413 and Type 0713	PVT	1023111
	PVT HV	1019067
	TTT	1001741
	SST	1001733
	PPE	1001649
	PPB	1001657
	NPE	1001718
	NPB	1001726
	PVT	1023112
PVT HV	1019069	
TTT	1001742	
SST	1001734	

1.2 Beta® Solenoid Diaphragm Metering Pumps

Type	Materials in contact with medium	Order no.
Type 0220 and Type 0420	PPE	1001650
	PPB	1001658
	NPE	1001719
	NPB	1001727
	PVT	1023113
	PVT HV	1019070
	TTT	1001754
	SST	1001735
Type 0232	PPE	1001651
	PPB	1001659
	NPE	1001720
	NPB	1001728
	PVT	1023124
	TTT	1001755
	SST	1001736

Spare parts kits Beta® with self-degassing dosing head

Spare parts kits for Beta® with self-degassing head, consisting of:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 1 pressure control valve compl.
- 2 valve balls
- 1 set seals
- 1 connector set

Type	Materials in contact with medium	Order no.
Type 1601	PPE	1001756
	PPB	1001762
	NPE	1001660
	NPB	1001666
Type 1602	PPE	1001757
	PPB	1001763
	NPE	1001661
	NPB	1001667
Type 1005 and Type 1605	PPE	1001758
	PPB	1001764
	NPE	1001662
	NPB	1001668
Type 0708 and Type 1008	PPE	1001759
	PPB	1001765
	NPE	1001663
	NPB	1001669
Type 0413 and Type 0713	PPE	1001760
	PPB	1001766
	NPE	1001664
	NPB	1001670
Type 0220 and Type 0420	PPE	1001761
	PPB	1001767
	NPE	1001665
	NPB	1001671

1.2 Beta® Solenoid Diaphragm Metering Pumps

Replacement diaphragms for Beta® range

Type	Materials in contact with medium	Order no.
Type 1000	all materials	1000244
Type 1601	all materials	1000245
Type 1602	all materials	1000246
Type 1005 and Type 1605	all materials	1000247
Type 0708 and Type 1008	all materials	1000248
Type 0413 and Type 0713	all materials	1000249
Type 0220 and Type 0420	all materials	1000250
Type 0232	all materials	1000251

1.3 gamma/ L Solenoid Diaphragm Metering Pumps

1.3.1

gamma/ L Solenoid Diaphragm Metering Pumps

- Capacity range 0.74-32 l/h, 16-2 bar
- Continuous stroke length adjustment from 0-100 % (recommended 30-100%)
- Material options: PP, PVDF, Acrylic/PVC, PTFE, stainless steel
- Patented coarse/fine bleeding on PP, PVDF and Acrylic/PVC versions
- Self-bleeding liquid end version in PP and Acrylic/PVC
- HV liquid end for highly viscous media
- Digitally accurate stroking rate via keypad and large LCD display
- Select feed rate display in strokes/min. or l/h
- Programmable pressure levels
- Dosing monitor input, adjustable error stroke counter
- External control via voltage free contact with optional increase/decrease pulse function
- Optional external control via standard signal 0/4-20 mA
- Interface for PROFIBUS® DP
- Connector for 2-stage level switch
- Optional 14-day process timer
- 12-24 V DC, 24 V AC low voltage version
- 3 LED display for operation, warning and fault indication
- Concentration entry option for proportional flow dosing
- Option 4-20 mA output corresponds to the product of stroke length and stroke frequency
- Power relay, especially in combination with the process timer for switching higher powers (230 V-8 A)
- Audible alarm for early warning/fault corresponding to intermittent tone/continuous tone



pk_1_005

1.3 gamma/ L Solenoid Diaphragm Metering Pumps

Technical data

Pump type	Delivery rate at max. backpressure			Delivery rate at medium backpressure			Number of strokes Strokes/min	Conne- ction size o ∅ x i ∅ mm	Suction head mWC	Shipping weight	
	bar	l/h	ml/ stroke	bar	l/h	ml/ stroke				PP, NP, PC, TT kg	SS kg
gamma/ L											
GALa 1601	16.0	1.10	0.10	8.0	1.40	0.13	180	6 x 4	6.0**	2.9	3.6
GALa 1602	16.0	2.10	0.19	8.0	2.50	0.24	180	6 x 4	6.0**	2.9	3.6
GALa 1005	10.0	4.40	0.41	5.0	5.00	0.46	180	8 x 5***	6.0**	3.1	3.9
GALa 0708	7.0	7.10	0.66	3.5	8.40	0.78	180	8 x 5	6.0**	3.1	3.9
GALa 0413	4.0	12.30	1.14	2.0	14.20	1.31	180	8 x 5	3.0**	3.1	3.9
GALa 0220	2.0	19.00	1.76	1.0	20.90	1.93	180	12 x 9	2.0**	3.3	4.4
GALa 1605	16.0	4.10	0.38	8.0	4.90	0.45	180	8 x 5***	6.0**	4.5	5.3
GALa 1008	10.0	6.80	0.63	5.0	8.30	0.76	180	8 x 5	6.0**	4.5	5.3
GALa 0713	7.0	11.00	1.02	3.5	13.10	1.21	180	8 x 5	4.0**	4.5	5.3
GALa 0420	4.0	17.10	1.58	2.0	19.10	1.77	180	12 x 9	3.0**	4.7	5.8
GALa 0232	2.0	32.00	2.96	1.0	36.20	3.35	180	12 x 9	2.0**	5.1	6.6
GALa 1000	10.0	0.74	0.07	5.0	0.82	0.08	180	6 x 4	6.0**	2.9	3.6
gamma/ L metering pumps with self-degassing dosing head											
GALa 1601	16.0	0.59	0.06	8.0	0.78	0.07	180	6 x 4	1.8**	2.9	
GALa 1602	16.0	1.40	0.13	8.0	1.70	0.16	180	6 x 4	2.1**	2.9	
GALa 1005	10.0	3.60	0.33	5.0	4.00	0.37	180	8 x 5	2.7**	3.1	
GALa 0708	7.0	6.60	0.61	3.5	7.50	0.69	180	8 x 5	2.0**	3.1	
GALa 0413	4.0	10.80	1.00	2.0	12.60	1.17	180	8 x 5	2.0**	3.1	
GALa 0220	2.0	16.20	1.50	1.0	18.00	1.67	180	12 x 9	2.0**	3.3	
GALa 1605	16.0	3.30	0.31	8.0	3.80	0.35	180	8 x 5	3.0**	4.5	
GALa 1008	10.0	6.30	0.58	5.0	7.50	0.69	180	8 x 5	3.0**	4.5	
GALa 0713	7.0	10.50	0.97	3.5	12.30	1.14	180	8 x 5	2.5**	4.5	
GALa 0420	4.0	15.60	1.44	2.0	17.40	1.61	180	12 x 9	2.5**	4.7	

gamma/ L pumps with liquid ends for highly viscous media have 10-20 % less metering capacity and are not self-priming. G 3/4-DN connector with d16-DN10 nozzle union.

* The values given in the capacity data tables are guaranteed minimum values, using medium hardness water at room temperature. Bypass connection on self-venting dosing head 6x4 mm.

** Suction lift readings when liquid end and suction tubing are full, or for self-degassing liquid end when the suction tubing contains air.

*** 6 mm inner diameter in stainless steel version.

Materials in contact with medium

	dosing head	suction/pressure connector	seals	balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	FPM-B	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	FPM-B	ceramic
PVT	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	stainless steel no. 1.4404	stainless steel no. 1.4404	PTFE	ceramic

Self-degassing version available in PP and NP only. Supplied with Hastelloy valve springs, PVDF valve core. Dosing diaphragm with PTFE-coating.

FPM = Fluorine Rubber

Reproducible dosing accuracy ± 2 % under correct conditions (see operating instructions).

Ambient temperature -10 °C to +45 °C

Medium power consumption: Type 1000-0220: 17 W, Type 1605-0232: 22 W

Type of enclosure: IP 65, insulation class F

Metering pumps supplied with mains power cable (2 m) and plug, hose/pipe connector set as tables.

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1.3 gamma/ L Solenoid Diaphragm Metering Pumps

1.3.2 Identcode Ordering System

gamma/ L, Version a

GALa	Type	Capacity		bar		I/h		bar		I/h		
		bar	I/h	bar	I/h	bar	I/h	bar	I/h	bar	I/h	
1605		16.0	4.10	1008	10.0	6.80	0713	7.0	11.00	0420	4.0	17.10
1602		16.0	2.10	1005	10.0	4.40	0708	7.0	7.10	0413	4.0	12.30
1601		16.0	1.10	1000	10.0	0.74				0232	2.0	32.00
										0220	2.0	19.00
Dosing head/valves material												
PP		Polypropylene/Polypropylene		PV	PVDF/PVDF		SS	Stainless steel 1.4404/1.4404				
NP		Acrylic glass/PVC		TT	PTFE/PTFE							
Seals/diaphragm material												
E		EPDM/PTFE coated, only for PP and NP										
B		FPM-B/PTFE coated, only on PP and NP										
T		PTFE/PTFE coated, only on PV, TT and SS										
S		Diaphragm additionally with FPM coating for siliceous media, FPM seals on PP and NP, PTFE on TT, PV and SS										
Liquid end version												
0		Non-bleed version, no valve spring, for NP, TT and SS and type 0232 only										
1		Non-bleed version, with valve spring, for NP, TT and SS and type 0232 only										
2		Bleed function, no valve springs for PP, PVT, NP, not type 0232										
3		Bleed function, with valve springs for PP, PVT, NP, not type 0232										
4		version for highly viscous media, only PVDF, types 1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420										
9		self-degassing for PP, NP only, not for types 1000 and 0232										
Hydraulic connections												
0		Standard according to technical data										
5		Delivery side connection for hose 12/6, suction side standard										
9		Delivery side connection for hose 10/4, suction side standard										
Version												
0		With Prominent® logo										
Power supply												
U		100-230 V, ±10 %, 50/60 Hz										
M		12-24 V DC ±10 %, types 1000-0220 only										
N		24 V DC ±10 %, types 1605-0232 only										
P		24 V AC ± 10 % all types										
Cable and plug												
A		2 m European		C		2 m Australian	1	2 m, open-ended				
B		2 m Swiss		D		2 m USA						
Relay												
0		No relay										
1		Fault indicating relay, normally energised, 1 x changeover contact 230 V - 2 A										
3		Fault indicating relay, normally de-energised, 1 x changeover contact 230 V - 2 A										
4		as 1 + pacing relay 2 x normally open contacts 24 V - 100 mA										
5		as 3 + pacing relay 2 x normally open contacts 24 V - 100 mA										
A		Disconnect and warning relay, normally de-energised 2 x normally open contacts 24 V - 100 mA										
C		as 1 + 4-20 mA output 1 x normally open contact 24 V - 100 mA										
G		Power relay, normally de-energised, 1 x changeover contact 230 V - 8 A										
H		Acoustic alarm										
Accessories												
0		No accessories										
1		With foot valve and delivery valve, 2 m PVC suction tubing, 5 m PE delivery tube, for PP, PV and NP only										
2		As 0 + calibrating cylinder										
3		As 1 + calibrating cylinder										
Control variant												
0		Manual + external 1:1										
1		Manual + external with pulse control										
2		Manual + external 1:1 + analogue current										
3		Manual + external with pulse control + analogue 0/4 - 20 mA										
4		as 0 + 14-day process timer										
5		as 3 + 14-day process timer										
7		as 1 + concentration entry										
8		as 3 + concentration entry										
P		as 3 + PROFIBUS® DP interface, 9-pin D-sub connector										
R		as 3 + PROFIBUS® DP interface, M12										
-		no relay with PROFIBUS® version										
Access code												
0		No access code										
1		With access code										
Metering monitor												
0		Pulse signal input										
Pause/level												
0		Pause N/C, level N/C										

1.3 gamma/ L Solenoid Diaphragm Metering Pumps

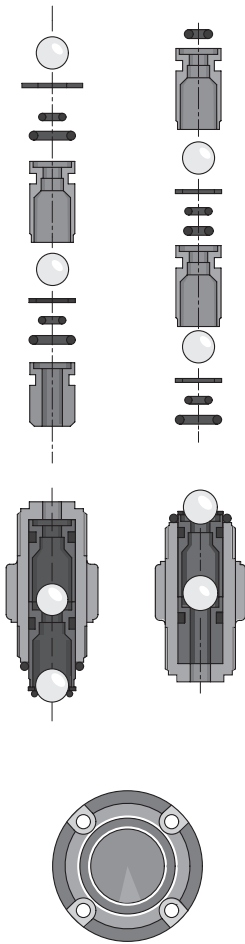
1.3.3 Spare Parts Kits, Replacement Diaphragms

Replacement parts kit for gamma/ L, consisting of:

- 1 Metering diaphragm
- 1 Suction valve compl.
- 1 Pressure valve compl.
- 2 Valve balls
- 1 Kit gaskets
- 1 Connecting kit

Suction and pressure valve set not included with stainless steel version.

Spare parts kits gamma/ L



pk_1_008

Type	Materials in contact with medium	Order no.
Type 1000	PPE	1001644
	PPB	1001652
	NPE	1001713
	NPB	1001712
	PVT	1023107
	TTT	1001737
	SST	1001729
Type 1601	PPE	1001645
	PPB	1001653
	NPE	1001714
	NPB	1001722
	PVT	1023108
	TTT	1001738
Type 1602	PPE	1001646
	PPB	1001654
	NPE	1001715
	NPB	1001723
	PVT	1023109
	TTT	1001739
Type 1005 and Type 1605	SST	1001731
	PPE	1001647
	PPB	1001655
	NPE	1001716
	NPB	1001724
	PVT	1023110
	PVT HV	1019066
Type 0708 and Type 1008	TTT	1001740
	SST	1001732
	PPE	1001648
	PPB	1001656
	NPE	1001717
	NPB	1001725
	PVT	1023111
Type 0413 and Type 0713	PVT HV	1019067
	TTT	1001741
	SST	1001733
	PPE	1001649
	PPB	1001657
	NPE	1001718
	NPB	1001726
	PVT	1023112
	PVT HV	1019069
	TTT	1001742
	SST	1001734

1.3 gamma/ L Solenoid Diaphragm Metering Pumps

Type	Materials in contact with medium	Order no.
Type 0220 and Type 0420	PPE	1001650
	PPB	1001658
	NPE	1001719
	NPB	1001727
	PVT	1023113
	PVT HV	1019070
	TTT	1001754
	SST	1001735
Type 0232	PPE	1001651
	PPB	1001659
	NPE	1001720
	NPB	1001728
	PVT	1023124
	TTT	1001755
	SST	1001736

Spare parts kits for gamma/ L with self-bleeding liquid end, consisting of:

- 1 pump diaphragm
- 1 suction valve set
- 1 discharge valve set
- 1 bleed valve set
- 2 valve balls
- 1 seal set
- 1 connector set

Spare parts kits gamma/ L with self-bleeding liquid end

Type	Materials in contact with medium	Order no.
Type 1601	PPE	1001756
	PPB	1001762
	NPE	1001660
	NPB	1001666
Type 1602	PPE	1001757
	PPB	1001763
	NPE	1001661
	NPB	1001667
Type 1005 and Type 1605	PPE	1001758
	PPB	1001764
	NPE	1001662
	NPB	1001668
Type 0708 and Type 1008	PPE	1001759
	PPB	1001765
	NPE	1001663
	NPB	1001669
Type 0413 and Type 0713	PPE	1001760
	PPB	1001766
	NPE	1001664
	NPB	1001670
Type 0220 and Type 0420	PPE	1001761
	PPB	1001767
	NPE	1001665
	NPB	1001671

1.3 gamma/ L Solenoid Diaphragm Metering Pumps

Spare diaphragm for gamma/ L series

Type	Materials in contact with medium	Order no.
Type 1000	all materials	1000244
Type 1601	all materials	1000245
Type 1602	all materials	1000246
Type 1005 and Type 1605	all materials	1000247
Type 0708 and Type 1008	all materials	1000248
Type 0413 and Type 0713	all materials	1000249
Type 0220 and Type 0420	all materials	1000250
Type 0232	all materials	1000251

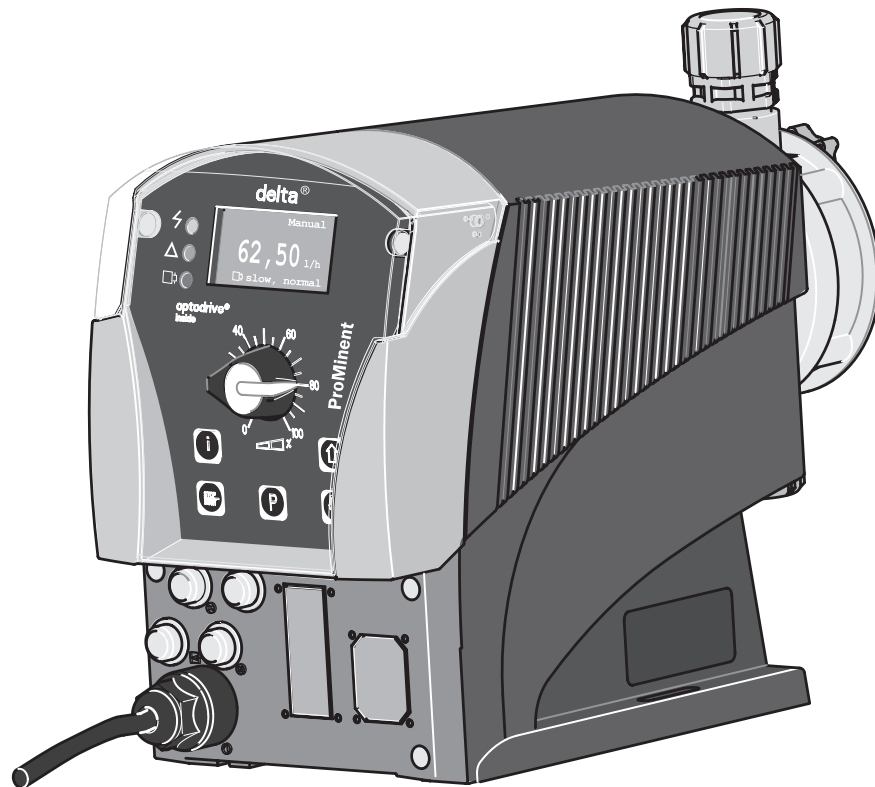
1.4 delta® Solenoid-driven Diaphragm Metering Pumps

1.4.1

delta® Diaphragm Metering Pumps with Controlled Solenoid Drive

optoDrive®
inside

- Continuous or pulsing operation
- Adaptation of the pump to the metering medium
- Detection of blocked metering points, broken metering lines and trapped air or gas bubbles in the liquid end by the integrated injection control optoGuard®
- Output range 7.5 - 75 l/h, 25 - 2 bar
- Large adjustment range: continuously 1:1,800, discontinuously 1:36,000
- Stroke length continuously adjustable between 0 - 100 % (recommended 30 - 100 %)
- Material versions PVDF, acrylic and stainless steel
- Patented coarse / fine bleed valve
- Diaphragm failure detection and signalling (option)
- Adjustment and display of the output alternatively as strokes/min or l/h via the keyboard
- Large, illuminated graphic display
- External control through potential-free contacts with optional pulse transfer and reduction
- Option of external control via standard signal 0/4-20 mA
- Interface for PROFIBUS® or CANopen (option)
- Option 14-day process timer for time- and event-dependent metering tasks
- Port for 2-phase level switch
- 3 LED display for operation, warning and error messages in full text
- Concentration input for volume-proportional metering
- Automatic bleeding
- Pump type 2508 with 7.5 l/h at 25 bar
- Material NP for pump types 2508, 1612, 1608, 1020, and 0730
- HV liquid ends for high-viscosity media.



pk_1_131_2

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

Technical data

Pump type	Max. pressure bar	Delivery rate l/h	Stroke Volume cm ³ /stroke	Max. stroke rate Strokes/min	Connection size o Ø x i Ø mm	Suction head mWC	Shipping weight PVT SST kg
DLTA 2508	25	7.5	0.62	200	8 x 4**	5*	10 / 11
DLTA 1608	16	7.8	0.65	200	8 x 5**	5*	10 / 11
DLTA 1612	16	11.3	0.94	200	8 x 5	6*	10 / 11
DLTA 1020	10	19.1	1.59	200	12 x 9	5*	10 / 11
DLTA 0730	7	29.2	2.43	200	12 x 9	5*	10 / 11
DLTA 0450	4	49.0	4.08	200	G3/4 - DN10	3*	10 / 11
DLTA 0280	2	75.0	6.25	200	G3/4 - DN10	2*	10 / 11

* Suction height (mWC) = suction height with primed liquid end and primed suction line

** For stainless steel version 6 mm connection width

Materials in contact with medium

Type	Liquid end	Suction/pressure port	Gaskets	Valve balls
NPE	Plexiglass	PVC	EPDM	Ceramic
NPB	Plexiglass	PVC	FPM	Ceramic
PVT	PVDF	PVDF	PTFE	Ceramic
SST	Stainless steel 1.4404	Stainless steel 1.4404	PTFE	Ceramic

Type of connections

Plastic	8-12 mm	Hose compression fitting
	DN 10	Hose grommet d16 DN 10
Stainless steel	6-12 mm	System Swagelok
	DN 10	Insert Rp 3/8

Metering diaphragm with PTFE coating

Reproducibility of metering $\pm 2\%$ when used in accordance with notes in the operating instructions.

Permissible ambient temperature -10°C to 45°C .

Mean power consumption 78 W

IP rating IP 65, insulation class F

Scope of delivery: Metering pump with mains cable (2 m) and connector, connecting kit for hose/pipe connection according to table.

1.4 delta[®] Solenoid-driven Diaphragm Metering Pumps

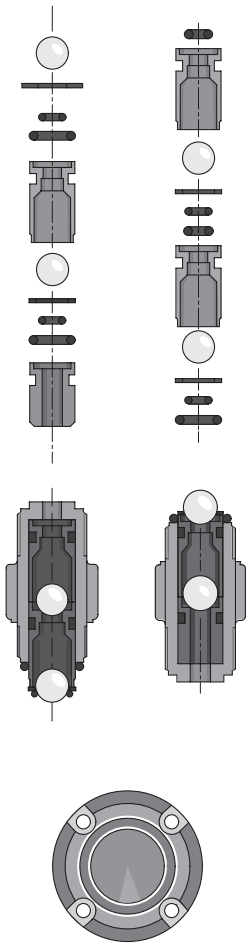
1.4.2 Identcode Ordering System

delta[®] series

DLTA	Type	Capacity	
		bar	l/h
	2508	25.0	7.50
	1608	16.0	7.80
	1612	16.0	11.30
	1020	10.0	19.10
	0730	7.0	29.20
	0450	4.0	49.00
	0280	2.0	75.00
Dosing head/valves material			
	PV	PVDF/PVDF not for pump type 2508	
	NP	Acrylic glass/PVC only for pump type 2508, 1608, 1612, 1020, 0730	
	SS	Stainless steel/stainless steel	
Seals/diaphragm material			
	T	PTFE/PTFE coated	
	S	PTFE/diaphragm additionally with FPM coating for silica-laden media	
	B	FPM/PTFE-coated	
	E	EPDM/PTFE-coated	
Liquid end version			
	0	Without ventilation, without valve spring	
	1	Without ventilation, with valve spring	
	2	With ventilation, without valve spring	
	3	With ventilation, with valve spring	
	4	HV version for high-viscosity media	
Hydraulic connections			
	0	Standard connectors as per technical data	
	5	Discharge-side connector for 12/6 hose, suction-side standard	
Diaphragm rupture indicator			
	0	Without diaphragm failure indication	
	1	With diaphragm failure indication	
Version			
	0	With ProMinent logo	
Power supply			
	U	Universal controller 100-240 V	
Cable and plug			
	A	2 m Europe	
	B	2m Switzerland	
	C	2 m Australia	
	D	2 m USA / 115 V	
	1	2 m without plug	
Relay			
	0	Without relay	
	1	alarm relay normally energised 1 x C/O contact 230 V – 8 A	
	3	alarm relay normally de-energised 1 x C/O contact 230 V – 8 A	
	4	as 1 + pacing relay 2 x N.O. contacts 24 V – 100 mA	
	5	as 3 + pacing relay 2 x N.O. contacts 24 V – 100 mA	
	A	Shutdown and alarm relay normally energised 2xN.O. cont. 24 V-100mA	
	C	as 1 + 4-20 mA output 1 x N.O. contact 24 V – 100 mA	
	F	with automatic bleeder not for pump type 2508	
Accessories			
	0	Without accessories	
	1	With foot and metering valve, 2m suction line and 5 m pressure line (only for type 2508, 1608, 1612, 1020, and 0730)	
	2	As 0 + measuring cup	
	3	As 1 + measuring cup	
Control variant			
	0	Manual + external contact with pulse control	
	3	Manual + external contact with pulse control + analog 0/4-20 mA	
	4	as 0 + 14-day process timer	
	5	as 3 + 14-day process timer	
	C	CANopen	
	R	As 3 + PROFIBUS [®] interface, M12	
Access code			
	0	Without access code	
	1	With access code	
Language			
	DE	German	
	EN	English	
	FR	French	
	ES	Spanish	
Pause/level			
	0	Pause N.C. contact level, N.C. contact	

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

1.4.3 Spare Parts Kits, Replacement Diaphragms



pk_1_008

Replacement parts kit for delta®, consisting of:

- 1 metering diaphragm
- 1 suction valve compl.
- 1 pressure valve compl.
- 2 valve balls
- 1 kit gaskets
- 1 connecting kit

Stainless steel version without suction and pressure valve compl.

Spare parts kits for delta®

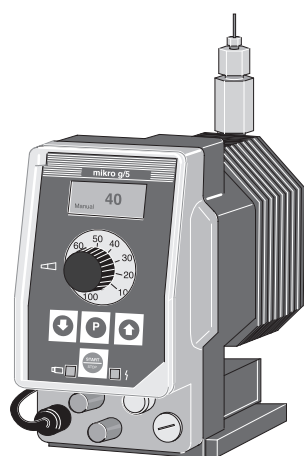
Type	Materials in contact with medium	Order no.
Type 2508	NPE	1033172
	NPB	1033171
	SST	1030226
Type 1608	NPE	1030620
	NPB	1030611
	PVT	1030225
Type 1612	SST	1030226
	NPE	1030536
	NPB	1030525
Type 1020	PVT	1027081
	SST	1027086
	NPE	1030537
Type 0730	NPB	1030526
	PVT	1027082
	SST	1027087
Type 0450	NPE	1030621
	NPB	1030612
	PVT	1027083
Type 0280	SST	1027088
	PVT	1027084
	SST	1027089
Type 0280	PVT	1027085
	SST	1027090

Replacement diaphragms for delta® series

Type	Materials in contact with medium	Order no.
Type 2508/1608	all materials	1030353
Type 1612	all materials	1000248
Type 1020	all materials	1000249
Type 0730	all materials	1000250
Type 0450	all materials	1000251
Type 0280	all materials	1025075

1.5 mikro g/ 5 Precision Piston Metering Pumps

1.5.1 mikro g/ 5 Precision Piston Metering Pumps



- Capacity range 150-1500 ml/h, 40-6 bar
- Stroke volume 1-500 µl
- Materials PTFE and stainless steel
- Digitally accurate stroking rate adjustment via LCD display
- External control via voltage free contact, optional increase/lower impulse function
- Optional external control via standard signal 0/4-20 mA, 0-1 V or 0-10 V
- Optional timer switch relay
- Input for two stage float switch
- Reproducible metering accuracy: $\pm 0.5\%$

Microprocessor controlled and interactive precision dosing pump with LCD display for laboratories and industry

The mikro g/ 5 version "a" is a solenoid driven, microprocessor controlled precision piston dosing pump for all micro capacity chemical feed applications. The self monitoring of the electronics and the identification even of external fault sources ensures high levels of chemical feed accuracy.

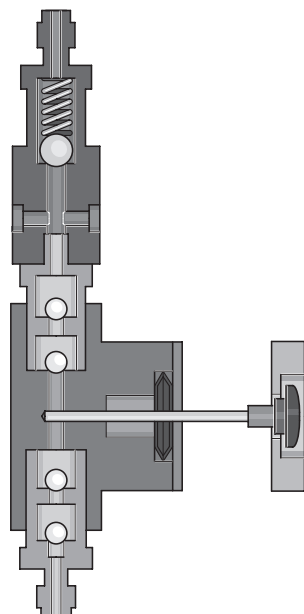
Programming the mikro g/ 5 requires no previous knowledge of the system. All adjustable and current functions are displayed in clear text on the LCD display. The numerous control options mean that the mikro g/ 5 is highly adaptable to different dosing tasks in laboratories and industry.

The patented drive unit housing is made in stable, glass fibre reinforced chemical and corrosion resistant PPE plastic with IP 65 protection. It has a microprocessor controller, a long stroke magnet, hydraulic regulator for continuous and consistent stroke motion and stroke length adjustment.

The pump capacity is adjusted between 100 and 2 % (1:50) by altering the stroke length using the micrometer adjustment knob, and altering stroking rate with precision quartz resolution in single strokes from 50-1 strokes per min (1:50) between 1:2500.

The liquid end types SS, in stainless steel 1.4751 and TT, in PTFE come in three sizes: 50, 200 and 500 µl/stroke. The plungers are in oxide ceramic with self tensioning PTFE pure white plunger packing, PTFE graphite plunger packing or Bal-Seal plunger packing. Double ball valves are in ruby/ceramic. The integrated back pressure valve guarantees constant and pressure-independent dosing within a pressure range from zero to the maximum back pressure of 40 bar. Reproducible metering accuracy is better than $\pm 0.5\%$. The feed rate ranges from 1-500 µl/stroke to 0.1-1500 ml/h at maximum back pressure of 6, 18 and 40 bar.

pk_1_011

pk_1_010
Liquid end

1.5 mikro g/ 5 Precision Piston Metering Pumps

Technical data

Pump type		400150	180600	061500
Liquid end type	SS/TT	2.5/50	5.0/200	8.0/500
Adjustable stroke volumes	micro l/stroke	1-50	4-200	10-500
Dosing quantity min-max.	ml/h	0.06-150	0.24-600	0.60-1,500
Stroking rate	strokes/min	0-50	0-50	0-50
Suction head	mWC	6	6	4
Max. back pressure	bar	40*	18*	6
Back pressure valve pre-pressure	bar	2.5	2.5	1.5
SS connectors	inches-mm	1/16" - 1,58	1/16" - 1,58	1/8" - 3,2
TT connectors	mm	1.75	1.75	3.20
Stroke length	mm	10.0	10.0	10.0

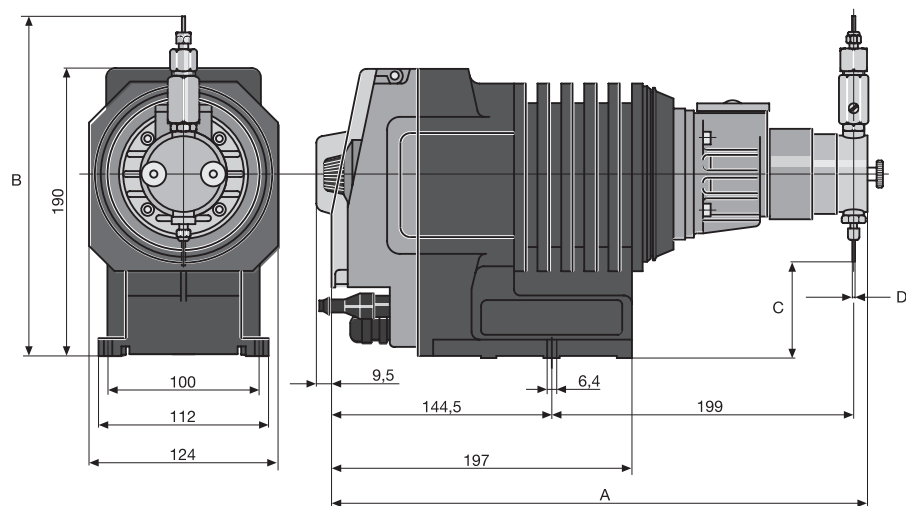
* TT version ..: max. 10 bar

Electrical connection	230 V ± 10 %; 50/60 Hz
Input voltage	5V
Average power consumption	26W
Peak power consumption during dosing lift	0.29A
Number of strokes min-max	1-50
Protection/insulation class	IP 65 /F
Permissible ambient temperature	5 °C...45 °C
Reproducible metering accuracy	<±0,5%
Shipping weight SS	5.9 kg
Shipping weight TT	5.6 kg
Included in delivery	Metering pump with mains cable and plug, 0.5 m each, PTFE suction and dosing pipe

Dimensions

mikro g/ 5		A	B	C	D
400150	SS	352	224	60	1,58
	TT	352	227	67	1,75
180600	SS	352	224	60	1,58
	TT	352	227	67	1,75
061500	SS	354	252	44	3,175
	TT	354	235	57	3,2

(measurements in mm)



pk_1_012

1.5 mikro g/ 5 Precision Piston Metering Pumps

1.5.2 Identcode Ordering System

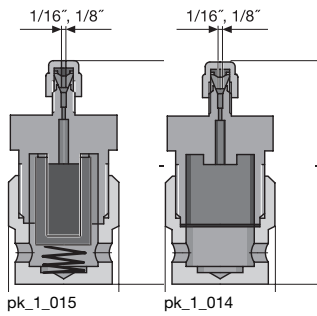
mikro g/ 5, Version a

MG5a	Pump type		
	bar	bar	ml/h
400150	40*		150
180600	18*		600
061500	6		1,500
Liquid end material			
SS1	Stainless steel, no. 1.4404, with PTFE pure white plunger packing		
SS2	Stainless steel, no. 1.4404, with PTFE-graphite plunger packing		
SS3	Stainless steel, no. 1.4404, with bal-sealing		
TT1	PTFE + 25 % carbon with PTFE pure white plunger packing		
TT2	PTFE + 25 % carbon with PTFE-graphite plunger packing		
TT3	PTFE + 25 % carbon with bal-sealing		
Valve springs			
0	No springs		
1	With 2 valve springs, 1.4571, 0.1 bar (not type 400150)		
Version			
0	Standard		
1	With lock		
Electrical connection			
A	230 V ± 10 %; 50/60 Hz Euro. plug		
B	230 V ± 10 %; 50/60 Hz Swiss plug		
C	230 V ± 10 %; 50/60 Hz Austral. plug		
D	115 V ± 10 %; 50/60 Hz USA plug		
Control type			
1	Optional type		
2	Optional type with illuminated LCD		
Control Variants			
0	Manual + external + pause		
1	As 0 + analogue 0/4-20 mA		
2	As 0 + analogue 0-60 mV, 0-1 V, 0-10 V		
Pulse Control			
0	No pulse control		
1	With pulse control		
Timer			
0	No timer		
1	With timer		
Relay			
0	No relay		
1	Fault indicating (N/C)		
2	Pacing (N/O)		
3	Fault indicating (N/O)		
4	Timer relay (N/O)		

* TT version ...: max. 10 bar

1.5 mikro g/ 5 Precision Piston Metering Pumps

1.5.3 mikro g/ 5 Accessories



Stainless steel suction filter

Without check ball, interchangeable filter element. Material: 1.4404/1.4310/SS 316/PTFE

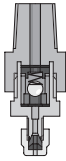
Connection		Order no.
1/16" - 15 µm	(for mikro 50 and 200 ml head) (Fig. pk_1_015) for tube Ø 1.58	803253
1/8" - 15 µm	(for mikro 500 ml head) (Fig. pk_1_015) for tube Ø 3.175	803254
1/8" - 60 µm	(for SK dosing pumps) (Fig. pk_1_014) for tube Ø 3.175	803255

Replacement filter elements for suction filter

		Order no.
Sintered elements	15 µm	403814
Screen mesh	60 µm	404523

Stainless steel discharge valve

Housing in 1.4404 and springs in 1.4571, PTFE seals.



pk_1_016

Size	Connection	Order no.
Ø 20 x 48 mm	1/16" - 1/4" for tube Ø 1.58 and 1.75 mm	803251
Ø 22 x 56 mm	1/8" - 1/4" for tube Ø 3.175 and 3.2 mm	803252

Suction and discharge pipe



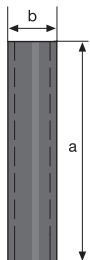
pk_1_013

	Permissible operating pressure bar	Order no.
PTFE 1.75 mm o. Ø x 1.15 mm i. Ø (1/16")	12*	037414
PTFE 3.2 mm o. Ø x 2.4 mm i. Ø (1/8")	8*	037415
Stainless steel pipe 1.4435 1.58 mm o. Ø x 0.9 mm i. Ø (1/16")	400*	1020384
Stainless steel pipe 1.4435 3.175 mm o. Ø x 1.5 mm i. Ø (1/8")	400*	1020775

* permitted operating pressure at 20 °C, provided media is compatible and pipe is correctly connected.

Nipple

1.4571 pipe nipple for mikro g/ 5 and gamma/ 4 SK for connecting 1/16" and 1/8" PTFE tubing.

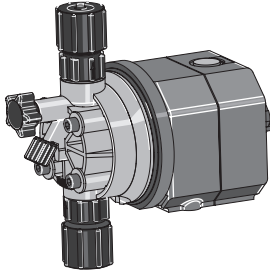


pk_1_017

	Order no.
Nipple 1/16" o. Ø 1.58 mm x i. Ø 0.9 mm, length 25 mm	403215
Nipple 1/8" o. Ø 3.175 mm x i. Ø 1.5 mm, length 30 mm	403216
Nipple 1/8-1/16" o. Ø 3.175 - 1.58 mm, length 45 mm	403217

1.6 Pneumados b Metering Pumps

1.6.1 Pneumados b Metering Pumps



P_PN_0005_SW

- Output range: 0.76 - 16.7 l/h, 16 - 2 bar
- Infinitely variable stroke length adjustment
- Material version PVDF and stainless steel
- Stroke rate up to 180 strokes/min

Pneumados b is a pneumatically operated metering pump in the output range from 0.76 l/h to 16.7 l/h at a max. backpressure of 16 - 2 bar. The pressure stroke takes place by means of compressed air applied against a diaphragm while the intake stroke is controlled by spring force. The metering output can be adjusted by means of the stroke length and stroke rate.

Typical applications of the Pneumados b include:

Animal feed treatment

- Metering and spraying animal feed with flavouring agents

Painting systems

- Metering coagulants

Greenhouses

- Metering fertilisers and minerals

Carwash systems

- Metering detergent, shampoo, brightener, wax, drying agent as well as preparing recycling water by metering flocculant, pH-corrector, antifoaming agent and de-emulsifier

in all systems with central controller (e.g. PLC) and compressed air supply

1.6 Pneumados b Metering Pumps

Technical data

Pump type	Delivery rate at max. backpressure			Number of strokes Strokes/min	Connector Sizes	Suction head mWC	Shipping weight kg
	bar	l/h	ml/stroke				
PNDb 1000	10.0	0.76	0.07	180	6 x 4	6.0	1.0 - 1.7
PNDb 1601	16.0	1.00	0.09	180	6 x 4	6.0	1.0 - 1.7
PNDb 1602	16.0	1.70	0.16	180	6 x 4	6.0	1.0 - 1.7
PNDb 1005	10.0	3.80	0.35	180	8 x 5*	5.0	1.2 - 1.9
PNDb 0708	7.0	6.30	0.58	180	8 x 5	4.0	1.2 - 1.9
PNDb 0413	4.0	10.50	0.97	180	8 x 5	3.0	1.2 - 1.9
PNDb 0220	2.0	16.70	1.55	180	12 x 9	2.0	1.2 - 1.9

* Stainless steel version 6 x 4 mm

Filtered compressed air 6 bar \pm 10 %

Air consumption at 1 m feed line 47 l/min

Max. stroke rate 180 strokes/min

Connectors

Hose nozzle with clamping ring connection for PV	6, 8 and 12 mm
Swagelok screw connection for stainless steel SS	6, 8 and 12 mm

Materials in contact with medium

	Liquid end	Intake/pressure connection	Seals	Balls
PVT	PVDF	PVDF	PTFE	Ceramic
SST	Stainless steel M. No. 1.4404	Stainless steel M. No. 1.4404	PTFE	Ceramic

DEVELOPAN® Metering diaphragm with PTFE coating.

Metering reproducibility \pm 2 % when used in accordance with operating instructions. Permissible ambient temperature -10 °C to +50 °C.

1.6 Pneumados b Metering Pumps

1.6.2 Identcode Ordering System

Pneumados b

PNDb	Type	Capacity	
		bar	l/h
	1000	10.0	0.76
	1601	16.0	1.00
	1602	16.0	1.70
	1005	10.0	3.80
	0708	7.0	6.30
	0413	4.0	10.50
	0220	2.0	16.70
Dosing head/Valves material			
	PV	PVDF/PVDF	
	SS	SS Stainless steel 1.4404/1.4404	
Seals/diaphragm material			
	S	Metakorin diaphragm with Viton-B seal	
	T	Standard diaphragm with PTFE seal	
	X	Without delivery unit	
Liquid end version			
	0	Without bleeder, without valve spring only for SS	
	1	Without bleeder, with valve spring only for SS	
	2	With bleeder, without valve spring only for PV	
	3	With bleeder, with valve spring only for PV	
	X	Without delivery unit	
Hydraulic connectors			
	0	Standard connection as per technical data	
Version			
	0	With ProMinent logo	
Power connector			
	0	G 1/4 connector, compressed air 6 bar	
	1	6 x 4 connector, compressed air 6 bar	
Control type			
	0	Single-acting (standard), without control valves	
	1	Electropneumatic actuation, with electric clock generator 24 V DC, solenoid valve 24 V DC, wall bracket and mounting material for solenoid valve	
Approvals			
	01	CE	

1.6 Pneumados b Metering Pumps

1.6.3 Sample Order For Ancillary Equipment

	Order no.
1 x PVC foot valve with filter and Ø 6 back pressure ball	924557
1 x PVC dosing valve with Ø 6 - R 1/2 ball check valve	924680
1 x 5 m suction and discharge pipe as compressed air line, PE 6 x 4 mm	1004492
1 x compressed air connector for Pneumados G 1/4 - 6 mm quick release connector LCK 1/4"	354641
1 x wall bracket Pneumados including fixtures and fittings	1030028

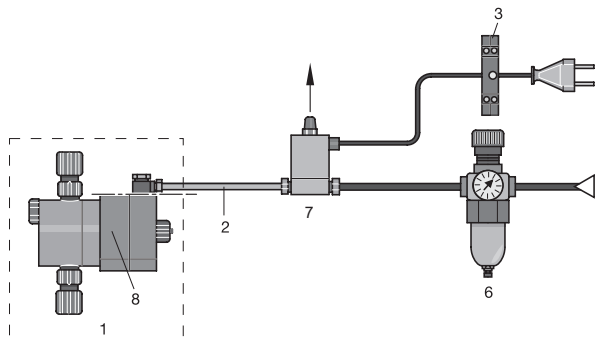
For electrical controller

	Order no.
1 x 3/2-way solenoid valve MHE3, 24Vdc, with connection fittings 6/4mm	1030275
1 x retaining bracket for solenoid valve	1030276
1 x sound absorber for solenoid valve	1030277
1 x electrical pulse generator 30-180 strokes/min., 24Vdc	1030351

Electrical/Pneumatic controller

Schematic diagram

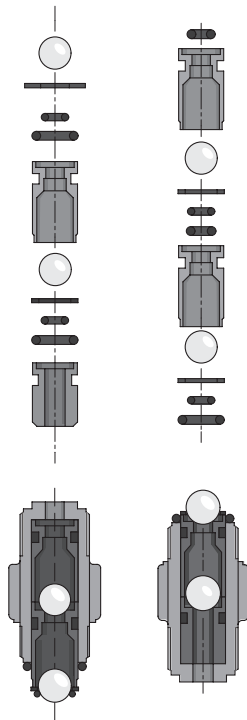
- 1 Pneumados supply limit
- 2 PE 6x4 max. 1 m
- 3 electrical pulse generator
- 4 230 V/50-60 Hz mains connector
- 5 compressed air
- 6 maintenance unit
- 7 6 bar
- 8 3/2 way solenoid valve with sound absorber
- 9 Pneumados



pk_1_035

1.6 Pneumados b Metering Pumps

1.6.4 Spare Parts Kits

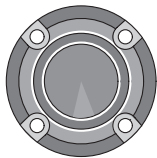


Replacement parts kit for Pneumados b consisting of

- 1 Metering diaphragm
- 1 Suction port compl.
- 1 Pressure port compl.
- 2 Valve balls
- 1 Kit gaskets
- 1 Connecting kit

Stainless steel version without suction and pressure valve compl.

Type	Materials in contact with medium	Order no.
Type 1000	PVT	1023107
	SST	1001729
Type 1601	PVT	1023108
	SST	1001730
Type 1602	PVT	1023109
	SST	1001731
Type 1005	PVT	1023110
	SST	1001732
Type 0708	PVT	1023111
	SST	1001733
Type 0413	PVT	1023112
	SST	1001734
Type 0220	PVT	1023113
	SST	1001735



pk_1_008

1.7 DULCO®flex Peristaltic Pumps

1.7.1

DULCO®flex DF2a

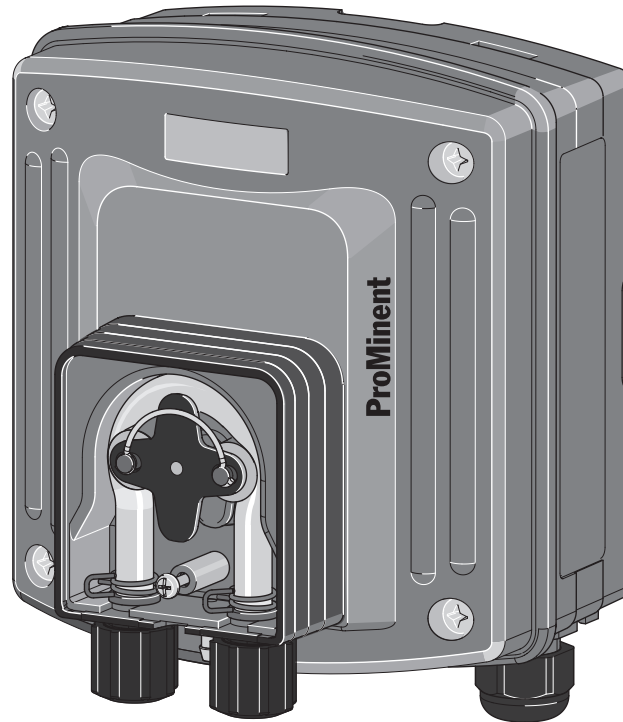
- Capacity range 0.4-2.4 l/h at max. 1.5 bar back pressure
- Hose material: Tygon® or PharMed®
- Control and/or quantity control via mains ON/OFF
- Practically silent operation
- Self-priming against max. 1.5 bar
- Gentle metering
- Sprung rollers for constant rolling pressure and extended service life of hose

The DULCO®flex is a peristaltic pump. The metering chemical is displaced in the direction of flow as rotor squeezes the hose. No valves are required which ensures that the chemical is treated gently.

Typical applications are processes in which only a limited feed pressure is required such as the metering of conditioning agents in private pools.

The robust, chemical-resistant PPE housing is protected on all sides from spray (IP 65), which guarantees its universal application capability. OEM versions are available on request.

Minimum order quantity: 20 units



pk_1_130

1.7 DULCO®flex Peristaltic Pumps

1.7.2 Identcode Ordering System

DULCO®flex System DF2a

DF2a	Type	Capacity	
		bar	l/h
	0204	1.5	0.4
	0208	1.5	0.8
	0216	1.5	1.6
	0224	1.5	2.4
Hose material			
	P	PharMed®	
	T	Tygon®	
	V	Viton® for fragrances (special version)	
Version			
	0	With ProMinent® logo	
	1	Without ProMinent® logo	
Hydraulic connectors			
	0	Connector for hose 6/4 mm priming and discharge side	
	9	Connector for hose 10/4 mm discharge side only	
Power supply			
	A	230 V ± 10 %, 50/60 Hz	
	B	115 V ± 10 %, 50/60 Hz	
Cable and plug			
	0	No mains lead	
	1	With 2 m mains lead, open ended	
Drive			
	0	Mains ON/OFF	
Installation			
	W	Wall mounted	
Accessories			
	0	No accessories	

Tygon®, Viton® and PharMed® are registered trademarks

Technical data

Type	Capacity		Frequency rpm	Connector size o dia. x i dia.	Suction head mWC	Intake head mWC
	bar	l/h				
DULCO®flex DF2a						
0204	1.5	0.4	5	6x4/10x4	4	3
0208	1.5	0.8	10	6x4/10x4	4	3
0216	1.5	1.6	20	6x4/10x4	4	3
0224	1.5	2.4	30	6x4/10x4	4	3

Admissible ambient temperature: 10-45 °C
 Power consumption approx.: 5 W
 Switching duration: 100 %
 Enclosure rating: IP 65

	Order no.
Spare hose set PharmaMed®	1009480
Spare hose set Tygon®	1009481
replacement hose compl. Viton®	1023842

1.7 DULCO®flex Peristaltic Pumps

1.7.3

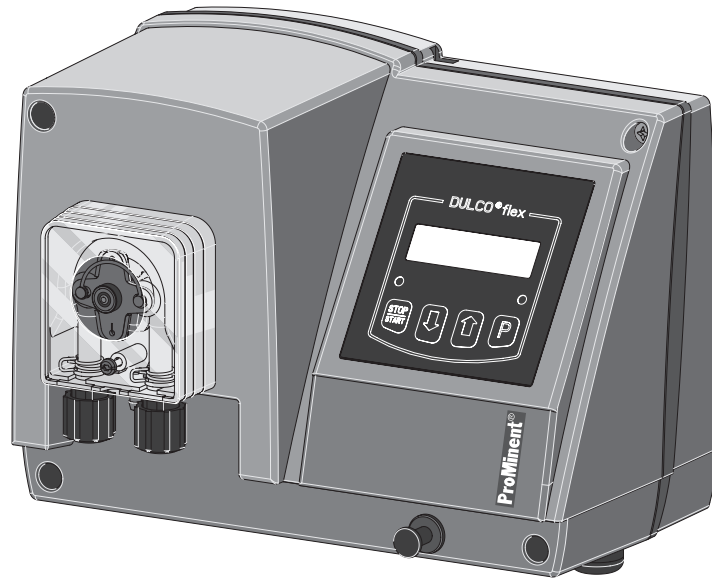
DULCO®flex DF3a

- Output range 0.4 - 2.4 l/h at max. 1.5 bar backpressure
- Hose material Viton®, used specifically for metering of fragrances in wellness applications
- Control of two further peristaltic pumps for different fragrances
- Control of a solenoid valve for the diluent water
- Almost silent operation
- Self-priming against max. 1.5 bar
- Sprung rollers for constant rolling pressure and increased service life of the hose

The DULCO®flex DF3a was specifically developed for metering fragrances in wellness facilities. This pump can be used wherever fragrances are metered in small quantities. Typical areas of application include the aroma infusion of douse water in saunas, steambaths, and whirlpools.

The metering pump is equipped with a process timer which can control two further peristaltic pumps for other essences. Since the essences used in saunas must not be used undiluted on the oven, the DF3a is equipped with three relays for controlling the diluent water.

To save essences when the sauna is not in use, the pump features a contact input to which e.g. a door contact or motion sensor can be connected. This ensures metering of fragrances only when the sauna is in use.



P_DX_0003_SW

1.7 DULCO®flex Peristaltic Pumps

1.7.4 Identcode Ordering System

DULCO®flex system DF3a

DF3a	Application	D	Fragrance dosing
	Installation	W	Wall mounting
	Version	0	with LCD, with ProMinent® logo
		1	with LCD, without ProMinent® logo
	Type		
	Capacity		
			bar l/h
		0204	1.5 0.4
		0208	1.5 0.8
		0216	1.5 1.6
		0224	1.5 2.4
	Hose material	V	Viton®
	Hydraulic connectors	0	Standard
		9	Special connection 10x4 pressure side
	Power supply	A	230 V, 50/60 Hz
		B	115 V, 50/60 Hz
	Cable and plug	0	Without cable
		1	With cable 2.0 m; open end
		A	With cable 2.0 m; Euro connector
		B	With cable 2.0 m; Swiss connector
	Accessories	0	Without accessories
		1	Metering valve, foot valve; intake and pressure line.
	Hardware-flaring	0	None
	Language	DE	German
		EN	English
		FR	French
		SV	Swedish
		IT	Italian
	Relay	0	Without relay
	Anwenderrelais	0	None
		1	Solenoid valve
		2	Solenoid valve + pump 2
		3	Solenoid valve + pump 2 + pump 3
	Control Variants	0	External contact
	Pause/level	0	Pause break contact + level break contact
		1	Pause make contact + level break contact
		2	Pause break contact + level make contact
		3	Pause make contact + level make contact
	Approvals	01	CE-Symbol

Viton® is a registered trademark.

1.7 DULCO®flex Peristaltic Pumps

1.7.5

DULCO®flex DF4a

- Output range 0.4 - 12 l/h, 4 - 2 bar
 - Hose material Pharmed® and Tygon®
 - Powerful stepper motor, speed-controllable
 - Continuous adjustment of the metering rate manually or externally through contact or analogue signal 0/40-20 mA
 - Suction function (high speed)
 - Sprung rollers for constant rolling pressure and increased service life of the hose
 - Switchable output change, e.g. increase when needed or off-peak reduction
 - Display of the metering rate in l/h
 - Reversible direction of rotation, e.g. backflushing
 - Housing IP rating IP 65 pursuant to DIN EN 60529
-
- Pump type 04004, 0.4 l/h - 4 bar
 - available from 2nd quarter of 2009

NEW

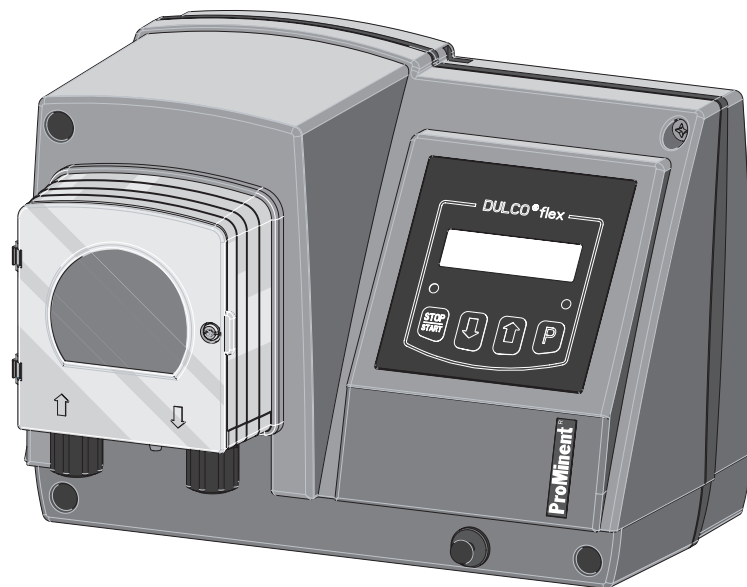
The DULCO®flex DF4a was developed for metering chemicals in swimming pool applications.

It is available in three versions with the system control menu as well as the inputs and outputs adapted to the respective application:

- 1 "Standard pump" as volume-adjustable metering pump for general applications (from 3rd quarter of 2009).
- 2 "Metering of activated carbon" with reversible direction of rotation for backflushing the hose over the entire output range.
- 3 "Metering of flocculants" with a continuous metering rate from approx. 5 ml/h. Up to two auxiliary inputs can be configured to realise an increase in the metering rate in case of sudden increased load and an off-peak reduction of the metering volume.

The metering volume can either be set in l/h on the display or specified via external control signals. The pump can process contact signals as well as analogue signals, e.g. 0/4 - 20 mA or 0 - 10 V.

Thanks to the universal controllability and the three output stages, the pump can be used for a wide range of metering tasks. Pharmed® and Tygon® are available as hose materials.



P_DX_0006_SW

1.7 DULCO®flex Peristaltic Pumps

1.7.6 Identcode Ordering System

DULCO®flex system DF4a

DF4a	Application	
	0	Standard pump
	A	Activated carbon metering
	F	Flocculant metering
	Installation	
	W	Wall mounting
	Version	
	0	With ProMinent® logo
	1	Without ProMinent® logo
	Type Capacity	
		bar l/h
	04004	4.0 0.4
	04015	4.0 1.5
	03060	2.5 6.0
	02120	2.0 12.0
	Hose material	
	P	PharMed®
	T	Tygon®
	Hydraulic connectors	
	0	Standard
	9	Special connection 10x4 pressure side
Power supply		
U	100 - 240 VAC, 50/60 Hz	
Cable and plug		
0	Without cable	
1	With cable 2.0 m; open end	
A	With cable 2.0 m; Euro connector	
B	With cable 2.0 m; Swiss connector	
Accessories		
0	Without accessories	
2	with lip-seal metering valve PCB and 10 m PE metering line	
Hardware-flaring		
0	None	
Language default		
00	Language-neutral	
Relay		
1	Fault signalling relay, drop-out action	
3	Fault signalling relay, pick-up action	
Control Variants		
0	manual + external contact	
2	manual + external analogue 0/4 - 20 mA	
8	manual + external analogue 0/4 - 20 mA + 0-10 V	
further input		
1	Pause + 2-stage level + AUX1	
2	Pause + 1-stage level + AUX1 + AUX2	
Pause/level		
0	Pause break contact + level break contact	
Approvals		
01	CE-Symbol	

Tygon® and PharMed® are registered trademarks.

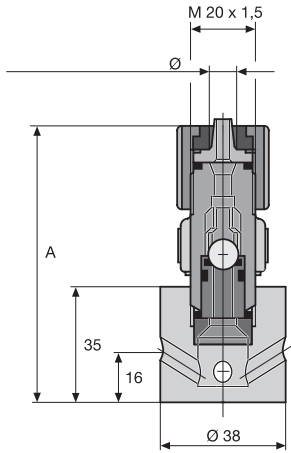
1.8 Mechanical-Hydraulic Accessories

1.8.1 Foot Valves

At end of intake line to protect against soiling and prevent backflow, with screen filter and non-return ball. For connections 6/4, 8/5, 12/6, 12/9 with ceramic weight.

PPE Foot valve

PP body, EPDM seals



pk_1_038

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for hose	6 x 4	84	pk_1_038	924558
8/5 for hose	8 x 5	84	pk_1_038	809468
12/9 for hose	12 x 9	87	pk_1_038	809470
10/4 for hose	10 x 4	87	pk_1_038	1002916
12/6 for hose	12 x 6	87	pk_1_038	809469
6/4 for hose	6 x 4	57	pk_1_037	914554
G 3/4 - DN 10 for hose	20 x 15 and 24 x 16	93	pk_2_026 (sect. 2.5.1)	809465

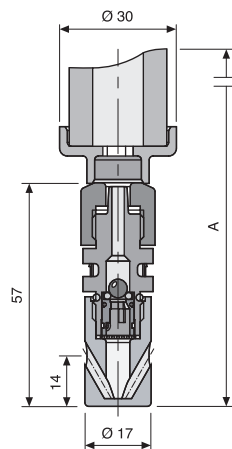
PPB Foot valve

PP body, FPM (FPM) seals

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for hose	6 x 4	84	pk_1_038	924559
8/5 for hose	8 x 5	84	pk_1_038	924683
12/9 for hose	12 x 9	87	pk_1_038	924684
10/4 for hose	10 x 4	87	pk_1_038	1002915
12/6 for hose	12 x 6	87	pk_1_038	924685
G 3/4 - DN 10 for hose	20 x 15 and 24 x 16	93	pk_2_026 (sect. 2.5.1)	790189

PCB Foot valve

PVC housing, FPM seals.



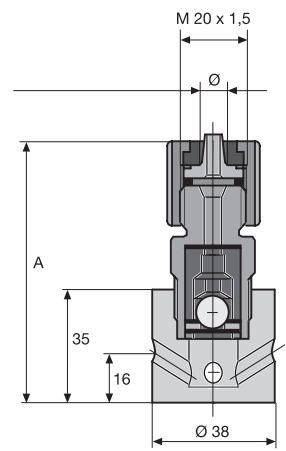
P_AC_0207_SW

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for hose	6 x 4	84	pk_1_038	924557
8/5 for hose	8 x 5	84	pk_1_038	924562
12/9 for hose	12 x 9	87	pk_1_038	924564
10/4 for hose	10 x 4	87	pk_1_038	1002917
12/6 for hose	12 x 6	87	pk_1_038	924563
6/4 for hose	6 x 4	57	pk_1_037	914505
G 3/4 - DN 10 for hose	20 x 15 and 24 x 16	93	pk_2_026 (sect. 2.5.1)	809464

1.8 Mechanical-Hydraulic Accessories

PVT Foot valve

PVDF housing, PTFE seals.

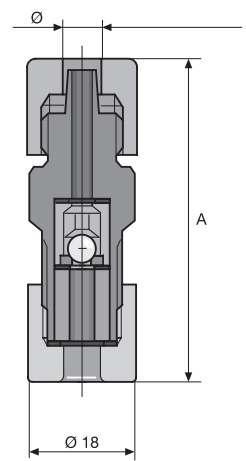


pk_1_040

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for hose	6 x 4	79	pk_1_040	1024705
8/5 for hose	8 x 5	79	pk_1_040	1024706
12/9 for hose	12 x 9	82	pk_1_040	1024707

TT1 Foot valve

PTFE housing and seals, for connections 6/4, 8/5, 12/6, 12/9 with ceramic weight.



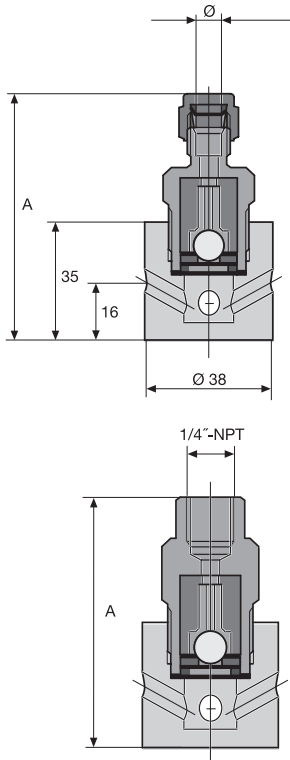
pk_1_039

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for hose	6 x 4	79	pk_1_040	809455
8/5 for hose	8 x 5	79	pk_1_040	809471
12/9 for hose	12 x 9	82	pk_1_040	809473
12/6 for hose	12 x 6	82	pk_1_040	809472
6/4 for hose	6 x 4	52	pk_1_039	914349
G 3/4 - DN 10 with fusion coupler d16		93	pk_2_027 (sect. 2.5.1)	809466

1.8 Mechanical-Hydraulic Accessories

SS1 Foot valve

Stainless steel 1.4404 housing, PTFE seals. A support sleeve is required for hose connections 6/4, 8/5, 12/9.



pk_1_031

Connector	oØ x iØ mm	A mm	fig.	Order no.
6/4 for pipe 6 x 5 mm / hose	6 x 4	74	P_AC_0204_SW	924568
8/5 for pipe 8 x 7 mm / hose	8 x 5	74	P_AC_0204_SW	809474
12/9 for pipe 12 x 10 mm / hose	12 x 9	77	P_AC_0204_SW	809475
1/4" NPT for SS2		70	pk_1_031	924567
G 3/4 - DN 10 with socket Rp 3/8		67	P_AC_0204_SW	809467

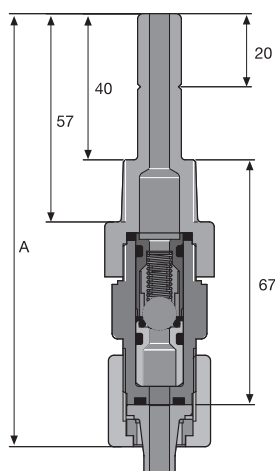
1.8 Mechanical-Hydraulic Accessories

1.8.2 Injection Valves

For connection of discharge line to point of injection. Discharge valve with ball check. Spring loaded PP, PVC, PVDF and stainless steel versions, with Hastelloy C spring, 0.5 bar response pressure (for R 1/4 stainless steel 1.4571 spring, response pressure approx. 1 bar). Installation in any position.

Vertical installation from below for TT version without spring. Valve spring can be retrofitted. Materials as pump liquid ends.

Important: Injection valves and discharge lances are not intended as completely sealed units!



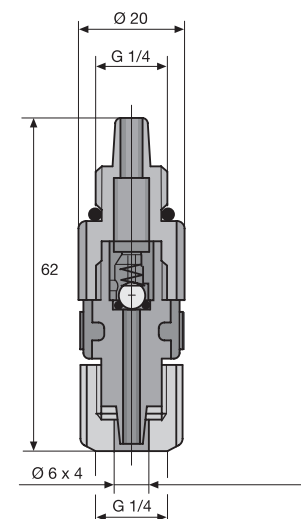
pk_1_105

PPE Injection valves

PP/PVDF housing, EPDM seals with non-return ball, spring-loaded with Hastelloy C spring, prepressure approx. 0.5 bar with extended screwed socket..

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	119	pk_1_105	924681
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	119	pk_1_105	809476
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	119	pk_1_105	809478
10/4 - R 1/2 for PVC hose	10 x 4	119	pk_1_105	1002920
12/6 - R 1/2 for PVC hose	12 x 6	119	pk_1_105	809477
6/4 - G 1/4 for PE/PTFE pipe*	6 x 4	62	pk_1_042	914184
G 3/4 - DN 10 for PVC hose	24 x 16	83	pk_2_029 (sect. 2.5.2)	809461

* stainless steel 1.4571 valve spring, priming pressure approx. 1 bar.



pk_1_042

PPB Injection valves

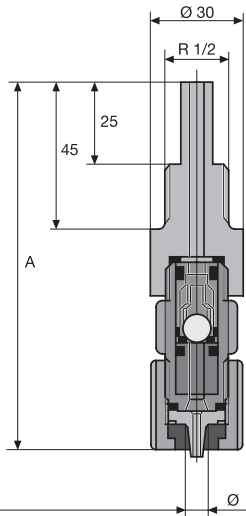
PP/PVDF housing, FPM seals with spring-loaded non-return ball, prepressure approx. 0.5 bar.

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	119	pk_1_105	924682
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	119	pk_1_105	924687
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	119	pk_1_105	924688
10/4 - R 1/2 for PVC hose	10 x 4	119	pk_1_105	1002921
12/6 - R 1/2 for PVC hose	12 x 6	119	pk_1_105	924689
G 3/4 - DN 10 for PVC hose	24 x 16	83	pk_2_029 (sect. 2.5.2)	790191

1.8 Mechanical-Hydraulic Accessories

PP/PTFE Injection valves

For prevention of chemical deposition. PP body, PTFE mounting insert, EPDM seals with ball check, and Hastelloy C spring approx. 0.5 bar priming pressure. (fig. pk_1_046)



pk_1_046

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	103	pk_1_046	924588
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	103	pk_1_046	924589
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	106	pk_1_046	924590
10/4 - R 1/2 for PVC hose	10 x 4	106	pk_1_046	1002923
12/6 - R 1/2 for PVC hose	12 x 6	106	pk_1_046	924591

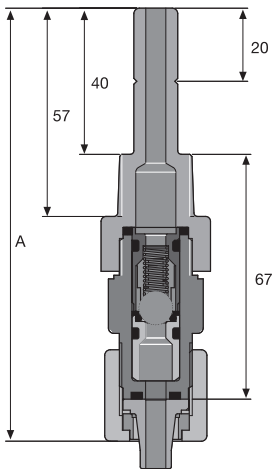
PVC/PTFE Injection valves

PVC body, PTFE mounting insert, FPM-B seals, spring loaded ball check with Hastelloy C spring, approx. 0.5 bar priming pressure.

Connector	oØ x iØ mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	pk_1_046	809450
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	pk_1_046	809451
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	pk_1_046	809452
10/4 - R 1/2 for PVC hose	10 x 4	pk_1_046	1002924
12/6 - R 1/2 for PVC hose	12 x 6	pk_1_046	809453

PCB Injection valves

Housing made of PVC/PVDF, gaskets made of FPM with non-return ball spring-loaded with Hastelloy C spring, pre-pressure approx. 0.5 bar, with extended screwed socket. Type 8/4 up to 25 bar.



pk_1_105

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	119	pk_1_105	924680
8/4 - R 1/2 for PTFE line	8 x 4	119	pk_1_105	1034621
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	119	pk_1_105	924592
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	119	pk_1_105	924594
10/4 - R 1/2 for PVC hose	10 x 4	119	pk_1_105	1002919
12/6 - R 1/2 for PVC hose	12 x 6	119	pk_1_105	924593
6/4 - G 1/4 for PE/PTFE pipe*	6 x 4	62		914559
G 1/2 - DN 10 for PVC hose	24 x 16	83	pk_2_029 (sect. 2.5.2)	809460

* Spring made of 1.4571, approx. 1 bar prepressure.

PVT Injection valves

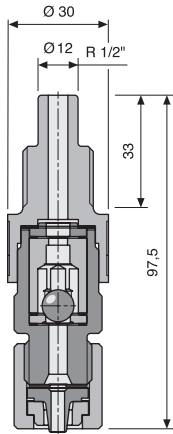
Housing PVDF, gaskets PTFE, with non-return ball, spring-loaded with Hast. C spring, approx. 0.5 bar pre-pressure, with extended screwed socket. Type 6/3 up to 20 bar, 8/4 up to 25 bar.

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/3 - R 1/2 for PTFE pipe	6 x 3	119	Fig. 1	1024713
6/4 - R 1/2 for PTFE pipe	6 x 4	119	Fig. 1	1024708
8/4 - R 1/2 for PTFE line	8 x 4	119	Fig. 1	1034619
8/5 - R 1/2 for PTFE pipe	8 x 5	119	Fig. 1	1024710
12/9 - R 1/2 for PTFE pipe	12 x 9	119	Fig. 1	1024711
10/4 - R 1/2 for PVC hose	10 x 4	119	Fig. 1	1024709
12/6 - R 1/2 for PVC hose	12 x 6	119	Fig. 1	1024712

1.8 Mechanical-Hydraulic Accessories

TT1 Injection valves

Vertical installation from below. With ball check, without spring. Valve spring (Order No. 469404) can be retrofitted. Body and seals PTFE.

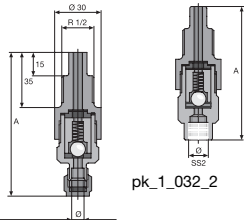


P_AC_0184_SW

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 for PE/PTFE pipe	6 x 4	98	Fig. 1	809488
8/5 - R 1/2 for PE/PTFE pipe	8 x 5	98	Fig. 1	809479
12/9 - R 1/2 for PE/PTFE pipe	12 x 9	101	Fig. 1	809481
12/6 - R 1/2 for PVC hose	12 x 6	101	Fig. 1	809480
6/4 - R 1/4 for PE/PTFE pipe	6 x 4	65		914347
G 3/4 - DN 10 with fusion coupler d16			pk_2_030	809462

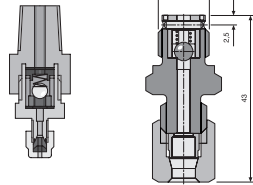
SS1 Injection valve

Stainless steel 1.4404 body and PTFE seals with spring loaded ball check. Spring made of Hastelloy C. with approx. 0.5 bar priming pressure, for 1.4571 R 1/4 spring, approx. 1 bar priming pressure. Ferrule is required for connection with PE/PTFE pipe.



pk_1_032_2

pk_1_032_1



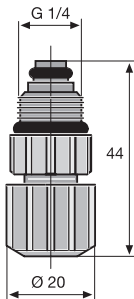
pk_1_016

P_AC_0182_SW

Connection	oØ x iØ mm	A mm	fig.	Order no.
6 mm - R 1/2 for pipe	6 x 5	93	pk_1_032_1	809489
8 mm - R 1/2 for pipe	8 x 7	93	pk_1_032_1	809482
12 mm - R 1/2 for pipe	12 x 10	96	pk_1_032_1	809483
1/4" NPT - R 1/2 for pipe	R 1/4" NPT	89	pk_1_032_2	924597
6 mm - R 1/4 for pipe	6	43	P_AC_0182_SW	914588
1/16" - R 1/4 for pipe	1,58 and 1,5		pk_1_016	803251
1/8" - R 1/4 for pipe	3,18 and 3,2		pk_1_016	803252
G 3/4 - DN 10, sleeve	sleeve Rp 3/8		pk_2_030 (sect. 2.5.2)	809463

PPB Injection valves, O-ring loaded

PP body, (FPM) FPM seals. Priming pressure approx. 0.5 bar.



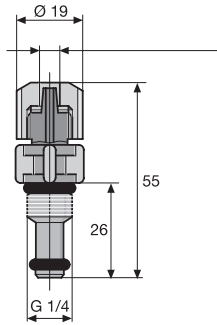
pk_1_043

Connector	oØ x iØ mm	fig.	Order no.
6/4 - G 1/4	6 x 4	pk_1_043	914754
6/4 - G 1/4	6 x 4	pk_1_044	741193

1.8 Mechanical-Hydraulic Accessories

PCB Injection valves O-ring loaded

PVC body, FPM (FPM) seals, priming pressure approx. 0.5 bar.

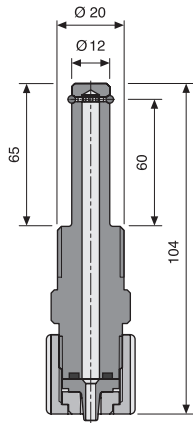


pk_1_044

Connector	oØ x iØ mm	fig.	Order no.
6/4 - G 1/4	6 x 4	pk_1_043	914558
6/4 - G 1/4	6 x 4	pk_1_044	915091

PTFE Injection valves O-ring loaded

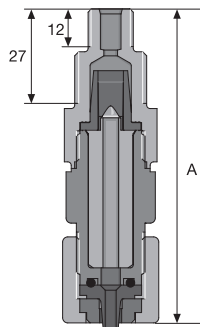
PTFE housing, FPM seals.



Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - for PE/PTFE line	6 x 4	104	P_AC_0183_SW	809484
8/5 - for PE/PTFE line	8 x 5	104	P_AC_0183_SW	809485
10/4 - for PE/PTFE line	10 x 4	104	P_AC_0183_SW	1002925
12/6 - for PVC hose	12 x 6	104	P_AC_0183_SW	809487
12/9 - for PE/PTFE line	12 x 9	104	P_AC_0183_SW	809486

Lip seal dosing valve PCB

Body PVC, seals FPM, inlet pressure approx. 0.05 bar. For dosing sodium hypochlorite and in conjunction with the peristaltic pump DF2a..



pk_1_070

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 - R 1/2 - 1/4 for PE/PTFE pipe	6 x 4	90	Fig. 3	1019953
10/4 - R 1/2 - 1/4 for PE/PTFE pipe	10 x 4	90	Fig. 3	1024697

1.8 Mechanical-Hydraulic Accessories



Dosing Connector For Warm Water Up To 200 °C

Consists of stainless steel 1.4404 discharge valve, 1 m stainless steel 1.4571 discharge line and threaded connector with reinforcing sleeve for connection of PE/PTFE pipe to stainless steel pipe.

Connection	fig.	Order no.
Warm water 6 mm - G 1/4	pk_1_049	913166
Warm water 6 mm - G 1/2	pk_1_049	913167
Warm water 8 mm - G 1/2	pk_1_049	913177
Warm water 12 mm - G 1/2	pk_1_049	913188

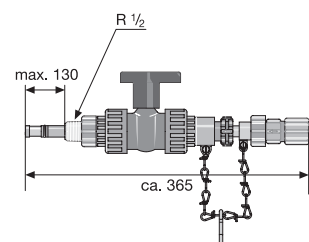
pk_1_049

1.8 Mechanical-Hydraulic Accessories

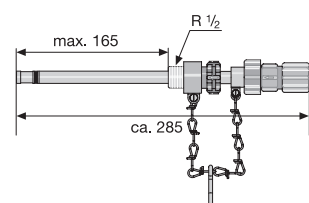
1.8.3 Injection Lances, Non-Return Valves

PPE injection lance

For immersion depths of 20 - 165 mm, in large diameter pipe to prevent chemical deposition at the point of injection. Consisting of spring-loaded metering valve, Hastelloy C spring, ceramic ball, adjustable immersion rod and hose valve. With connectors for all hose sizes used with solenoid metering pumps: 6/4, 8/5, 12/9, 10/4 and 12/6.



pk_1_007



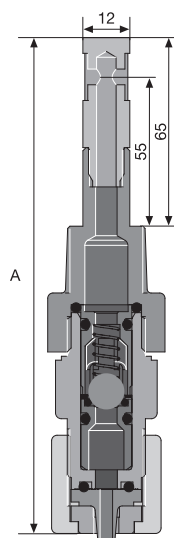
pk_1_062

Type	Material gaskets	Max. Pressure bar	fig.	Order no.
PPE without shut-off cock valve	EPDM/silicone	6	pk_1_007	1021530
PPE with shut-off cock valve	EPDM/silicone	6	pk_1_062	1021531
PCB without shut-off cock valve	FPM/silicone*	6	pk_1_007	1021528
PCB with shut-off cock valve	FPM/silicone*	6	pk_1_062	1021529

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

Short injection lance

Injection lance with universal connection kit, facilitating connection of different hose sizes from 6/4 to 12/9. Hastelloy C spring, ceramic ball and silicone hose.



pk_1_106

Type	Material, valve body	Material, screwed socket	Seal material	A mm	fig.	Order no.
PPE	PP	PVDF	EPDM	126	pk_1_106	1028383
PCB	PVC	PVDF	FPM-B	126	pk_1_106	1028363
PVT	PVDF	PVDF	PTFE	126	pk_1_106	1028081

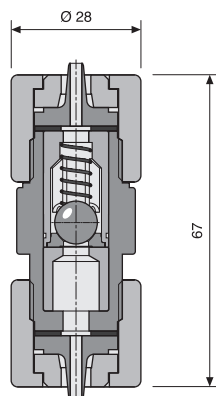
PVDF non-return valve for hose installation

With connection kit on both sides for fitting in hose line.

With non-return ball, spring-loaded with Hastelloy C spring, prepressure approx. 0.5 bar.

PVDF housing, PTFE seals.

Different hose sizes from 6/4 to 12/9 can be joined by using different connection kits.



P_AC_0181_SW

Connection	oØ x iØ mm	A mm	fig.	Order no.
6/4 for PE/PTFE line	6 x 4	67	P_AC_0181_SW	1030463
8/5 for PE/PTFE line	8 x 5	67	P_AC_0181_SW	1030975
10/4 for PE/PTFE line	10 x 4	67	P_AC_0181_SW	1030977
12/6 for PVC hose	12 x 6	67	P_AC_0181_SW	1030978
12/9 for PE/PTFE line	12 x 9	67	P_AC_0181_SW	1030976

1.8 Mechanical-Hydraulic Accessories

1.8.4 Back Pressure Valves/Relief Valves

Back pressure valves are used to generate a constant back pressure for precise dosing and/or to protect against overdosing, or for dosing accuracy with an open discharge or a positive pressure on the suction side. They are also used in conjunction with pulsation dampeners to produce pulsation-free or low-pulsation dosing. With fluctuating back pressure and dosing into a vacuum, we recommend the back pressure valves Type DHV-RM.

(Pressure Relief Valves/Overflow Valves see on page → 2-31)

The back pressure valves described here are designed for the full range of applications. Please consult the relevant section for each version.

Important: Back pressure valves are not intended as completely sealed units. When using with dangerous chemicals, all relevant safety measures must be observed.

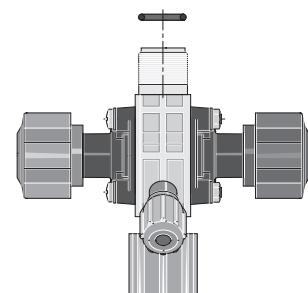
Relief valves are installed in by-pass pipework, to protect pumps, pipework and housings from excess pressure as a result of operational error or blockage in the main pipework.

If a problem arises, the valve alters the direction of fluids, feeding back into the storage tank.

Multifunction valve type MFV-DK, PVDF

Multifunction Valve for assembly directly onto the liquid end of the pump. Has the following functions:

- Back pressure valve, opening pressure approx. 1.5 bar, with open discharge or positive pressure on the suction side (black rotary knob)
- Relief valve, opening pressure approx. 6, 10 or 16 bar (red rotary knob)
- Admission aid in existing back pressure, no need to de-pressurise pipes
- Pressure relief, e.g. prior to servicing



pk_1_053

The ProMinent® Multifunction Valve is simple to operate using smooth action rotary knobs, which return to the initial position on release. This ensures safe operation even under difficult access conditions. The ProMinent® Multifunction Valve is made from PVDF and can be used with virtually all chemicals.

Warning: Back pressure valves are not intended as completely sealed units!

Caution: The bypass line must always be connected.

Valve body PVDF
 Diaphragm PTFE- coated
 Seal FPM and EPDM (enclosed)

.Hoses see page → 1-55.

Type	Relief opening pressure	Connection	Bypass connector	Order no.
Size I	16 bar	6/12	6/4	792011
Size I	10 bar	6/12	6/4	791715
Size I	6 bar	6/12	6/4	1005745
Size II	10 bar	6/12	12/9	792203
Size II	6 bar	6/12	12/9	740427
Size III	10 bar	DN 10	12/9	792215

Area of application of multifunctional valve

- Size I ALPc 1001, 1002, 1004, 1008, 0708
 Beta®, gamma/ L type 1000, 1601, 1602, 1605, 1005, 1008, 0708, 0413, 0220
 delta® Type 1608, 1612
- Size II ALPc 0419, 0230
 Beta®, gamma/ L type 1605, 1008, 0713, 0420, 0232
 delta® type 1020, 0730
- Size III delta® type 0450, 0280

For material PP, PV, NP, TT.

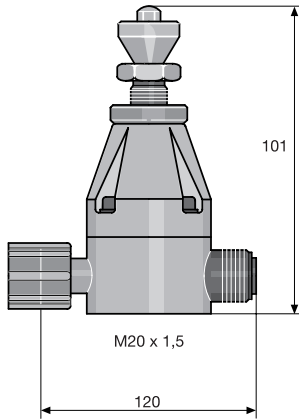
1.8 Mechanical-Hydraulic Accessories

Back pressure valve type DHV-S-DK, adjustable between 1-10 bar

Adjustable back pressure valve for mounting direct on the dosing head, to generate a constant back pressure. For precise dosing with an open discharge and with positive pressure on the suction side.

Warning: Back pressure valves are not intended as completely sealed units!

Application range: Metering pumps alpha, Beta®, gamma/ L, Pneumados b, EXtronic®, D4a and delta®



pk_1_129

Type	Adjustable pressure	Connection	Material	Order no.
DHV-S-DK	1 – 10 bar	6 - 12 mm	PP/EPDM	302320
DHV-S-DK	1 – 10 bar	6 - 12 mm	PC/FPM*	302321
DHV-S-DK	1 – 10 bar	6 - 12 mm	TT/PTFE	302322
DHV-S-DK	1 – 10 bar	6 mm	SS	1003793
DHV-S-DK	1 – 10 bar	8 mm	SS	1003795
DHV-S-DK	1 – 10 bar	12 mm	SS	1003797

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

Back pressure valve/relief valve type DHV-S-DL, adjustable between 1-10 bar

Adjustable back pressure valve for mounting direct on the dosing head, to generate a constant back pressure. For precise dosing with an open discharge and with positive pressure on the suction side.

They are also used in connection with pulsation dampers for low-pulsation metering.

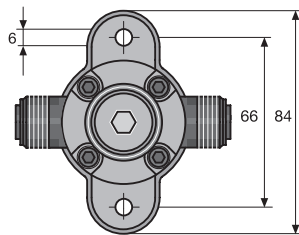
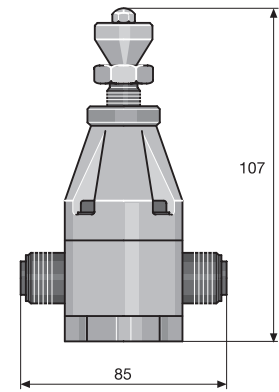
For use with pulsation dampener under back pressure, or long pipe, use type DHV-RM.

See section 2.5: Back pressure valves

Warning: Back pressure valves are not intended as completely sealed units!

Application range: Metering pumps alpha, Beta®, gamma/ L, Pneumados b, EXtronic®, D4a and delta®

(Pressure Relief Valves/Overflow Valves see on page → 2-31)

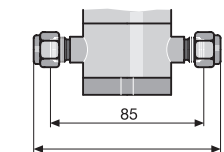


Type	Adjustable pressure	Connection	Material	Order no.
DHV-S-DL	1 – 10 bar	6 - 12	PP	302323
DHV-S-DL	1 – 10 bar	6 - 12	PC/FPM*	302324
DHV-S-DL	1 – 10 bar	6 - 12	TT	302325
DHV-S-DL	1 – 10 bar	6	SS	302326
DHV-S-DL	1 – 10 bar	8	SS	302327
DHV-S-DL	1 – 10 bar	12	SS	302328

For the connection, 2 connecting kits in the required hose size are to be ordered separately.

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

(Connection Kits see page → 1-76)

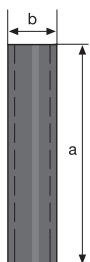


pk_1_054

Pipe nipples

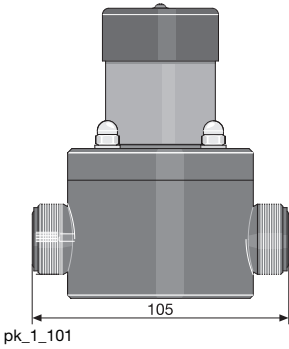
For the direct connection of the pressure maintenance valve DHV-S-DL in stainless steel (SS) to the liquid end.

Type	A mm	B mm	fig.	Order no.
1.4571 pipe nipple	6	40	pk_1_017	818537
	8	40	pk_1_017	818538
	12	40	pk_1_017	818539



pk_1_017

1.8 Mechanical-Hydraulic Accessories



Back pressure valve Type BPV-DM

Adjustable back pressure valve for mounting in the dosing line, to generate a constant back pressure and/or for precise dosing with an open discharge as well as positive pressure on the suction side.

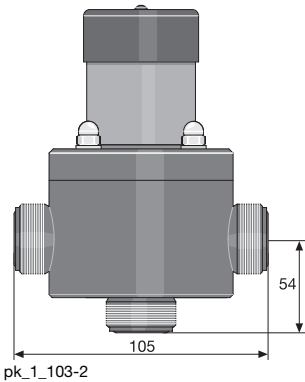
Warning: back pressure valves are not tight shut-off isolation devices! The installation notes in the operating instructions must be strictly observed!

Applications: metering pumps alpha, Beta®, gamma/ L, EXtronic®, Pneumados b, D4_a and delta®

Type	Adjustable pressure	Connection	Material	Order no.
BPV-DM	1 – 10 bar	6 - 12	PP/EPDM	1009884
BPV-DM	1 – 10 bar	6 - 12	PP/FPMB	1009886
BPV-DM	1 – 10 bar	6 - 12	PVC/EPDM	1009885
BPV-DM	1 – 10 bar	6 - 12	PVC/FPMB	1026450

* For the connection, 2 No. connection kits in the required hose size must be ordered in addition.

(Connection Kits see page → 1-76)



Relief valve Type BPV-SM

Adjustable relief valve for mounting in the dosing line to protect against excess pressure. With additional relief line connection in the base of the valve body – no tee required for installation.

Warning: back pressure valves are not tight shut-off isolation devices! The installation notes in the operating instructions must be strictly observed!

Applications: metering pumps alpha, Beta®, gamma/ L, EXtronic®, Pneumados b, D4_a and delta®

Type	Adjustable pressure	Connection	Material	Order no.
BPV-SM	1 – 10 bar	6 - 12	PPE	1009887
BPV-SM	1 – 10 bar	6 - 12	PPB	1009889
BPV-SM	1 – 10 bar	6 - 12	PCE	1009888
BPV-SM	1 – 10 bar	6 - 12	PCB	1026445

* For the connection, 2 No. connection kits in the required hose size must be ordered in addition.

(Connection Kits see page → 1-76)

1.8 Mechanical-Hydraulic Accessories

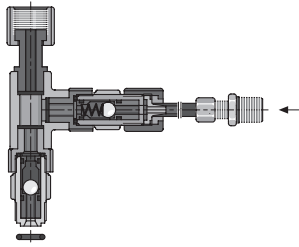
1.8.5 Fittings

Flushing Assembly

For flushing and cleaning liquid ends, discharge line and injection valve..

Manual or timer relay controlled versions. Assembly, including retrofitting, onto suction connector of metering pump. Supplied with 2 m flushing pipe and connector nipple R 3/8.

Automatic flushing assembly for flushing the pump head fully automatically is possible on request.



pk_1_056

PPE Flushing Assembly

PP material, EPDM seal.

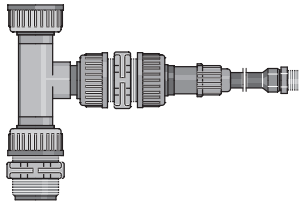
	fig.	Order no.
For connections 6/4, 8/5, 12/6, 12/9	pk_1_056	809909
For G 3/4 -DN 10 connector	pk_1_057	809917
For G 1 -DN 15 connector	pk_1_057	809919

PCB Flushing Assembly

Material: PVC, FPM seals

	fig.	Order no.
for connection 6/4, 8/5, 12/6, 12/9*	pk_1_056	809925
for connection G 3/4 - DN 10*	pk_1_057	809926
for connection G 1 - DN 15*	pk_1_057	803960

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.



pk_1_057

Relief Valve Assembly

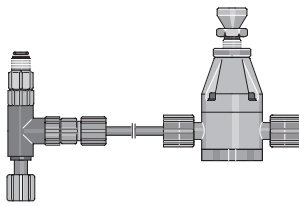
Consists of back pressure valve, adjustable between 1.5 and 10 bar, DL type complete with connector parts, for assembly directly onto liquid end.

Connector sizes 6-12 mm according to pressure connector on metering pump.

Relief Valve Assembly PPE:

Material: PP, EPDM seals.

	fig.	Order no.
For connections 6/4, 8/5, 12/6, 12/9	pk_1_058	809990
G 3/4 - DN 10 connector	pk_1_059	809991
G 1 - DN 15 connector	pk_1_059	809992

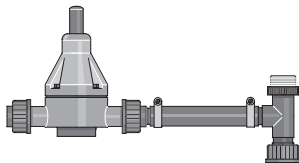


pk_1_058

Relief Valve Assembly PCB:

Material: PVC, FPM seals.

	fig.	Order no.
for connection 6/4, 8/5, 12/6, 12/9*	pk_1_058	809989
for connection G 3/4 - DN 10*	pk_1_059	809993
for connection G 1 - DN 15*	pk_1_059	914745



pk_1_059

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

1.8 Mechanical-Hydraulic Accessories

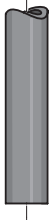
1.8.6 Hoses, Pipes

Suction and discharge line

for metering pumps and accessories. We recommend using the original lines to ensure the mechanical connection in case of clamping ring fittings as well as compressive strength and chemical resistance.

On request, food grade version is possible.

Suction line, soft PVC

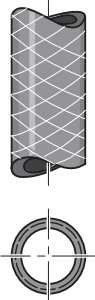


pk_1_013

Material	Length	oØ x iØ	Permissible operating pressure	Order no.	
	m	mm			bar
PVC flexible	5	6 x 4	0.5*	1004520	
	5	8 x 5	0.5*	1004521	
	5	12 x 9	0.5*	1004522	
	10	6 x 4	0.5*	1004523	
	10	8 x 5	0.5*	1004524	
	10	12 x 9	0.5*	1004525	
	25	6 x 4	0.5*	1004526	
	25	8 x 5	0.5*	1004527	
	25	12 x 9	0.5*	1004528	
	50	6 x 4	0.5*	1004529	
	50	8 x 5	0.5*	1004530	
	50	12 x 9	0.5*	1004531	
	Sold in meters		19 x 15	0.5*	037020

* Admissible operating pressure at 20 °C in accordance with DIN EN ISO 7751, subject to chemical resistance and correct assembly.

Suction and discharge line, soft PVC with woven fabric core



pk_1_060

Material	Length	oØ x iØ	Permissible operating pressure	Order no.	
	m	mm			bar
Fabric reinforced flexible PVC	5	10 x 4	18*	1004533	
	5	12 x 6	17*	1004538	
	10	10 x 4	18*	1004534	
	10	12 x 6	17*	1004539	
	25	10 x 4	18*	1004535	
	25	12 x 6	17*	1004540	
	50	10 x 4	18*	1004536	
	50	12 x 6	17*	1004541	
	Sold in meters		24 x 16	16*	037040
	Sold in meters		27 x 19	16*	037041

* permissible operating pressure at 20°C in accordance with DIN EN ISO 7751, 1/4 of the bursting pressure subject to chemical resistance and correct assembly.

For socket welded and PVC cemented rigid PP and PVDF pipe, pipes and fittings with a pressure rating of PN 16 or PN 10 bar are to be used.

Caution:

The resistance of soft PVC hoses is not identical with that of hard PVC. Please observe the resistance for PVC soft as well as the cleaning instructions when using the equipment for foodstuff applications (see homepage).

1.8 Mechanical-Hydraulic Accessories

Suction and discharge, PE

Material	Length	oØ x iØ	Permissible operating pressure	Order no.
	m			
Polyethylene	5	6 x 4	10*	1004492
	5	8 x 5	10*	1004493
	5	12 x 9	7*	1004504
	10	6 x 4	10*	1004505
	10	8 x 5	10*	1004506
	10	12 x 9	7*	1004507
	25	6 x 4	10*	1004508
	25	8 x 5	10*	1004509
	25	12 x 9	7*	1004510
	50	6 x 4	10*	1004511
	50	8 x 5	10*	1004512
	50	12 x 9	7*	1004513

* Admissible operating pressure at 20 °C in accordance with DIN EN ISO 7751, subject to chemical resistance and correct assembly

Suction and discharge lines, PTFE

Material	Length	oØ x iØ	Permissible operating pressure	Order no.
	m			
PTFE	Sold in meters	1.75 x 1.15	12*	037414
	Sold in meters	3.2 x 2.4	8*	037415
	Sold in meters	6 x 3	20*	1021353
	Sold in meters	6 x 4	15*	037426
	Sold in meters	8 x 4	25*	1033166
	Sold in meters	8 x 5	17*	037427
	Sold in meters	12 x 9	11*	037428
	Sold in meters	19 x 16	6*	037430

* Admissible operating pressure at 20 °C in accordance with DIN EN ISO 7751, subject to chemical resistance and correct assembly

Stainless steel pipes

Material	Length	oØ x iØ	Permissible oper- ating pressure	Order no.
	m			
Stainless steel pipe 1.4435	Sold in meters	1.58 x 0.9	400*	1020384
	-	3.175 x 1.5	400*	1020385
	Sold in meters	6 x 5	175*	015738
	Sold in meters	6 x 4	185*	015739
	Sold in meters	8 x 7	131*	015740
	Sold by meter	12 x 10	185*	015743

* Admissible operating pressure at 20 °C in accordance with DIN EN ISO 7751, subject to chemical resistance and correct assembly

1.8 Mechanical-Hydraulic Accessories

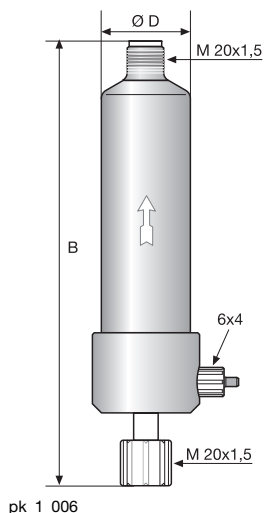
1.8.7 Pressure Accumulator

PP Pressure accumulator

Caution: An overflow valve must always be installed when using pressure accumulators.

20 °C - max. operating pressure 10 bar

40 °C - max. operating pressure 6 bar



	Volume	Permissible stroke volume	Connection	fig.	Order no.
	I	ml			
Size 0*	0.15	1.0	M 20 x 1,5	pk_1_006	1021157
Size I	0.35	2.5	DN 8	pk_1_065	243218
Size II	1.00	5.0	d 16-DN 10	pk_1_065	243219
Size II	1.00	5.0	d 20-DN 15	pk_1_065	243220

* With vent valve. Installed directly at pressure connection.

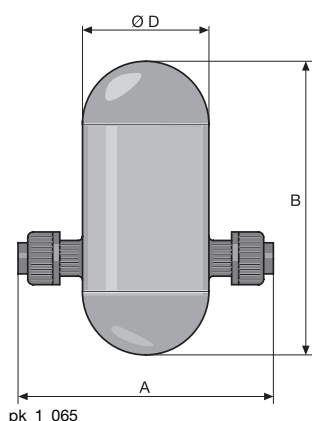
	Connection	A	B	Ø D
Size 0	M 20 x 1,5	-	225	49
Size I	DN 8	150	170	75
Size II	DN 10	192	220	110
Size II	DN 15	200	220	110

PVC Pressure accumulator

Caution: An overflow valve must always be installed when using pressure accumulators.

20 °C - max. operating pressure 10 bar

40 °C - max. operating pressure 6 bar



	Volume	Permissible stroke volume	Connection	fig.	Order no.
	I	ml			
Size 0**	0.15	1.0	M 20 x 1,5	pk_1_006	1021120*
Size I	0.35	2.5	DN 8	pk_1_065	243203*
Size II	1.00	5.0	d 16-DN 10	pk_1_065	243204*
Size II	1.00	5.0	d 20-DN 15	pk_1_065	243205*

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

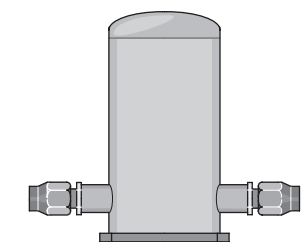
** With bleed valve. Installation directly a the pressure port.

	Connection	A	B	Ø D
Size 0	M 20 x 1,5	-	225	49
Size I	DN 8	150	170	75
Size II	DN 10	192	220	110
Size II	DN 15	200	220	110

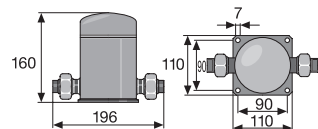
1.8 Mechanical-Hydraulic Accessories

Stainless steel accumulator

Max. operating pressure 10 bar.



pk_1_128



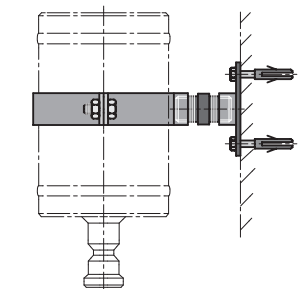
pk_1_063

	Volume l	Permissible stroke volume ml	Connection	fig.	Order no.
Size 0	0.15	2.5	for pipe oØ 6	pk_1_128	914510
Size I	0.35	2.5	for pipe oØ 8	pk_1_128	914511
Size I	1.00	2.5	for pipe oØ 12	pk_1_128	914512
Size II*	1.00	5.0	G 3/8-DN 10, seal	pk_1_063	914756

* Threaded sleeve insert G 3/8.

Wall mounting for accumulator

For PP and PVC versions, consisting of clamping ring, mounting plate and connecting nipple.



pk_1_061

			Order no.
For size I accumulator - 0.35 l	0,35 l	Ø 75	818501
For size II accumulator - 1 l	1 l	Ø 110	818502

1.8 Mechanical-Hydraulic Accessories

1.8.8 Pulsation Dampeners (In-line)

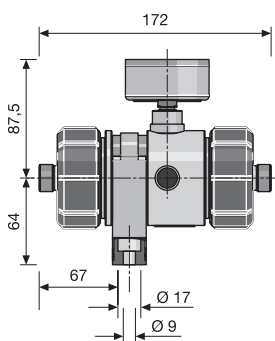
The pulsation dampener is used to produce minimal pulsation dosing and to reduce flow resistance in long discharge lines.

The cushion of gas located between the hose and the housing is compressed by a thrust stroke from the dosing pump, allowing a quantity of feed chemical to pass along the discharge line. On the next suction stroke, the excess pressure created by the cushion of gas forces the chemicals through the pipe. The gas is now released from pressure, and returns to its original volume.

Important: The pulsation dampeners must be protected by an overflow valve.

In-line Dampener PP

Operating conditions
 5 - 30 °C - max. operating pressure 10 bar
 40 °C - max. operating pressure 8 bar
 60 °C - max. operating pressure 4 bar



P_AC_0180_SW

	Volume l	Dampener diaphragm	Seal material	Connection	Order no.
PPE in-line dampener	0.05	CSM*	EPDM	M 20 x 1.5	1026768
PPB in-line dampener	0.05	FPM	FPM	M 20 x 1.6	1026771
PPE in-line dampener	0.05	CSM*	EPDM	G 3/4 - DN 10	1026769
PPB in-line dampener	0.05	FPM	FPM	G 3/4 - DN 10	1026772

* chlorosulfonated polyethylene

PVC In-line dampener

Operating conditions
 5 - 20 °C - max. operating pressure 10 bar
 40 °C - max. operating pressure 6 bar
 60 °C - max. operating pressure 2 bar

	Volume l	Dampener diaphragm	Seal material	Connection	Order no.
PCE in-line dampener	0.05	CSM*	EPDM	M 20 x 1.5	1026774
PCB in-line dampener	0.05	FPM	FPM	M 20 x 1.6	1026777
PCE in-line dampener	0.05	CSM*	EPDM	G 3/4 - DN 10	1026775
PCB in-line dampener	0.05	FPM	FPM	G 3/4 - DN 10	1026778

* chlorosulfonated polyethylene

Threaded end plug

Threaded end plugs to close off the outlet side of the damper together with T-piece installation.

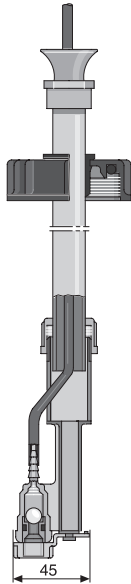
Material	Connection	Order no.
PP	M 20 x 1,5	1030200
PP	G 3/4 - DN 10	1001352
PVC	M 20 x 1,5	1030458
PVC	G 3/4 - DN 10	1001349

1.8 Mechanical-Hydraulic Accessories

1.8.9 Suction Lances, Suction Kit without Level Switch

Variable suction lance without level switch

680 mm long for connection to disposable container of 5 - 60 litres, consisting of foot valve, retaining tube, vertically adjustable screw cap and 2 m intake hose.



pk_1_067

PPE

Material, retaining tube and foot valve PP
Seal material EPDM
Hose Material PE

Material	Hose o \varnothing x i \varnothing mm		fig.	Order no.
PPE	6 x 4	For 50 mm container opening	pk_1_067	790539
PPE	8 x 5	For 50 mm container opening	pk_1_067	790540
PPE	12 x 9	For 50 mm container opening	pk_1_067	790541

PCB

Material, retaining tube and foot valve PVC
Seal material FPM
Hose Material soft PVC

Material	Hose o \varnothing x i \varnothing mm		fig.	Order no.
PCB	6 x 4	For 50 mm container opening	pk_1_067	790536
PCB	8 x 5	For 50 mm container opening	pk_1_067	790537
PCB	12 x 9	For 50 mm container opening	pk_1_067	790538



pk_1_066

Screw cap

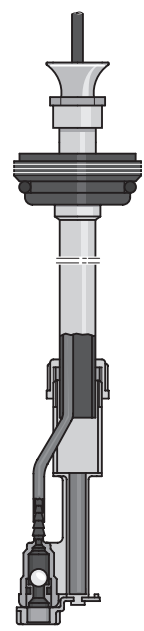
For tanks with opening \varnothing 44, customers need to order the \varnothing 44 screw cap as a spare part to replace \varnothing 50 screw cap.

	Order no.
\varnothing 44 screw cap	811626

1.8 Mechanical-Hydraulic Accessories

Variable suction lance for 200 litre drum without level switch

1000 mm long for connection to 200 litre drum, with foot valve, retaining tube, vertically adjustable screw plug and 3 m intake hose.



pk_1_125

PPE

Material, retaining tube and foot valve PP
Seal material EPDM
Hose Material PE

Material	Hose o Ø x i Ø mm		fig.	Order no.
PPE	6 x 4	For 2" container opening DIN S 70 x 6	pk_1_125	790545
PPE	8 x 5	For 2" container opening DIN S 70 x 6	pk_1_125	790546
PPE	12 x 9	For 2" container opening DIN S 70 x 6	pk_1_125	790547

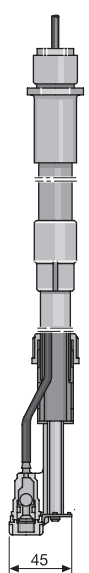
PCB

Material, retaining tube and foot valve PVC
Seal material FPM
Hose Material soft PVC

Material	Hose o Ø x i Ø mm		fig.	Order no.
PCB	6 x 4	For 2" container opening DIN S 70 x 6	pk_1_125	790542
PCB	8 x 5	For 2" container opening DIN S 70 x 6	pk_1_125	790543
PCB	12 x 9	For 2" container opening DIN S 70 x 6	pk_1_125	790544

Variable suction kit without level switch

For ProMinent® solenoid pumps consisting of foot valve, adjustable retaining tube with screw connection and 2 m intake line.



pk_1_069

Length of retaining tube:

- Size I** 385 - 550 mm for 35-60 litre container
- Size II** 660 - 1040 mm for 100-500 litre container
- Size III** 1200 - 1350 mm for 1000 litre container

1.8 Mechanical-Hydraulic Accessories

PPE

Material, retaining tube and foot valve PP
 Seal material EPDM
 Hose Material PE

Material	Hose o \varnothing x i \varnothing mm	For container	fig.	Order no.
PP I	6 x 4	35, 60 l	pk_1_069	790333
PP I	8 x 5	35, 60 l	pk_1_069	790334
PP I	12 x 9	35, 60 l	pk_1_069	790335
PP II	6 x 4	100, 140, 250, 500 l	pk_1_069	790336
PP II	8 x 5	100, 140, 250, 500 l	pk_1_069	790337
PP II	12 x 9	100, 140, 250, 500 l	pk_1_069	790338
PP III	6 x 4	1000 l	pk_1_069	790453
PP III	8 x 5	1000 l	pk_1_069	790454
PP III	12 x 9	1000 l	pk_1_069	790455

PCB

Material, retaining tube and foot valve PVC
 Seal material FPM
 Hose Material soft PVC

Material	Hose o \varnothing x i \varnothing mm	For container	fig.	Order no.
PVC I	6 x 4	35, 60 l	pk_1_069	790327
PVC I	8 x 5	35, 60 l	pk_1_069	790328
PVC I	12 x 9	35, 60 l	pk_1_069	790329
PVC II	6 x 4	100, 140, 250, 500 l	pk_1_069	790330
PVC II	8 x 5	100, 140, 250, 500 l	pk_1_069	790331
PVC II	12 x 9	100, 140, 250, 500 l	pk_1_069	790332
PVC III	6 x 4	1000 l	pk_1_069	790450
PVC III	8 x 5	1000 l	pk_1_069	790451
PVC III	12 x 9	1000 l	pk_1_069	790452

See Page → 2-35 for suction kits with larger nominal diameters

1.8 Mechanical-Hydraulic Accessories

1.8.10 Suction Lances, Suction Assembly With Single Stage Float Switch

Variable suction lance with one-stage level switch and flat connector

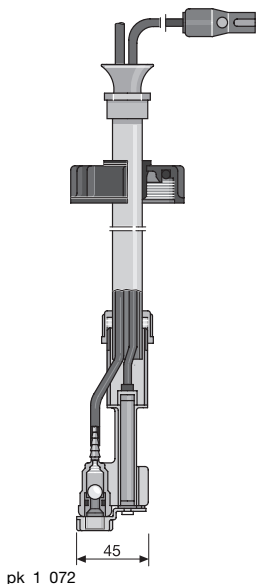
680 mm for connection to 5-60 litre one way tank, consists of PP foot valve, support pipe and float switch with flat connector, height adjustable Ø 50 screw cap and 2 m PE suction hose. For D_4a dosing pump ranges.

Switching mode: 1 x N/O for low liquid levels

PPE

Material, retaining tube and foot valve PP
 Seal material EPDM
 Hose Material PE

Material	Hose o Ø x i Ø mm		fig.	Order no.
PP	6 x 4	PP for Ø 50 tank opening, suction hose	pk_1_072	790378
PP	8 x 5	PP for Ø 50 tank opening, suction hose	pk_1_072	790379
PP	12 x 9	PP for Ø 50 tank opening, suction hose	pk_1_072	790380



PCB

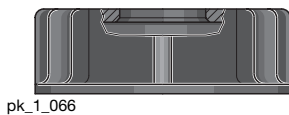
Material, retaining tube and foot valve PVC
 Seal material FPM
 Hose Material soft PVC

Material	Hose o Ø x i Ø mm		fig.	Order no.
PVC	6 x 4	PVC for Ø 50 tank opening, suction hose	pk_1_072	790375
PVC	8 x 5	PVC for Ø 50 tank opening, suction hose	pk_1_072	790376
PVC	12 x 9	PVC for Ø 50 tank opening, suction hose	pk_1_072	790377

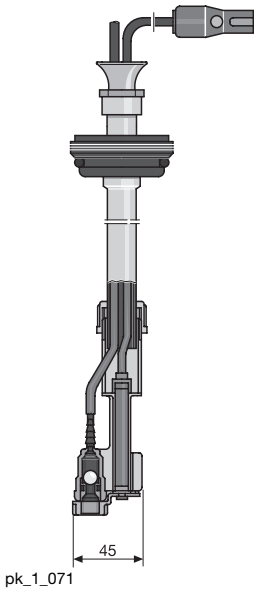
Screw cap

For tanks with opening Ø 44, customers need to order the Ø 44 screw cap as a spare part to replace Ø 50 screw cap.

	Order no.
Ø 44 screw cap	811626



1.8 Mechanical-Hydraulic Accessories



PP Adjustable suction lance for 200 litre drum with single stage float switch

1000 mm for connection to 200 litre one way tank, consists of PP foot valve, support pipe and float switch with flat connector, height adjustable screw cap and 3 m PE suction hose. For D_4a dosing pump ranges.

Switching mode: 1 x N/C for low liquid levels

PPE

Material, retaining tube and foot valve PP
 Seal material EPDM
 Hose Material PE

Material	Hose o Ø x i Ø mm		fig.	Order no.
PP	6 x 4	PP for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790384
PP	8 x 5	PP for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790385
PP	12 x 9	PP for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790386

PCB

Material, retaining tube and foot valve PVC
 Seal material FPM
 Hose Material soft PVC

Material	Hose o Ø x i Ø mm		fig.	Order no.
PVC	6 x 4	PVC for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790381
PVC	8 x 5	PVC for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790382
PVC	12 x 9	PVC for tank opening 2" DIN S 70 x 6, suction hose	pk_1_071	790383

Suction lance for 60 litre canister, fixed length, gas-tight, with one-stage level switch

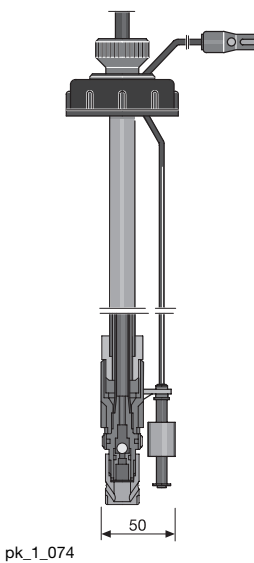
560 mm for connection to 60 litre tank with tank height 600 mm and Ø 55 tank opening. Designed with deaerating/aerating valve. Consisting of foot valve and retaining tube, level switch with flat connector, 2 m intake hose. For D_4a dosing pump ranges.

Switching mode: 1 x N/O for low liquid levels

PPE

Material, retaining tube and foot valve PP
 Seal material EPDM
 Hose Material PE

Material	Hose o Ø x i Ø mm		fig.	Order no.
PP	6 x 4	PP for Ø 55 with suction hose	pk_1_074	801954
PP	8 x 5	PP for Ø 55 with suction hose	pk_1_074	801955
PP	12 x 9	PP for Ø 55 with suction hose	pk_1_074	801956



1.8 Mechanical-Hydraulic Accessories

PCB

Material, retaining tube and foot valve PVC
Seal material FPM
Hose Material soft PVC

Material	Hose o \times i \varnothing mm		fig.	Order no.
PVC	6 x 4	PVC for \varnothing 55 with suction hose	pk_1_074	801853*
PVC	8 x 5	PVC for \varnothing 55 with suction hose	pk_1_074	801854*
PVC	12 x 9	PVC for \varnothing 55 with suction hose	pk_1_074	801855*

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

Variable suction kit with one-stage level switch and flat connector

Consisting of foot valve, retaining tube and screw connection, one-stage level switch with flat connector, intake hose. For D_4a dosing pump ranges.

Switching mode: 1 x N/O for low liquid levels

Adjustable length

Size I	385 - 550 mm	for tank	35 to	60 litre
Size II	660 - 1040 mm	for tank	100 to	500 litre
Size III	1200 - 1350 mm	for tank		1000 litre

PPE

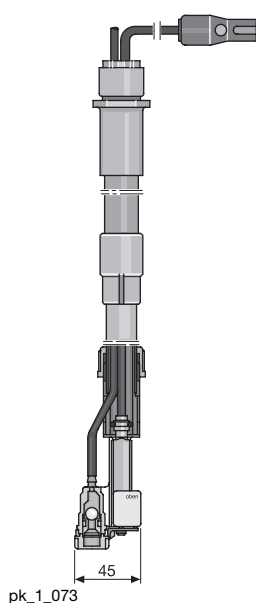
Material, retaining tube and foot valve PP
Seal material EPDM
Hose Material PE

Material	Hose o \times i \varnothing mm	For container	fig.	Order no.
PP I	6 x 4	35, 60 l	pk_1_073	790353
PP I	8 x 5	35, 60 l	pk_1_073	790354
PP I	12 x 9	35, 60 l	pk_1_073	790355
PP II	6 x 4	100, 140, 250, 500 l	pk_1_073	790356
PP II	8 x 5	100, 140, 250, 500 l	pk_1_073	790357
PP II	12 x 9	100, 140, 250, 500 l	pk_1_073	790358
PP III	6 x 4	1000 l	pk_1_073	790459
PP III	8 x 5	1000 l	pk_1_073	790460
PP III	12 x 9	1000 l	pk_1_073	790461

PCB

Material, retaining tube and foot valve PVC
Seal material FPM
Hose Material soft PVC

Material	Hose o \times i \varnothing mm	For container	fig.	Order no.
PVC I	6 x 4	35, 60 l	pk_1_073	790347
PVC I	8 x 5	35, 60 l	pk_1_073	790348
PVC I	12 x 9	35, 60 l	pk_1_073	790349
PVC II	6 x 4	100, 140, 250, 500 l	pk_1_073	790350
PVC II	8 x 5	100, 140, 250, 500 l	pk_1_073	790351
PVC II	12 x 9	100, 140, 250, 500 l	pk_1_073	790352
PVC III	6 x 4	1000 l	pk_1_073	790456
PVC III	8 x 5	1000 l	pk_1_073	790457
PVC III	12 x 9	1000 l	pk_1_073	790458



1.8 Mechanical-Hydraulic Accessories

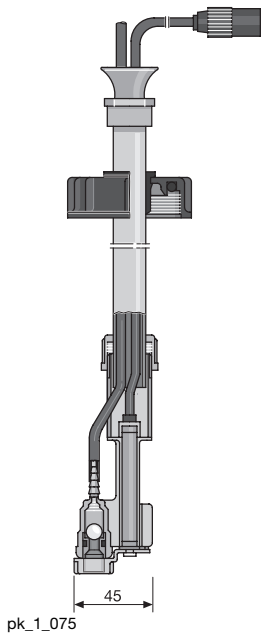
1.8.11 Suction Lances, Suction Assembly With Two Stage Float Switch

Variable suction lance with two-stage level switch

680 mm long for connection to disposable container of 5 - 60 litres, consisting of foot valve, level switch with round plug and retaining tube, vertically adjustable screw cap and 2 m intake hose.

For Beta® and gamma metering pump ranges.

Switching mode: 2 x N/C for low liquid levels



PPE

Material, retaining tube and foot valve PP
 Seal material EPDM
 Hose Material PE

Material	Hose o Ø x i Ø mm		fig.	Order no.
PP	6 x 4	PP for Ø 50 tank opening, suction hose	pk_1_075	802277
PP	8 x 5	PP for Ø 50 tank opening, suction hose	pk_1_075	802278
PP	12 x 9	PP for Ø 50 tank opening, suction hose	pk_1_075	790372

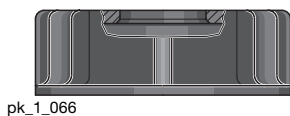
PCB

Material, retaining tube and foot valve PVC
 Seal material FPM
 Hose Material soft PVC

Material	Hose o Ø x i Ø mm		fig.	Order no.
PVC	6 x 4	PVC for Ø 50 tank opening, suction hose	pk_1_075	802077
PVC	8 x 5	PVC for Ø 50 tank opening, suction hose	pk_1_075	802078
PVC	12 x 9	PVC for Ø 50 tank opening, suction hose	pk_1_075	790371

Screw cap

For tanks with opening Ø 44, customers need to order the Ø 44 screw cap as a spare part to replace Ø 50 screw cap.



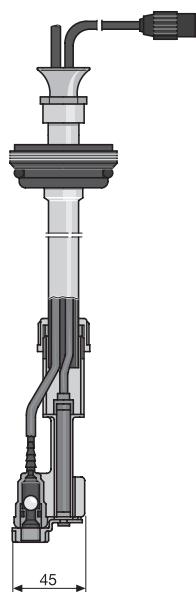
	Order no.
Ø 44 screw cap	811626

1.8 Mechanical-Hydraulic Accessories

Variable suction lance for 200 litre drum with two-stage level switch

1000 mm long for connection to 200 litre drum, with foot valve, level switch with round plug and retaining tube, vertically adjustable screw plug and 3 m intake hose. For Beta® and gamma metering pump ranges.

Switching mode: 2 x N/C for low liquid levels



pk_1_076

PPE

Material, retaining tube and foot valve PP
Seal material EPDM
Hose Material PE

Material	Hose o Ø x i Ø mm	fig.	Order no.
PP	6 x 4	PP for tank opening 2" DIN S 70 x 6, pk_1_076	802279
PP	8 x 5	PP for tank opening 2" DIN S 70 x 6, pk_1_076	802280
PP	12 x 9	PP for tank opening 2" DIN S 70 x 6, pk_1_076	790374

PCB

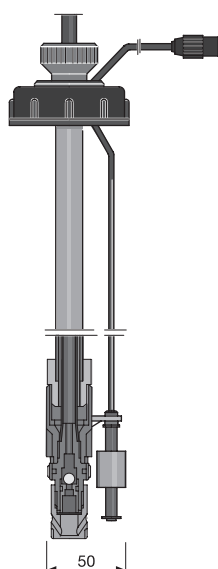
Material, retaining tube and foot valve PVC
Seal material FPM
Hose Material soft PVC

Material	Hose o Ø x i Ø mm	fig.	Order no.
PVC	6 x 4	PVC for tank opening 2" DIN S 70 x 6, pk_1_076	802079
PVC	8 x 5	PVC for tank opening 2" DIN S 70 x 6, pk_1_076	802080
PVC	12 x 9	PVC for tank opening 2" DIN S 70 x 6, pk_1_076	790373

Suction lance for 60 litre canister, fixed length, gas-tight, with two-stage level switch

560 mm long for connection to 60 litre canister, height 600 mm and 55 mm Ø opening. With breather valve. Consisting of foot valve and retaining tube, level switch with round plug and 2 m intake hose. For Beta® and gamma metering pump ranges.

Switching mode: 2 x N/C for low liquid levels



pk_1_078

PPE

Material, retaining tube and foot valve PP
Seal material EPDM
Hose Material PE

Material	Hose o Ø x i Ø mm	fig.	Order no.
PP	6 x 4	PP for Ø 55 with suction hose	pk_1_078 802285
PP	8 x 5	PP for Ø 55 with suction hose	pk_1_078 802286
PP	12 x 9	PP for Ø 55 with suction hose	pk_1_078 802287

1.8 Mechanical-Hydraulic Accessories

PCB

Material, retaining tube and foot valve	PVC
Seal material	FPM
Hose Material	soft PVC

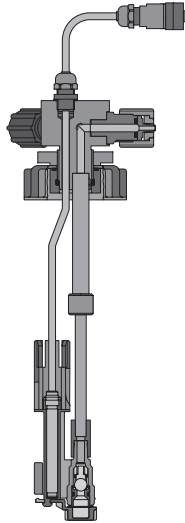
Material	Hose o Ø x i Ø mm		fig.	Order no.
PVC	6 x 4	PVC for Ø 55 with suction hose	pk_1_078	802081*
PVC	8 x 5	PVC for Ø 55 with suction hose	pk_1_078	802082*
PVC	12 x 9	PVC for Ø 55 with suction hose	pk_1_078	802083*

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

Variable suction lance, gas-tight, with two-phase level switch and round plug

length-adjustable approx. 520-720 mm, for 60 litres can with container opening Ø 55 mm. Type with connection for aeration and breathing port. Consisting of foot valve with retaining pipe and two-phase level switch with round plug. For suction hose 6 x 4 mm and 8 x 5 mm.

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.



P_AC_0213_SW

Material		Order no.
PCB	for tank opening 55 mm	1030891

PP Adjustable suction assembly with two stage float switch and round plug

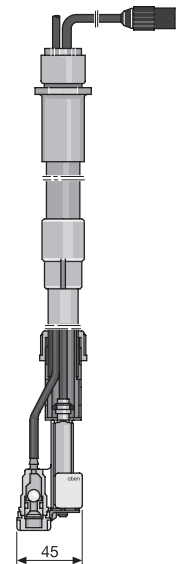
For ProMinent® gamma/ 4a, gamma/ 5a consisting of foot valve, retaining tube and screw connection, two-stage level switch with 3-pin round plug, intake line.

For Beta® and gamma metering pump ranges.

Switching mode: 2 x N/C for low liquid levels

Adjustable Length

Size I	385 - 550 mm	for tank	35 to	60 litre
Size II	660 - 1040 mm	for tank	100 to	500 litre
Size III	1200 - 1350 mm	for tank		1000 litre



pk_1_077

1.8 Mechanical-Hydraulic Accessories

PPE

Material, retaining tube and foot valve	PP
Seal material	EPDM
Hose Material	PE

Material	Hose o \varnothing x i \varnothing mm	For container	fig.	Order no.
PP I	6 x 4	35, 60 l	pk_1_077	790365
PP I	8 x 5	35, 60 l	pk_1_077	790366
PP I	12 x 9	35, 60 l	pk_1_077	790367
PP II	6 x 4	100, 140, 250, 500 l	pk_1_077	790368
PP II	8 x 5	100, 140, 250, 500 l	pk_1_077	790369
PP II	12 x 9	100, 140, 250, 500 l	pk_1_077	790370
PP III	6 x 4	1000 l	pk_1_077	790465
PP III	8 x 5	1000 l	pk_1_077	790466
PP III	12 x 9	1000 l	pk_1_077	790467

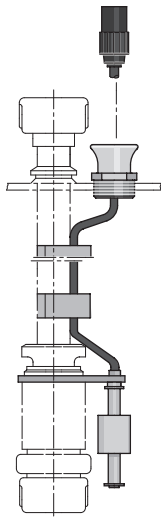
PCB

Material, retaining tube and foot valve	PVC
Seal material	FPM
Hose Material	soft PVC

Material	Hose o \varnothing x i \varnothing mm	For container	fig.	Order no.
PVC I	6 x 4	35, 60 l	pk_1_077	790359
PVC I	8 x 5	35, 60 l	pk_1_077	790360
PVC I	12 x 9	35, 60 l	pk_1_077	790361
PVC II	6 x 4	100, 140, 250, 500 l	pk_1_077	790362
PVC II	8 x 5	100, 140, 250, 500 l	pk_1_077	790363
PVC II	12 x 9	100, 140, 250, 500 l	pk_1_077	790364
PVC III	6 x 4	1000 l	pk_1_077	790462
PVC III	8 x 5	1000 l	pk_1_077	790463
PVC III	12 x 9	1000 l	pk_1_077	790464

1.8 Mechanical-Hydraulic Accessories

1.8.12 Float Switches



pk_1_079

Level switch kit compl. PVDF two-phase with round plug

The level switch kit can be ordered together with the suction fittings DN 10/DN 15. Connection is made by the customer. For metering pump series Beta®, gamma and gamma/ L.

Switching mode: for level shortage 2 x NC
 Materials: level switch PVFD
 Float PE expanded
 Cable 3 m, PE

Connection	Type	Order no.
DN 10/15	with 3P round plug	1034879

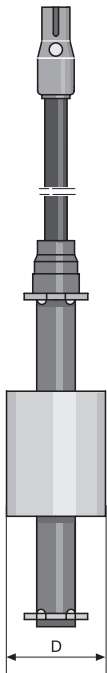
Single stage float switch

for minimum indication with simultaneous deactivation of the metering pump. With flat coupling for direct connection to ProMinent® metering pump D_4a.

Technical data:
 max. switching voltage 100 V,
 switching current 0.5 A,
 switching capacity 5 W/5 VA,
 temperature range -10°C to 65°C, IP rating IP 67.
 Switching mode: for level shortage 1 x NO.

Material:
 body PVDF, float PE expanded, cable PE.

	Lead length	Order no.
PVDF/PE with flat coupling	2 m	1031588
PVDF/PE with flat coupling	5 m	1031590



pk_1_080

Material:
 body PVDF, float PVDF, cable PE.

	Lead length	Order no.
PVDF with flat connector	2 m	1034695
PVDF with flat connector	5 m	1034696

1.8 Mechanical-Hydraulic Accessories

Two stage float switch

for level monitoring in the storage tank, two-phase with pre-alarm alarm signalling and deactivation of the metering pump after a further level decrease of 30 mm.

With 3P round plug for direct connection to Beta® and gamma.

With 3 litz wires, e.g. in connection with relay control, order no. 914768.

Technical data:

max. switching voltage 100V, switching current 0.5 A, switching capacity 5 W/5 VA, temperature range -10°C to 65°C, IP rating IP 67.

Switching mode: for level shortage 2 x NC.

Material:

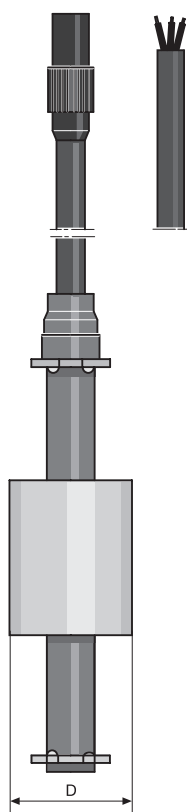
body PVDF, float PE expanded, cable PE.

	Lead length	Order no.
PVDF/PE with 3P round plug	2 m	1031604
PVDF/PE with 3P round plug	5 m	1031606
PVDF/PE with 3 litz wires	2 m	1031607
PVDF/PE with 3 litz wires	5 m	1031609

Material:

body PVDF, float PVDF, cable PE.

	Lead length	Order no.
PVDF with 3-pin round plug	2 m	1034697
PVDF with 3-pin round plug	5 m	1034698
PVDF with 3 leads	2 m	1034699
PVDF with 3 leads	5 m	1034700



pk_1_081

Connecting Straps

Connecting straps for upper float switch with foot valve 6, 8 and 12 mm.

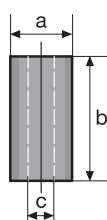
	Order no.
PP	800692
PVC	800573

Ceramic weight for vertical fixing of float switch

	Ø A	B	Ø C	Weight	Type	Order no.
	mm	mm	mm	g		
Size 1	25	50	10	60	For round and latch plug	1019244
Size 2	39	32	*	65	For round plug/flat connector	404004
Size 3	40	50	24	70	For round plug/flat connector	1030189

* Slot 13 x 27 mm

With the two stage float switch with round plug, the weight is pushed up when float is attached.



pk_1_082

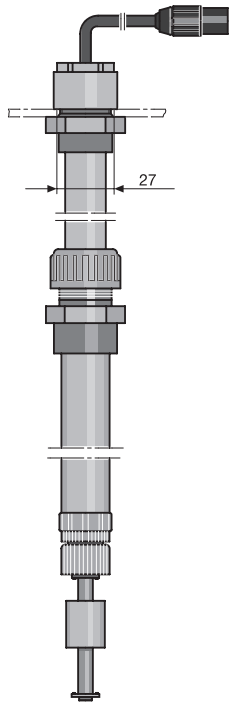
1.8 Mechanical-Hydraulic Accessories

Level switch PVDF/PE with retaining pipe hard PVC

For use in chemicals which would attack the float switch PE cable and/or for stable mounting in conjunction with electronic stirrers, FPM seal.

Adjustable Length

Size I 350 - 550 mm for 35 and 60 litre tank
 Size II 660 - 1160 mm for 100 to 1000 litre tank



pk_1_084

Size	Float switch	Order no.
Size I	- two-stage with round plug	802010
Size II	- two-stage with round plug	802011
Size I	- one-stage with flat connector	801727
Size II	- one-stage with flat connector	801728

Switching mode:

2-stage: 2 x N/C for low liquid levels

1-stage: 1 x N/O for low liquid levels



pk_1_126

Extension lead, 3-core

	fig.	Order no.
For 2-stage float switch with round plug and coupler, length, 3 m	pk_1_126	1005559

1.8 Mechanical-Hydraulic Accessories

1.8.13 Dosing Monitor, Control Cable

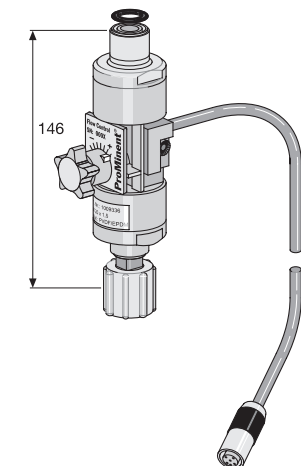
Flow Control adjustable flow monitor

Suitable for gamma/ L series in material versions PP, PC, NP and TT. Supplied with connection cable for assembly directly to liquid end.

Monitors individual strokes according to the float and orifice principle. The partial quantity of chemical flowing past the float is adapted to the preset stroke volume via the adjusting screw so that an alarm is actuated if the flow falls below 20 %. The user can select the number of incomplete strokes permitted (between 1 and 127) in accordance with the actual process requirements.

Materials

Housing: PVDF
 Float: PTFE-coated
 Seals: FPM/EPDM



pk_1_086_2

Flow Control	For pump type	Material	Order no.
Size I	1601, 1602	PVDF/EPDM	1009229
	1601, 1602	PVDF/FPM	1009335
Size II	1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420, 0232	PVDF/EPDM	1009336
	1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420, 0232	PVDF/FPM	1009338

Pay attention to the minimum values for the stroke length.

Pump type	Medium operating pressure	Stroke length (scale division)	Max. permissible operating pressure	Stroke length (scale division)
1601	8 bar	> 30 %	16 bar	> 40 %
1602	8 bar	> 30 %	16 bar	> 40 %
1005	5 bar	> 30 %	10 bar	> 50 %
0708	4 bar	> 30 %	7 bar	> 40 %
1605	8 bar	> 30 %	16 bar	> 50 %
1008	5 bar	> 30 %	10 bar	> 40 %
0413	2 bar	> 30 %	4 bar	> 30 %
0713	4 bar	> 30 %	7 bar	> 30 %
0220	1 bar	> 30 %	2 bar	> 30 %
0420	2 bar	> 30 %	4 bar	> 30 %
0232	1 bar	> 30 %	2 bar	> 30 %

Universal control cable

For control of metering pump via contact - external pacing, standard signal - analogue control and for voltage free ON/OFF - switch function.

For Beta®, gamma, mikro g/ 5 and Vario with 5-pin plastic round plug and 5-core open ended cable.



pk_1_085

	Lead length	Order no.
5 core universal cable, 5 pin round plug	2 m	1001300
5 core universal cable, 5 pin round plug	5 m	1001301
5 core universal cable, 5 pin round plug	10 m	1001302

1.8 Mechanical-Hydraulic Accessories

External control cable

For external control of Beta®, gamma, mikro g/ 5 and Vario via contacts only. With 5 pin round plug, internally bridged, and 2-core lead with open end.

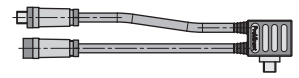
	Lead length	Order no.
2 core external cable, 5 pin round plug	2 m	707702
2 core external cable, 5 pin round plug	5 m	707703
2 core external cable, 5 pin round plug	10 m	707707



pk_1_055



pk_1_009

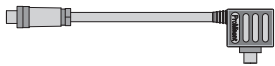


P_AC_0208_SW

PROFIBUS® adapter, enclosure rating IP 65

from eurofast 5-pin. M12 x 1 to 9-pin. Sub D-plug, length approx. 300 mm.

		fig.	Order no.
Y-adapter 2 x M12 x 1 male/ female 9-pin, sub D plug	9-pin, sub D plug	pk_1_055	1005838
Adapter 1 x M12 x 1 male 9-pin, sub D plug	9-pin, sub D plug	pk_1_009	1005839
Y-adapter 2 x M12 x 1 male/ female 9-pin, sub D plug	M12 x 1 male	P_AC_0208_SW	1024216
Adapter 1 x M12 x 1 male 9-pin, sub D plug	M12 x 1 male	P_AC_0209_SW	1024219



USB adaptor

To connect a laptop to dosing pumps in the gamma and Sigma series.

The USB adaptor can be used to transfer timer programmes created using ProTime software to the pump. You will find the ProTime software on our home page.

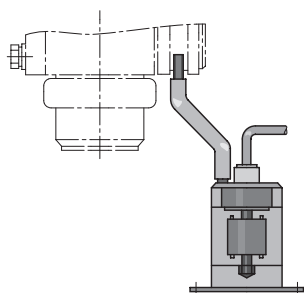
	Order no.
USB adaptor	1021544

P_AC_0209_SW

1.8 Mechanical-Hydraulic Accessories

1.8.14 Safety Plant

Diaphragm failure detector



pk_1_087

Trips alarm and switches off metering pump when diaphragm is ruptured. Consists of PVC/PE float switch, Acrylic housing, connector nozzles and connecting hose. Voltage free making contact, max. contact current 60 V AC, 300 mA, 18 W.

Fits all types, from Beta® and gamma.

Retrofitting possible

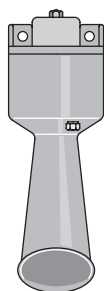
	Order no.
Diaphragm failure detector	803640

For evaluation of alarm contact from float switch we recommend the wall mounted relay controller in plastic housing with 2 change over relays, order number 914768.

Siren

HUW 55, 230 V, 50-60 Hz, 165 x 60 x 65, 85 phon, indoor

(e.g. in connection with fault signalling relay or relay control)



pk_1_088

	Order no.
Horn HUW 55	705002

Indicator lamp

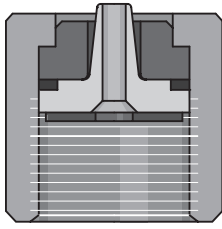
Red for wall mounting 230 V, 50-60 Hz (e.g. in connection with fault signalling relay, relay control or clock generator relay)

	Order no.
Indicator lamp, red	914780

1.8 Mechanical-Hydraulic Accessories

1.8.15

Connection Kits



pk_1_089

Connector set for attachment of variously sized hoses to suction and discharge connectors on alpha, Beta®, gamma, mikro g/ 5, CONCEPT, Pneumados, D4_a liquid ends and accessories. Consist of hose sleeves, clamping rings, union nuts and seals for one/two connectors.

Single Connector Set

Material		oØ x iØ mm	Order no.
PP/EPDM (PPE)	for hose	6 x 4	817160
PP/EPDM (PPE)	for hose	8 x 5	817161
PP/EPDM (PPE)	for hose	12 x 9	817162
PP/EPDM (PPE)	for hose	10 x 4	1002587
PP/EPDM (PPE)	for hose	12 x 6	817163
PP/FPM (PPB)	for hose	6 x 4	817173
PP/FPM (PPB)	for hose	8 x 5	817174
PP/FPM (PPB)	for hose	12 x 9	817175
PP/FPM (PPB)	for hose	10 x 4	1002588
PP/FPM (PPB)	for hose	12 x 6	817176
PVC/EPDM (PCE)	for hose	6 x 4	791161
PVC/EPDM (PCE)	for hose	8 x 5	792058
PVC/EPDM (PCE)	for hose	12 x 9	790577
PVC/EPDM (PCE)	for hose	10 x 4	1002590
PVC/EPDM (PCE)	for hose	12 x 6	792062
PVC/FPM (PCB)	for hose	6 x 4	817065
PVC/FPM (PCB)	for hose	8 x 5	817066
PVC/FPM (PCB)	for hose	12 x 9	817067
PVC/FPM (PCB)	for hose	10 x 4	1002589
PVC/FPM (PCB)	for hose	12 x 6	817068
PVDF (PVT)	for hose	6 x 3	1024583
PVDF (PVT)	for hose	6 x 4	1024619
PVDF (PVT)	for hose	8 x 4	1033148
PVDF (PVT)	for hose	8 x 5	1024620
PVDF (PVT)	for hose	12 x 9	1024618
PVDF (PVT)	for hose	10 x 4	1024585
PTFE (TTT)	for hose	12 x 6	1024617
PTFE (TTT)	for hose	6 x 4	817205
PTFE (TTT)	for hose	8 x 5	817206
PTFE (TTT)	for hose	12 x 9	817207
PTFE (TTT)	for hose	12 x 6	817208

Double Connector Set

Material		oØ x iØ mm	Order no.
PP/EPDM (PPE)	for hose	6 x 4	817150
PP/EPDM (PPE)	for hose	8 x 5	817153
PP/EPDM (PPE)	for hose	12 x 9	817151
PP/EPDM (PPE)	for hose	12 x 6	817152
PP/FPM (PPB)	for hose	6 x 4	817166
PP/FPM (PPB)	for hose	8 x 5	817167
PP/FPM (PPB)	for hose	12 x 9	817168
PP/FPM (PPB)	for hose	12 x 6	817169
PVC/EPDM (PCE)	for hose	6 x 4	817060
PVC/EPDM (PCE)	for hose	8 x 5	817048
PVC/EPDM (PCE)	for hose	12 x 9	817049
PVC/EPDM (PCE)	for hose	12 x 6	791040
PVC/FPM (PCB)	for hose	6 x 4	817050
PVC/FPM (PCB)	for hose	8 x 5	817053

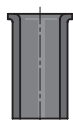
MaharFan

1.8 Mechanical-Hydraulic Accessories

Material		oØ x iØ mm	Order no.
PVC/FPM (PCB)	for hose	12 x 9	817051
PVC/FPM (PCB)	for hose	12 x 6	817052
PVDF (PVT)	for hose	6 x 4	1023246
PVDF (PVT)	for hose	8 x 5	1023247
PVDF (PVT)	for hose	12 x 9	1023248
PVDF (PVT)	for hose	12 x 6	1024586
PTFE (TTT)	for hose	6 x 4	817201
PTFE (TTT)	for hose	8 x 5	817204
PTFE (TTT)	for hose	12 x 9	817202
PTFE (TTT)	for hose	12 x 6	817203

Stainless steel support insert 1.4571

For connection of PE or PTFE pipe to stainless steel connectors using Swagelock and Serto systems.

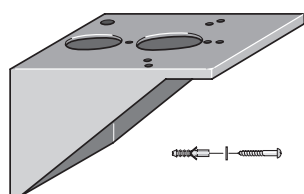


pk_1_090

	oØ x iØ mm	Order no.
for hose	6 x 4	359365
for hose	8 x 5	359366
for hose	12 x 9	359368
for hose	8 x 6	359362
for hose	12 x 10	359363

1.8.16

Wall Brackets for Metering Pumps



pk_1_092

PPE Wall Mounting Bracket

With fixtures, to hold one metering pump, size Beta®/ 4, Beta®/ 5, gamma/ L, G/ 4, G/ 5, D_4a, EXtronic® and alpha.

The Beta®/ 4, gamma/ L, and G/ 4 can be mounted either parallel to the wall or at an angle.

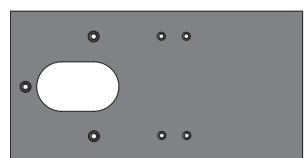
Dimensions L x W x H: 208 x 120 x 140 mm

Material Glass fibre reinforced plastic PPE

	fig.	Order no.
Sizes BT4, BT5, gamma/ L, G/ 4, G/ 5, CON-CEPT, D_4a (fig.)	pk_1_092	810164

Adapter plate PP

With fixtures, for vertical wall-mounting of Beta® or gamma pumps with self-degassing liquid ends. Used with PPE wall bracket.



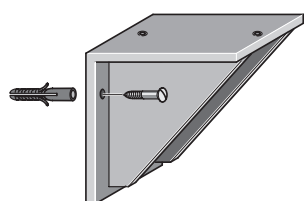
pk_1_121

	fig.	Order no.
For BT4, BT5, gamma /L	pk_1_121	1003030

Wall bracket PP

PP wall mounting, holds pump parallel to the wall, includes fixings.

Dimensions L x W x H: 230 x 220 x 220 mm



pk_2_036

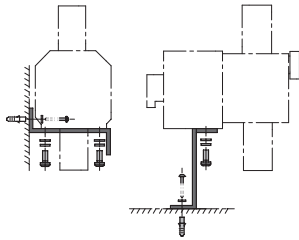
	fig.	Order no.
for delta®	pk_2_036	1001906

1.8 Mechanical-Hydraulic Accessories

Aluminium Wall Mounting Bracket

Plastic coated. For parallel pump mounting.

size G/ 5, EXtronic®	Order no.
	810163



pk_1_095

Wall/Floor bracket for Pneumados

To take Pneumados metering pump. Floor or wall mounted, made in coated aluminium. Includes fittings.

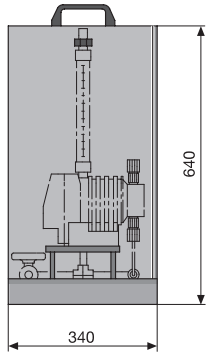
fig.	Order no.
pk_1_095	790605

Dimensions: L x W x H 92 x 80 x 30

Portable plastic pump stand

To take metering pumps size: G/ 4, G/ 5 or D_4a. The pump stand is available in either PP or black PE. It will take a fixed pipe and is fitted with a bund for feed chemicals which may leak as a result of damage to the suction line, or a rupture of the diaphragm.

Supplied with carrying handle. Does not include pump or pipework.

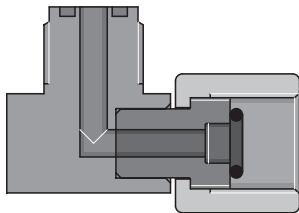


pk_1_093

	fig.	Order no.
Light grey PP	pk_1_093	1000180
Black PE	pk_1_093	1000181

Right-angled PVC threaded connector

For mounting multi-function valve onto Beta® or gamma/ L models, self-degassing liquid end version.



pk_1_083

	Material	fig.	Order no.
PCE Version	PVC/EPDM*	pk_1_083	1003472
PCB Version	PVC/FPM*	pk_1_083	1003318

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

1.8 Mechanical-Hydraulic Accessories

1.8.17 Contact Water Meters For Use In Potable Water, And Accessories

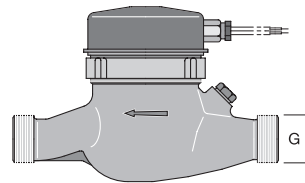
DIN Version contact water meter

PN 10 bar, indicating, type series MNR-K, operating temp. 40 °C,

contact load max. 100 mA, 24 V, NG - nominal size.

Q_{max} = maximum load, Q_d = permanent load

Q_n = nominal load (1/2 Q_d according to calibration regulations)



pk_1_096

$Q_{max} / Q_d / Q_n$	Threaded Connector Width	Connector Thread	Length without Thread	Pulse Interval	Order no.
NG - m ³ /h	R DN/mm	G	mm	I	
5/5/2.5	3/4 - DN 20	1	190	0.05	304467
5/5/2.5	3/4 - DN 20	1	190	0.10	304432
5/5/2.5	3/4 - DN 20	1	190	0.25	304455
5/5/2.5	3/4 - DN 20	1	190	0.30	304428
5/5/2.5	3/4 - DN 20	1	190	0.50	304431
5/5/2.5	3/4 - DN 20	1	190	1.00*	304434
5/5/2.5	3/4 - DN 20	1	190	1.50*	304433
5/5/2.5	3/4 - DN 20	1	190	2.50	304458
5/5/2.5	3/4 - DN 20	1	190	10.00	304453
5/5/2.5	3/4 - DN 20	1	190	100.00	304444
12/12/6	1 - DN 25	1 1/4	260	0.25	1004550
12/12/6	1 - DN 25	1 1/4	260	0.50	1004548
12/12/6	1 - DN 25	1 1/4	260	1.00*	1004544
12/12/6	1 - DN 25	1 1/4	260	1.50*	1004549
12/12/6	1 - DN 25	1 1/4	260	2.00*	1004546
12/12/6	1 - DN 25	1 1/4	260	10.00*	1004547
12/12/6	1 - DN 25	1 1/4	260	100.00	1004545
20/20/10	1 1/2 - DN 40	2	300	2.00*	1004551
20/20/10	1 1/2 - DN 40	2	300	3.00	1004552
20/20/10	1 1/2 - DN 40	2	300	4.00	1004553
20/20/10	1 1/2 - DN 40	2	300	10.00	1004554
20/20/10	1 1/2 - DN 40	2	300	100.00	1004555
30/30/15	2 - DN 50	2 1/2	270	3.00	1020551
30/30/15	2 - DN 50	2 1/2	270	4.00*	1020552
30/30/15	DN 50	Flange	270	6.00*	1020553
30/30/15	2 - DN 50	2 1/2	270	10.00	1020550
30/30/15	DN 50	Flange	270	100.00	304450

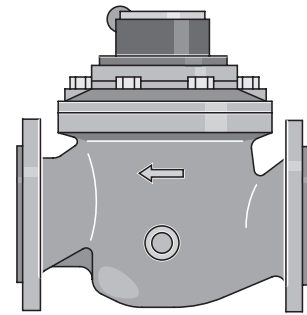
*Standard storage tank

1.8 Mechanical-Hydraulic Accessories

DIN Version contact water meter

PN 10 bar, indicating, type range WS-K, operating temp. 40 °C, contact load max. 100 mA, 24 V, DIN 2501 flange, PN 16.

Maximum load Q_{max} /permanent load Q_d /nominal load Q_n



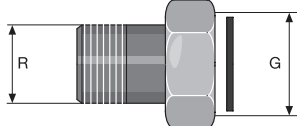
pk_1_097

$Q_{max} / Q_d / Q_n$	Connector width DN/mm	Length mm	Pulse Interval l	Order no.
110/55/40	DN 80	300	10.00*	1004560
110/55/40	DN 80	300	25.00	1004558
110/55/40	DN 80	300	100.00	1004559
180/90/60	DN 100	360	10.00	1004567
180/90/60	DN 100	360	25.00*	1004556
180/90/60	DN 100	360	50.00	1004557
350/200/150	DN 150	500	50.00*	1004568

*Standard storage tank

Union assembly set with seal

For threaded water meter, brass.

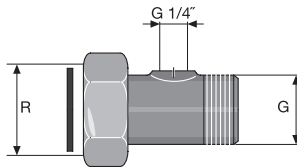


pk_1_098

		Order no.
R 3/4	G 1	359029
R 1	G 1 1/4	801322
R 1 1/4	G 1 1/2 - (turboDOS®)	359034
R 1 1/2	G 2	359037
R 2	G 2 1/2	359039

Union assembly set with seal

For threaded water meter with G 1/4 connector for discharge valve, brass.



pk_1_099

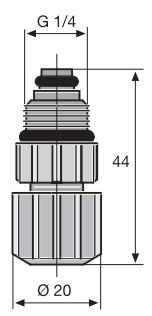
		Order no.
R 3/4	G 1 - 1/4	359030
R 1	G 1 1/4 - 1/4	359032
R 1 1/2	G 2 - 1/4	359038
R 2	G 2 1/2 - 1/4	801321

1.8 Mechanical-Hydraulic Accessories

O-ring loaded injection valve

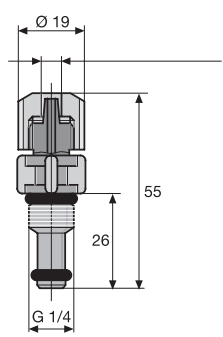
For use with threaded water meter union.

Fig. pk_1_099 for threaded connector as R 1 - DN 25



Connector		Material	oØ x iØ mm	fig.	Order no.
6/4 - G 1/4	Short for hose	PP/FPM	6 x 4	pk_1_043	914754
6/4 - G 1/4	Long for hose	PP/FPM	6 x 4	pk_1_044	741193
6/4 - G 1/4	Short for hose	PVC/FPM	6 x 4	pk_1_043	914558
6/4 - G 1/4	Long for hose	PVC/FPM	6 x 4	pk_1_044	915091

pk_1_043



pk_1_044

1.9 Mechanical/Hydraulic Special Accessories

1.9.1 Spare Parts Kits

Spare parts kits for ProMinent® metering pumps which have been modified or that are no longer available.

Type E, D and C by April 1990
 Type B by end of 1990

Spare parts kits gamma/ 4 and gamma/ 5

Supplied for PP and NP versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 1 seal set
- 1 connector set

Supplied for NS3 and PS3 versions:

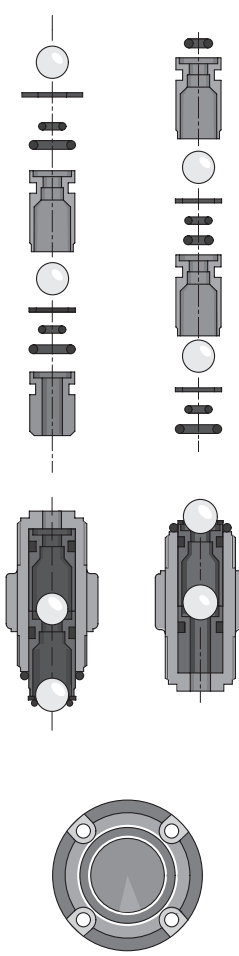
- 1 pump diaphragm
- 1 suction valve compl.
- 1 connector parts set
- 1 discharge valve compl.
- 1 bleed valve set
- 1 connector set

Supplied for TT-PTFE versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 2 ball seat discs
- 1 seal set
- 1 connector set

Supplied for SS stainless steel versions:

- 1 pump diaphragm
- 4 valve balls
- 4 ball seat discs
- 1 seal set
- 1 connector set



pk_1_008

Spare parts kits gamma/ 4

Pump type	Material	Order no. version a	Order no. version b
gamma/ 4 1000, 1001	NP1	910715	
	PP1	910716	
	TT	910776	910776
	SS/SK	910777	910777
	PP3		740356
	NP2		740355
	NP3		740354
gamma/ 4 1601, 1602	PP1		740357
	NP1	910719	
	PP1	910720	
	NS3/PS3	792033	792033
	TT	910778	910778



1.9 Mechanical/Hydraulic Special Accessories

Pump type	Material	Order no. version a	Order no. version b
	SS/SK	910779	910779
	PP3		740360
	NP2		740359
	NP3		740358
	PP1		740361
gamma/ 4 1201, 1203	NP1	910723	
	PP1	910724	
	NS3/PS3	792034	792034
	TT	910780	910780
	SS/SK	910781	910781
	PP3		740364
	NP2		740363
	NP3		740362
	PP1		740380
gamma/ 4 0803, 0806	NP1	910727	
	PP1	910728	
	NS3/PS3	792035	792035
	TT	910782	910782
	SS	910783	910783
	PP3		740383
	NP2		740382
	NP3		740381
	PP1		740384
gamma/ 4 1002, 1003	NP1	910731	
	PP1	910732	
	NS3/PS3	792036	792036
	TT	910784	910784
	SS	910785	910785
	HV/PP 4 (Type 1002)	910743	910743
	PP3		740387
	NP2		740386
	NP3		740385
	PP1		740388
gamma/ 4 0308, 0313	NP1	910735	
	PP1	910736	
	TT	910786	910786
	SS	910787	910787
	PP2		740480
	NP2		740391
	PP1		740497
	NP1		740498
	PP1	910955	
	NP1	910953	
gamma/ 4 0215, 0223	TT	910788	910788
	SS	910789	910789
	PP1	910740	
	NP1	910739	
	PP2		740481
	NP2		740392
	PP1		740499
	NP1		740500

Spare parts kits gamma/ 5

Pump type	Material	Order no. version a	Order no. version b
gamma/ 5 1602	SS	910947	910947
	NP1	910945	
	NP2		740386
	NP3		740385

MaharFan

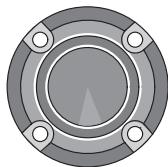
1.9 Mechanical/Hydraulic Special Accessories

Pump type	Material	Order no. version a	Order no. version b
gamma/ 5 1605	SS	910951	910951
	NP1	910949	
	NP2		740391
	NP1		740498
	NP1	910953	
gamma/ 5 1006	HV/PP4 (Type 1006)	910939	910939
	SS	910959	910959
	TT	910957	910957
	PP1	910955	
	NP1	910953	
	PP2		740480
	NP2		740391
	PP1		740497
	NP1		740498
gamma/ 5 1310	SS	910963	910963
	HV/PP4 (Type 1310)	910941	910941
	NP1	910961	
	NP2		740397
	NP1		740505
gamma/ 5 0613	PP2		740506
	SS	910971	910971
	TT	910969	910969
	PP1	910967	
	NP1	910965	
	NP2		740397
	PP1	910967	740504
gamma/ 5 0813	NP1		740505
	TT	910977	910977
	SS	910979	910979
	HV/PP4	910943	910943
	PP1	910975	
	NP1	910973	
	PP2		740503
	NP2		740393
	PP1		740501
gamma/ 5 0417	NP1		740502
	TT	910985	910985
	SS	910987	910987
	PP1	910983	
	NP1	910981	
	PP2		740503
	NP2		740393
gamma/ 5 0423-DN 10	PP1		740501
	NP1		740502
	TT	910993	910993
	SS	910995	910995
	PP1	910991	
Spare parts kits gamma/ 5	NP1	910989	
	PP2		740509
	NP2		740398
	PP1		740507
	NP1		740508
	NP1		740508
Spare parts kits gamma/ 5	TT	910931	910931
	SS	910933	910933
	NP1	910935	
	PP1	910937	
	PP2		740509
	NP2		740398
	NP1		740508
PP1		740507	

1.9 Mechanical/Hydraulic Special Accessories

PTFE Pump diaphragms

ProMinent® DEVELOPAN® pump diaphragms in EPDM with woven inner layer, integrally vulcanised steel core and PTFE Teflon coating on the side in contact with the dosing chemical.



pk_1_008

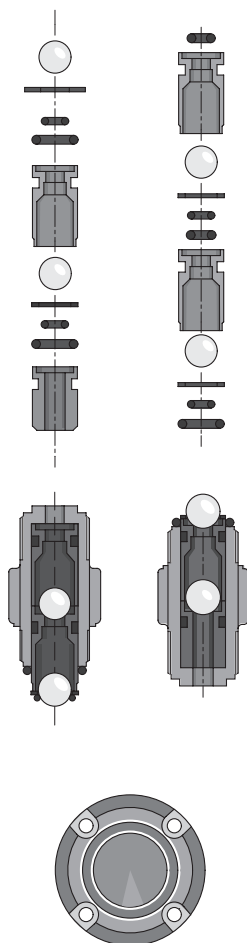
Pump type	Order no.
9.20, gamma/ 4 1000,1001	811453
9.21, gamma/ 4 1601,1602	811453
9.22, gamma/ 4 1201,1203	811454
9.23, gamma/ 4 0703, 0706	811455
9.33, gamma/ 4 1002, 1003	811456
9.44, gamma/ 4 0308, 0313, gamma/ 5 1605, gamma/ 5 1006	1002511
9.46, gamma/ 5 0215, 0223, gamma/ 5 1310, gamma/ 5 0613	811458
9.55, gamma/ 5 0813, gamma/ 5 0417	811459
9.66, gamma/ 5 0423, gamma/ 5 0230	811460

Spare parts kits CONCEPT

Kits for PP and NP material versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 1 seal set
- 1 connector set

CONCEPT spare parts kits are identical to gamma/ 4.

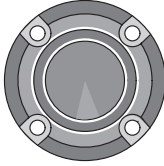


pk_1_008

Pump type	Material	Order no. version a	Order no. version b
Type 1601	PP1		740361
	NP6		740551
	NS3/PS3	792033	792033
	PP1	910720	
	NP1	910719	
Type 1201	PP1		740361
	NP6		740551
	NS3/PS3	792034	792034
	NP1	910723	
	PP1	910724	
Type 0703/0803	NS3/PS3	792035	792035
	PP1	910728	
	NP1	910727	
	NP6		740553
	PP1		740384
Type 1002	NS3/PS3	792036	792036
	PP1	910732	
	NP1	910731	
	NP6		740554
	PP1		740388
Type 0306/0308	PP1	910736	
	NP1	910735	
	NP6		740555
	PP1		740497
	Type 0212/0215	PP1	910740
NP1		910739	
NP6			740556
PP1			740499

1.9 Mechanical/Hydraulic Special Accessories

1.9.2 Pump Diaphragms



pk_1_008

PTFE Pump diaphragms

ProMinent® DEVELOPAN® pump diaphragms in EPDM with woven inner layer, large surface area, integrally vulcanised steel core and PTFE Teflon coating on the side in contact with chemicals.

Description for pump type	Order no.
9.21, CONCEPT 1601	811453
9.22, CONCEPT 1201	811454
9.23, CONCEPT 0703/0803	811455
9.33, CONCEPT 1002	811456
9.44, CONCEPT 0306/0308	1002511
9.46, CONCEPT 0212/0215	811458

Diaphragm PTFE/FPM (silicone)

ProMinent® EPDM diaphragm with woven fabric core, one PTFE and one FPM layer on side in contact with medium. Particularly suitable for metered media containing microcrystals, e.g. silicate. Suitable for Beta® and gamma/ L pumps*

Pump type	Order no.
1601	1024168
1602	1024169
1005 / 1605	1024170
0708 / 1008	1024171
0413 / 0713	1024172
0220 / 0420	1024173

* Identcode letter "S", e.g. BT4A1002PPS...

Diaphragm EPDM

ProMinent® EPDM diaphragm with woven fabric core.

Pump type	Order no.
1000	1001444
1601	1001445
1602	1001446
1005 / 1605	1001447
0708 / 1008	1001448
0413 / 0713	1001449
0220 / 0420	1001450
0232	1001451

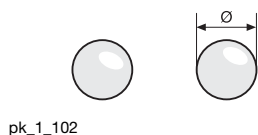
* Identcode letter "P", e.g. BT4A1002PPP...

1.9 Mechanical/Hydraulic Special Accessories

1.9.3 Custom Valve Balls/Valve Springs

For on-site retrofitting of dosing pumps and accessories, for applications where standard material is unsuitable. Supplied loose only, not fitted.

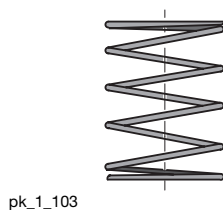
Valve balls



Material	Ø mm		Order no.
PTFE	4.7	for valve Ø 6 mm	404255
PTFE	9.5	for valve Ø 8 and 12 mm	404258
PTFE	11.0	for valve DN 10	404260
PTFE	16.0	for valve DN 15	404259
Ceramic	4.7	for valve Ø 6 mm	404201
Ceramic	9.5	for valve Ø 8 and 12 mm	404281
Ceramic	11.0	for valve DN 10	404277
Ceramic	16.0	for valve DN 15	404275

Valve springs for liquid ends

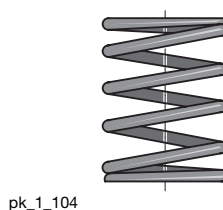
with approx. 0.1 bar pre-pressure for spring loading of the valve balls in the liquid end. Recommended to improve the valve function and to increase the metering accuracy, in particular for viscous metering media above 50 m Pas.



Material	Prepressure bar		Order no.
1.4571	0.1	for valve 4.7	469406
1.4571	0.1	for valve 9.2	469403
1.4571	0.1	for mikro g/ 5	469437
1.4571	0.1	for mikro g/ 5	469438
1.4571	0.1	for mikro g/ 5	469439
Hast. C	0.1	for valve DN 10	469114
Hast. C	0.1	for valve DN 15	469107

Valve springs for discharge valves

Approx. 0.5/1/2 bar prepressure for increasing metering accuracy and preventing suction and siphoning effect.



Material	Prepressure bar		Order no.
1.4571	1.0	for R 1/4" - Ø 6 mm connector	469401
Hast. C	0.5	for R 1/2" - Ø 6, 8 and 12 mm connector	469404
Hast. C	1.0	for R 1/2" - Ø 6, 8 and 12 mm connector	469413
Hast. C	2.0	for R 1/2" - Ø 6, 8 and 12 mm connector	469410
Hast. C	0.5	for DN 10	469115
Hast. C	1.0	for DN 10	469119
Hast. C	0.5	for DN 15	469108
Hast. C	1.0	for DN 15	469116

Valve spring made of Hastelloy C with FEP coating

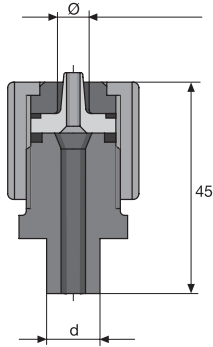
Material	Prepressure bar		Order no.
Hast. C/PVDF	0.5	for R 1/2" - Ø 6, 8 and 12 mm connector	818590
Hast. C/PVDF	1.0	for R 1/2" - Ø 6, 8 and 12 mm connector	818536
Hast. C/PVDF	0.5	for DN 10	818515
Hast. C/PVDF	0.5	for DN 15	818516

1.9 Mechanical/Hydraulic Special Accessories

1.9.4 Connector Parts/Fittings

Hose/adhesive nipple PVC*

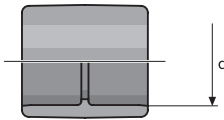
With union nut, for connection of PE tubing to rigid PVC fittings for on-site construction of connector system.



pk_1_107

	d mm		oØ x iØ mm	fig.	Order no.
Nozzle/solvent union	12	for hose	6 x 4	pk_1_107	817088
	12	for hose	8 x 5	pk_1_107	817089
	12	for hose	12 x 9	pk_1_107	817090
	12	for hose	12 x 6	pk_1_107	817091
	16	for hose	6 x 4	pk_1_107	817092
	16	for hose	8 x 5	pk_1_107	817093
	16	for hose	12 x 9	pk_1_107	817094
	16	for hose	12 x 6	pk_1_107	817095

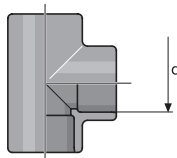
* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.



pk_1_109

PVC Straight solvent union

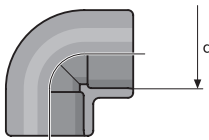
	d mm		fig.	Order no.
PVC Straight solvent union	12	DN 8	pk_1_109	356608
	16	DN 10	pk_1_109	356609
	20	DN 15	pk_1_109	356610
	25	DN 20	pk_1_109	356611



pk_1_113

PVC T-joint

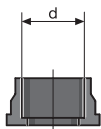
	d mm		fig.	Order no.
PVC T-joint	12	DN 8	pk_1_113	356406
	16	DN 10	pk_1_113	356407
	20	DN 15	pk_1_113	356408
	25	DN 20	pk_1_113	356409



pk_1_108

90° PVC Elbow joint

	d mm		fig.	Order no.
90° PVC Elbow joint	12	DN 8	pk_1_108	356315
	16	DN 10	pk_1_108	356316
	20	DN 15	pk_1_108	356317
	25	DN 20	pk_1_108	356318



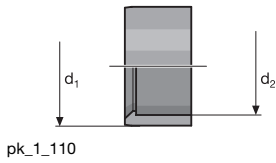
pk_1_115

PVC insert (Straight solvent union)

	d mm		fig.	Order no.
PVC insert (Straight solvent union)	12	DN 8	pk_1_115	356571
	16	DN 10	pk_1_115	356572
	20	DN 15	pk_1_115	356573
	25	DN 20	pk_1_115	356574

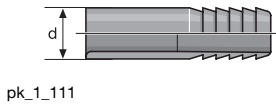
1.9 Mechanical/Hydraulic Special Accessories

PVC Short reducing union



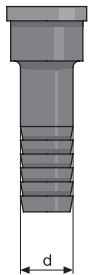
	d1 mm	d2 mm	fig.	Order no.
PVC Short reducing union	12	8	pk_1_110	357025
	16	10	pk_1_110	357026
	20	16	pk_1_110	357027
	25	20	pk_1_110	357028

PVC Hose connection nozzle



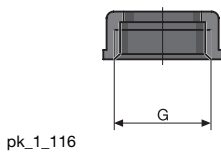
	d mm		fig.	Order no.
PVC Hose connection nozzle	12	DN 8	pk_1_111	356655
	16	DN 10	pk_1_111	356656
	20	DN 15	pk_1_111	356657
	25	DN 20	pk_1_111	356658

Hose nozzle with seal



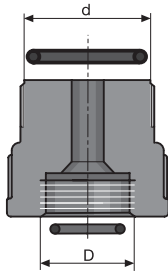
Material	d mm		fig.	Order no.
PVC	16	DN 10	pk_2_046	800554
PVC	20	DN 15	pk_2_046	811407
PVC	25	DN 20	pk_2_046	811408
PP	16	DN 10	pk_2_046	800657
PP	20	DN 15	pk_2_046	800655
PP	25	DN 20	pk_2_046	800656

Union nuts



Material	G	fig.	Order no.
PP	G 5/8 - DN 8	pk_1_116	800665
PP	G 3/4 - DN 10	pk_1_116	358613
PP	G 1 - DN 15	pk_1_116	358614
PP	G 1 1/4 - DN 20	pk_1_116	358615
PVC	G 5/8 - DN 8	pk_1_116	800565
PVC	G 3/4 - DN 10	pk_1_116	356562
PVC	G 1 - DN 15	pk_1_116	356563
PVC	G 1 1/4 - DN 20	pk_1_116	356564
PVDF	G 3/4 - DN 10	pk_1_116	358813

1.9 Mechanical/Hydraulic Special Accessories

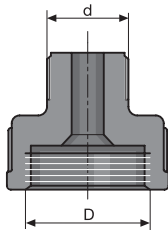


pk_1_114

Single adapter kit

For connection of system + GF+ threaded connectors to dosing pumps and accessories.

Material	Size	Internal thread D	External thread d	Order no.
PP/EPDM	For DN 8 threaded connector	M20 x 1,5	G 5/8	817164
PP/FPM	For DN 8 threaded connector	M20 x 1,5	G 5/8	740604
PVC/EPDM	For DN 8 threaded connector	M20 x 1,5	G 5/8	740583
PVC/FPM	For DN 8 threaded connector	M20 x 1,5	G 5/8	817069
PVDF/PTFE	For DN 8 threaded connector	M20 x 1,5	G 5/8	1031073
PP/EPDM	For DN 10 threaded connector	M20 x 1,5	G 3/4	817165
PP/FPM	For DN 10 threaded connector	M20 x 1,5	G 3/4	817178
PVC/EPDM	For DN 10 threaded connector	M20 x 1,5	G 3/4	740585
PVC/FPM	For DN 10 threaded connector	M20 x 1,5	G 3/4	740601
PVDF/PTFE	For DN 10 threaded connector	M20 x 1,5	G 3/4	1028409



pk_1_124

Single adapter kit

For fitting series A, B, C, E and EXtronic® accessories to current metric M20 x 1.5 connectors.

Material	Size	Internal thread D	External thread d	Order no.
PP	6-8 mm connector	M 20 x 1.5	G 1/4	811904
PVC	6-8 mm connector	M 20 x 1.5	G 1/4	811902

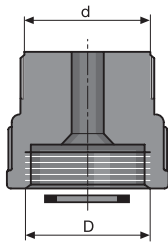
Double adapter set

Material	Quantity	Internal thread D	External thread d	Order no.
PP/EPDM	1x / 1x	M20 x 1.5 / G 5/8	G 5/8 / M20 x 1.5	817154
PVC/FPM	1x / 1x	M20 x 1.5 / G 5/8	G 5/8 / M20 x 1.5	817054

Double adapter kit

For fitting laboratory type GL connectors, manufacturers Bola or Schott.

Material	Size	Internal thread D	External thread d	Order no.
PTFE	GL 18	M20 x 1.5	GL 18	1000990

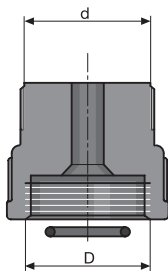


pk_1_127

Single adapter kit

For fittings of current accessories with metric M20 x 1.5 connectors to series A, B, C and E.

Material	Size	Internal thread D	External thread d	Order no.
PP/EPDM	6-8 mm connector	G 1/4	M 20 x 1.5	741088
PVC/FPM	6-8 mm connector	G 1/4	M 20 x 1.5	741087
PTFE	6-8 mm connector	G 1/4	M 20 x 1.5	741091
PP/EPDM	12 mm connector	G 3/8	M 20 x 1.5	741090
PVC/FPM	12 mm connector	G 3/8	M 20 x 1.5	741089
PTFE	12 mm connector	G 3/8	M 20 x 1.5	741092

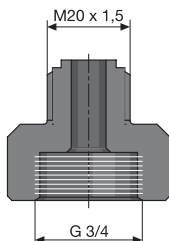


pk_1_122

1.9 Mechanical/Hydraulic Special Accessories

Adapter

Fits connector set for 12 x 9 hose.

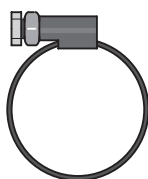


Material	Internal thread D	External thread d	Order no.
PP	DN 10, G 3/4	M20 x 1.5	800815
PVC	DN 10, G 3/4	M20 x 1.5	800816
PVDF	DN 10, G 3/4	M20 x 1.5	1017406

pk_1_112

Stainless steel threaded clip

For connection of suction and delivery tubing to pressure nozzle.

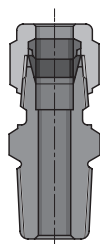


	Clamping range mm	Order no.
DN 10 clamping ring	16 – 25	359703
DN 15 clamping ring	20 – 32	359705

pk_1_068

Stainless steel straight threaded male adapter

Swagelock system, stainless steel SS 316 (1.4401) for fitting tubing to inner threaded liquid ends and valves with for SB version.

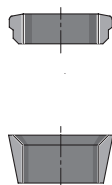


	Order no.
6 mm - ISO 7 R 1/4	359526
8 mm - ISO 7 R 1/4	359527
12 mm - ISO 7 R 1/4	359528
12 mm - ISO 7 R 3/8	359520
16 mm - ISO 7 R 3/8	359521
16 mm - ISO 7 R 1/2	359529

pk_1_028

Stainless steel clamping ring sets

For use with stainless steel threaded connectors for dosing pumps and Swagelock accessories. Both parts must be replaced at the same time. Consist of back and front clamping rings.

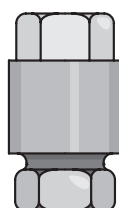


	oØ mm	Order no.
Set of ring Ø 6 for line	6	104232
Set of ring Ø 8 for line	8	104236
Set of ring Ø 12 for line	12	104244

pk_1_117

Stainless steel threaded connector

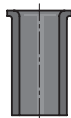
Serto system for connecting PE or PTFE discharge line to stainless steel pipe, made from stainless steel with clamping ring, but without support insert (parts in contact with chemicals stainless steel 1.4571).



	Order no.
6 mm outer diameter to 6 mm outer diameter stainless steel pipe	359317
8 mm outer diameter to 8 mm outer diameter stainless steel pipe	359318
12 mm outer diameter to 12 mm outer diameter stainless steel pipe	359320

pk_1_118

1.9 Mechanical/Hydraulic Special Accessories



pk_1_090

Stainless steel support insert

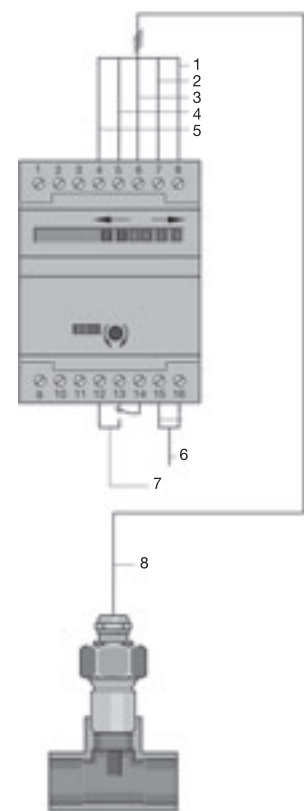
For connection of PE or PTFE tubing to Serto and Swagelok stainless steel threaded connectors..

	oØ x iØ mm		Order no.
for hose	6 x 4	standard pipe	359365
for hose	8 x 5	standard pipe	359366
for hose	12 x 9	standard pipe	359368
for hose	8 x 6		359362
for hose	12 x 10		359363

1.9 Mechanical/Hydraulic Special Accessories

1.9.5 Thermal Flow Monitors

The flow monitor consists of a probe and evaluation electronics. It operates on the principle of heat transfer in the water flow. It may be used with all solenoid and motor-driven dosing pumps with continuous flow of more than 0.5 l/h.



- pk_1_119
- 1 grey
 - 2 black
 - 3 brown
 - 4 blue
 - 5 white
 - 6 Mains voltage
 - 7 Relay flow control
 - 8 Connecting for sensor

Evaluation electronics

When liquids are flowing the changeover relay closes (switching power 250 V/4 A). When liquids cease to flow the relay opens for a set delay period of between 3-20 sec. LEDs indicate switching status. Allows smooth adjustment of flow volume.

Enclosure rating: Housing IP 40
Terminal boxes IP 00

Ambient temperature: 0 °C to +60 °C

Electrical connection	Order no.
230 V, 50/60 Hz	792886

Probe C

Single ceramic gauge

Outer thread: G 1/2

Temperature range: +5 °C to +60 °C medium temperature, not suitable for alkaline solutions

Supply line: Fixed connection, cable length 2 m

Max. cable length: 100 m

Enclosure rating: IP 67

Pressure rating: 7 bar

Application range: 0-60 cm/s	Order no.
	1022339

Probe S

Single section metal encapsulated gauge, stainless steel 14571

Outer thread: G 1/2

Temperature range: -25 °C to +80 °C medium temperature

Supply line: Fixed connection, cable length 2 m

Max. cable length: 100 m

Enclosure rating: IP 67

Pressure rating: 30 bar

Application range: 1 cm/s to 5 m/s	Order no.
	792888

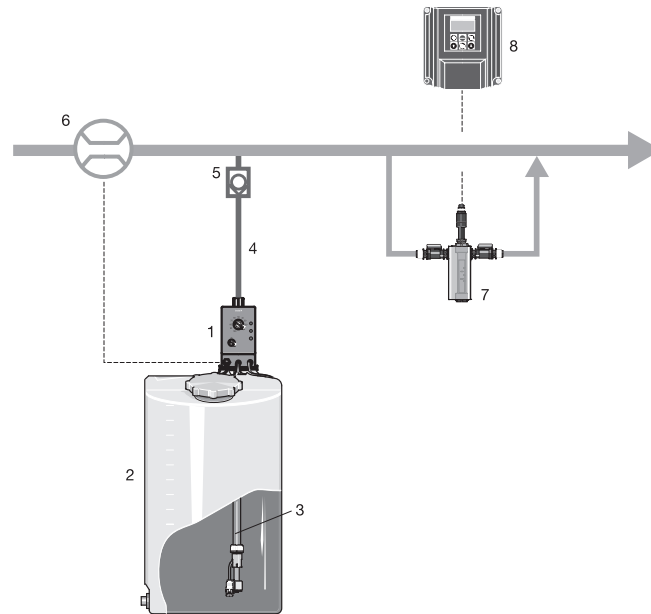
Connector parts required (T-joint, bypass) must be ordered separately.

1.10 Application Examples

1.10.1

Volume-proportional Metering Of Chlorine Bleach Solution In Drinking Water

Product: **Beta®**
 Metered medium: **NaOCl**
 Sector: **Drinking water**
 Application: **Disinfection**



- 1 Beta®/ 4 with self-venting liquid end made from PMMA/PVC (Plexiglas)
- 2 Metering tank
- 3 Intake fitting for foot valve and level switch
- 4 Soft PVC metering line with woven fabric or PTFE
- 5 Metering valve
- 6 Contact water meter
- 7 Chlorine measuring probe
- 8 Control measurement

pk_1_132

Task and requirements

- Volume-proportional feed of chlorine bleach solution into the main water flow
- Monitoring of chlorine content after metering

Operating conditions

- Variable flow
- Installation in closed buildings

Application information

- The metered medium emits gas. Therefore, after a longer pump standstill period, an air (gas) bubble may have formed in the intake line causing an interruption in metering operation.
- Metering is to take place fully automatically and without malfunctions as operating personnel are not always present in the waterworks or water supply.

Solution

- Beta® solenoid-driven metering pump with self-venting liquid end
- Contact water meter in main line for pump activation
- DULCOMETER® measurement and control technology for final inspection

Benefits

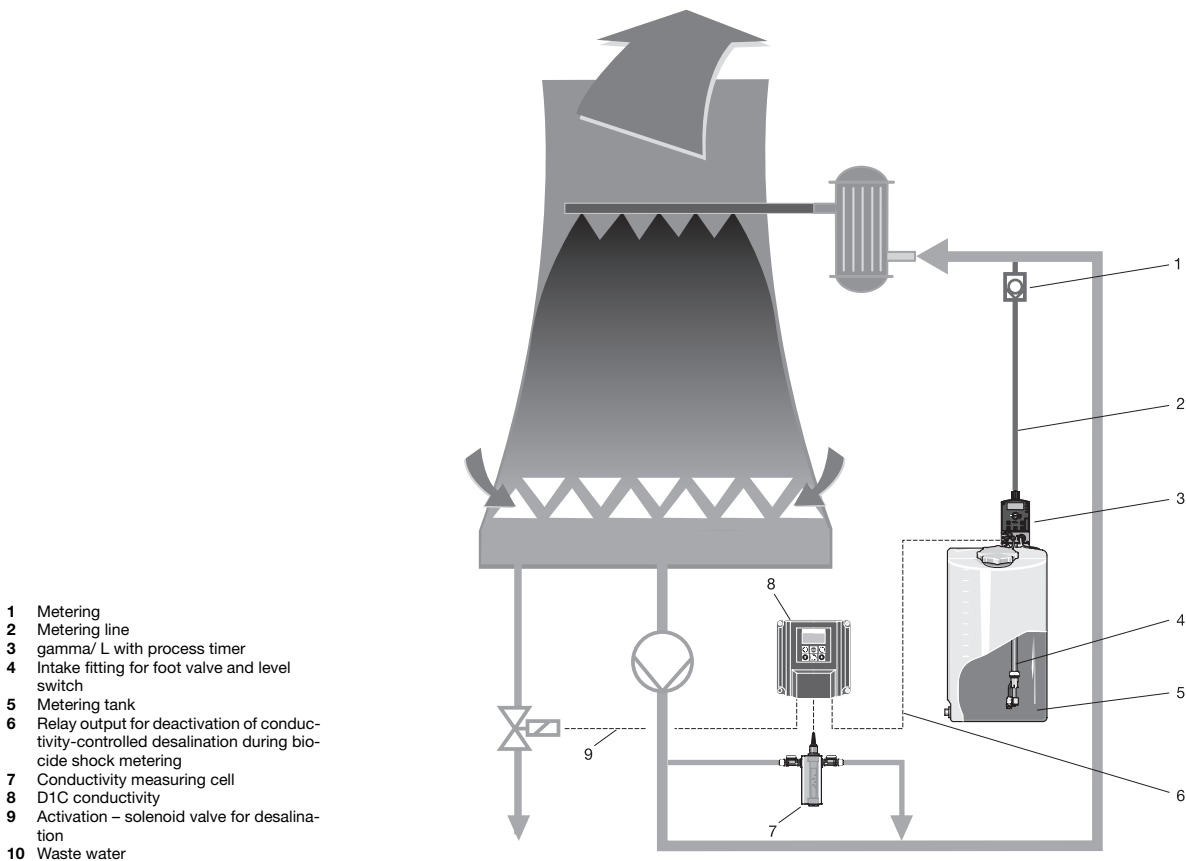
- High degree of reliability provided by self-venting liquid end
- Reliable protection against overmetering and undermetering with downstream final inspection

1.10 Application Examples

1.10.2

Shock Metering Of Biocide In Cooling Water Circuit

Product: **gamma/ L**
 Metering medium: **biocide**
 Industry: **cooling water treatment**
 Application: **disinfection**



pk_1_133

Tasks and requirements

- Increasing the biocide content e.g. at weekly intervals destroys all biology in the cooling water.
- Local increases in concentration may occur resulting in conductivity-controlled desalination. They disappear again after full distribution in the cooling water circuit.
- Conductivity-controlled desalination must therefore be deactivated during shock metering and for an appropriate time afterwards.

Operating conditions

- Aggressive chemicals (oxidising)
- Installation of the metering pump in the building

Notes on application

- Shock metering takes place at defined intervals, e.g. weekly.
- In smaller cooling circuits, the metering pump with the integrated process timer replaces the PLC.
- Irrespective of the set metering times, conductivity-controlled desalination must be deactivated via a potential-free contact.
- In some cases, desalination is performed before each shock metering cycle. This procedure must be controlled by means of a second relay contact in the pump.

1.10 Application Examples

Solution

- gamma/L with process timer and corresponding relay outputs
- The relays can be assigned to the process timer as needed and execute the necessary switching functions.
- The pump itself operates at the specified metering times.
- The metering program can be set up on a PC and can be downloaded on site to the pump.
- Metering programs can e.g. be sent by e-mail.
- Liquid end made of PVDF for high chemical resistance

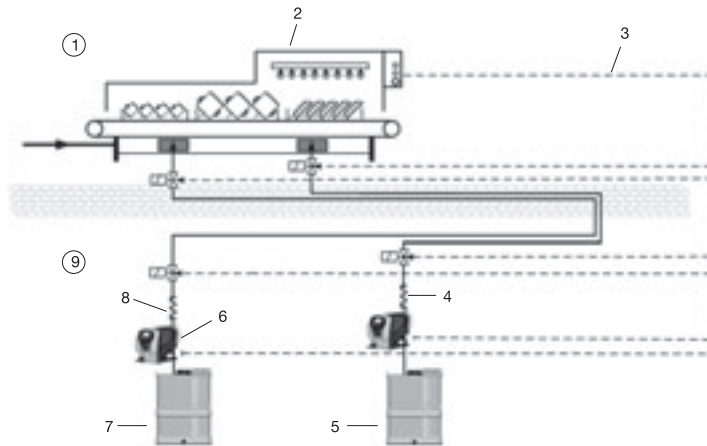
Benefit

- High IP rating IP75 for the control through integration into the pump.
- Cost savings since no PLC required
- Saving of installation costs thanks to compact design
- Simple and safe setting up of programs at the PC
- Fast downloading to the pump, especially in cases where several pumps run with the same program.

1.10 Application Examples

1.10.3 Detergent Metering In An Industrial Dishwasher

Product: **delta® with optoDrive®**
 Metering medium: **dishwashing detergent**
 Industry: **catering**
 Application: **dishwashers**



- 1 Kitchen
- 2 Dishwasher
- 3 Control circuit
- 4 Flexible connection
- 5 Rinser
- 6 optoDrive® delta® metering pumps
- 7 Cleaner
- 8 Flexible connection
- 9 Basement
- 10 Water

pk_1_134

Tasks and requirements

- Metering of cleaning and rinse aid chemicals for the dishwasher from the basement to the upper floors.
- Low-pulsation chemical metering.

Operating conditions

- Stainless steel pipes of up to 100 m of length across several floors.
- Defined metering volume.
- Metering only with conveyor belt in operation.
- Continuous metering.

Notes on application

- Drive of the metering pump when conveyor belt is started via potential-free contact ON / OFF (pause function).
- Typically, a hose of approx. 0.5 m is installed between the metering pump and the rigid stainless steel pipe to prevent tensions in the piping system.
- Because cleaning agents are normally very slick which might result in chemical leaks, the hoses are to be installed properly.
- Solenoid valves (pressure-retaining valves or metering valves are no leak-proof shut-off devices) are to be used to protect against backflow at stop.
- The metering system shows an inert behaviour because of the pipe length: Delayed response (at start) and dripping (at stop) at the metering point. For this reason, solenoid valves are to be used there.

Solution

- optoDrive® solenoid pumps delta®.
- Solenoid valves.

Benefit

- Fully-automatic operation with a minimum of staff and maintenance.
- Safe metering with the integrated injection control optoGuard®.
- Favourable price-performance ratio. No additional pulsation dampening is required thanks to the low-pulsation metering characteristics of the pump.
- Customer-specific process design thanks to adaptation of the pump to the properties of the metering medium.

1.10 Application Examples

2 Motor Driven Metering Pumps

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2.0 Overview Motor Driven Metering Pumps

2.0.1 Product Overview

Vario C Motor Diaphragm Metering Pump



pk_2_107

Capacity range 8 – 64 l/h, 10 – 4 bar

This metering pump is particularly suitable for use in applications requiring continuous metering. It is designed for simple metering tasks.

The Vario C is the basic model and does not feature integrated electronics. The drive motor is optionally available as a 3-phase 230/400 V, 50/60 Hz, 1-phase 230 V, 50 Hz or 1-phase 115 V 60 Hz motor.

With the PVDF or stainless steel liquid end, virtually universal resistance to chemicals is ensured in a diverse range of applications.



pk_2_108

Sigma/ 1 Motor Diaphragm Metering Pump

Capacity range 17 – 120 l/h, 12 – 4 bar

This metering pump is available as the basic version without its own internal electronics and in a micro-processor-controlled version. The pump covers the lower output range of the Sigma series.

The basic version is suitable for continuous metering tasks or for use in explosion hazard areas.

The control version offers many control and signalling options such as contact activation, analogue control,

PROFIBUS® DP interface,

diaphragm failure signalling etc.

The vast variety of options is specified in the identcode.

For Identcode see Pages → 2-11 and → 2-12.



pk_2_109

Sigma/ 2 Motor Diaphragm Metering Pump

Capacity range 48 – 350 l/h, 16 – 4 bar

With an output of up to 420 l/h, this metering pump covers the medium performance range of the Sigma series.

The basic version is suitable for continuous metering tasks or for use in explosion hazard areas.

The control version offers many control and signalling options such as contact activation, analogue control,

PROFIBUS® DP interface,

diaphragm failure signalling etc.

The vast variety of options is specified in the identcode.

For Identcode see Pages → 2-17 and → 2-18.

2.0 Overview Motor Driven Metering Pumps



pk_2_110

Sigma/ 3 Motor Diaphragm Metering Pump

Capacity range 145 – 1030 l/h, 12 – 4 bar

With an output of up to 1.030 l/h, this metering pump is the high-performance model of the Sigma series. All Sigma pumps are available in the basic version and in a microprocessor version.

The basic version is suitable for continuous metering tasks or for use in explosion hazard areas.

The control version offers many control and signalling options such as contact activation, analogue control,

PROFIBUS® DP interface,

diaphragm failure signalling etc.

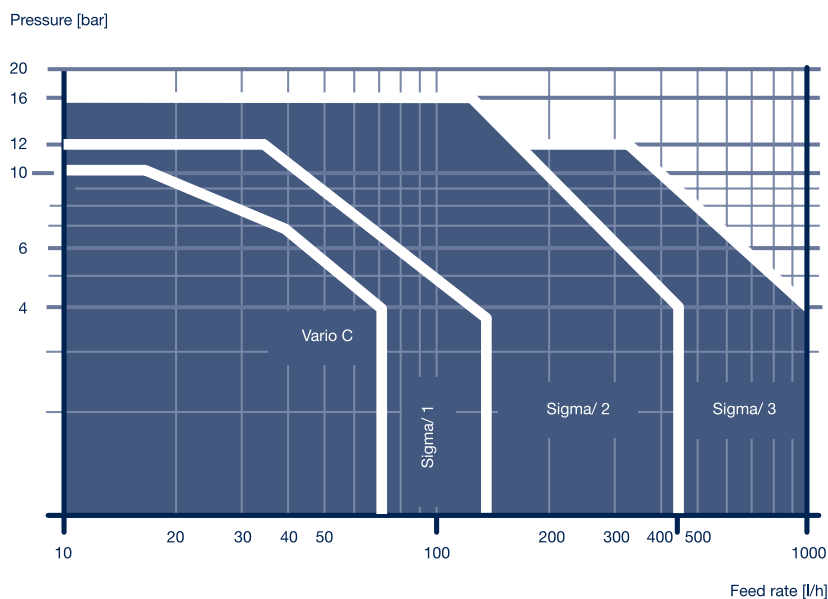
The vast variety of options is specified in the identcode.

For Identcode see Pages → 2-23 and → 2-24.

2.0 Overview Motor Driven Metering Pumps

2.0.2

Selection Guide

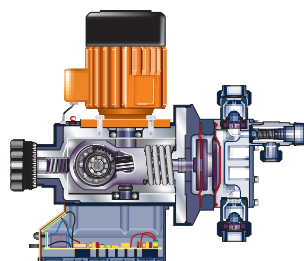


pk_2_diagramm

ProMinent offers an extensive range of metering pumps with an capacity rating of up to 1.000 l/h. All oscillating positive-displacement pumps feature a leak-free, hermetically sealed metering chamber and an identical operating structure.

Applications

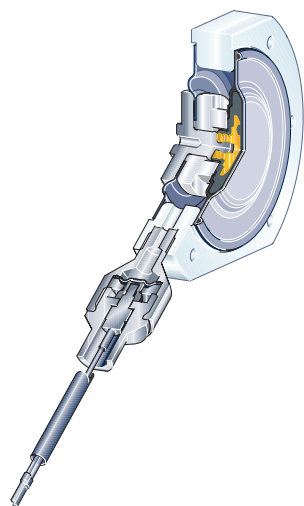
- General: Chemical feed and metering up to 1000 l/h
- Drinking water treatment: Metering of disinfectants
- Cooling circuits: Metering of disinfectants
- Waste water treatment: Metering of flocculants
- Paper industry: Metering of additives
- Plastics manufacturing: Metering of additives



pk_2_111

Features

- Extremely wide performance range
- High degree of metering accuracy even under fluctuating pressure conditions (pressure-stable characteristic) for effective saving of chemicals and exact process control
- Sturdy and inexpensively priced drive unit with high output ratings
- Simple integration and retrofitting in automated processes through flexible activation via stroke length and motor speed control
- Maximum reliability ensured by double diaphragm system and integrated overload safeguard



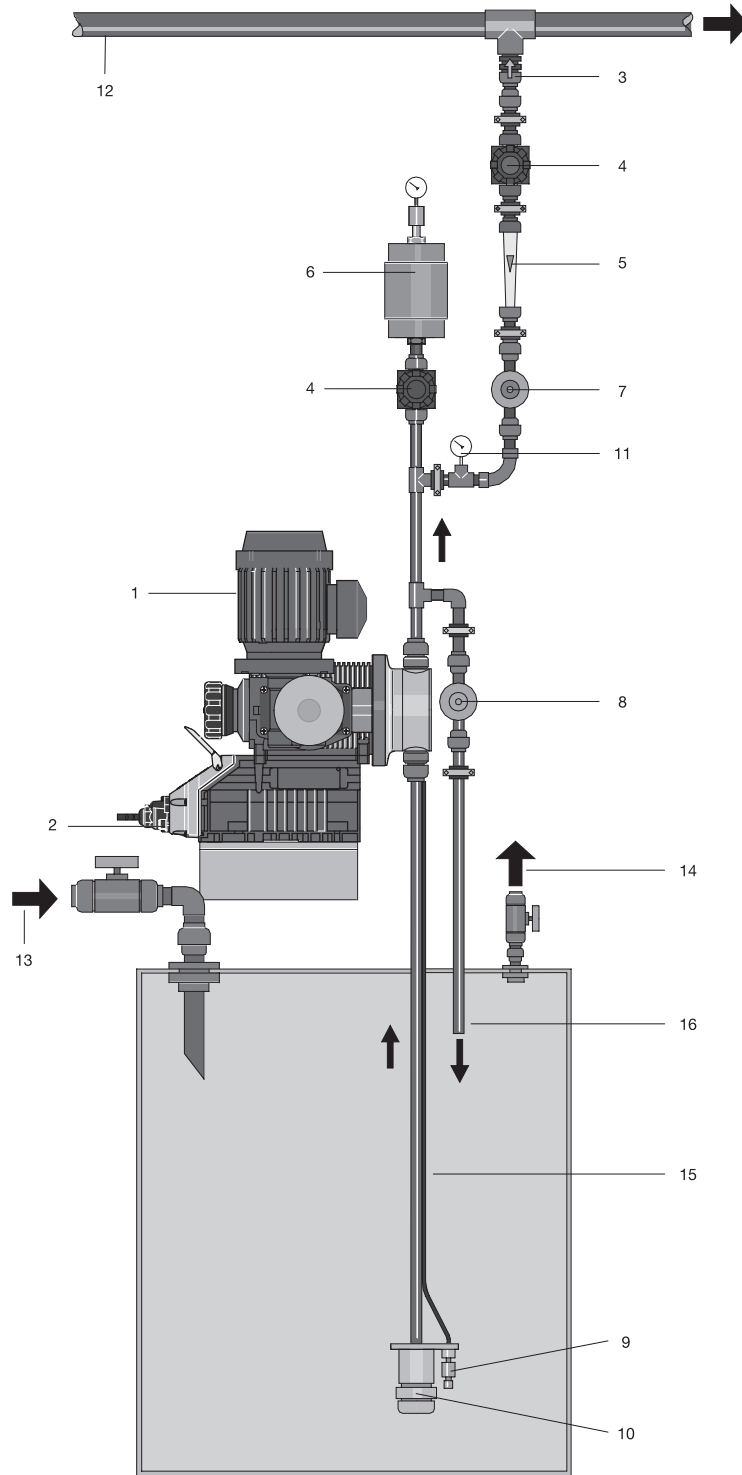
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2.0 Overview Motor Driven Metering Pumps

2.0.3 Installation Options

The smooth operation of metering systems depends not only on choosing the correct model for your application, but also on the correct installation of application specific accessories. The drawing below illustrates a variety of accessory components, not all of which will be required for every plant, but which gives an overview of what can be achieved in practical terms.

We are always at your service, to help you choose the right accessories for your processing application, and to provide any additional technical advice (e.g. calculating pipe work requirements).



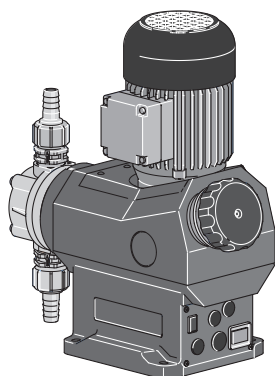
- 1 Metering pump
- 2 Actuation and control options
- 3 Injector valve
- 4 Isolation assembly
- 5 Flow measurement/monitoring
- 6 Pulsation dampener
- 7 Back pressure valve
- 8 Relief valve in bypass line
- 9 Float switch
- 10 Foot valve
- 11 Pressure gauge
- 12 System line
- 13 Filling
- 14 Vent
- 15 Intake line
- 16 Bypass

pk_2_000_1

2.0 Overview Motor Driven Metering Pumps

2.1 Vario C Diaphragm Metering Pumps

2.1.1 Vario C Diaphragm Metering Pumps



pk_2_126

The Vario C motor diaphragm metering pump is available in the standard version fitted with a 0.07 kW 230/400 V 50/60 Hz 3-phase AC motor and alternatively with a 0.07 kW, 230 V 50 Hz or 115 V 60 Hz single-phase AC motor. The capacity ranges between 8-76 l/h at a max. backpressure of 10-4 bar. The output can be adjusted by a self-locking rotary knob in 1 % steps via the stroke length (3 mm).

The reproducibility of the metering is better than ± 2 % in the stroke length range of 30% - 100% given defined conditions and correct installation. (The notes in the operating instructions must be observed.)

The rugged, corrosion-resistant metal-plastic housing has the IP rating IP65. A choice of 4 gear ratios, 2 liquid end sizes, 2 liquid end materials (PVDF; SS) allows the pump to be ideally matched to the basic metering tasks.

For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps.

Technical data

Type	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suction head mWC	Perm. admiss. pressure suction side bar	Connection, suction/pressure side G-DN
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	Delivery rate at max. backpressure		Max. stroke rate Strokes/min				
bar	l/h	ml/stroke		psi	l/h / gph					
10008	10	8	3.6	38	145	9.6/2.5	45	7	2.8	3/4-10
10016	10	16	3.6	77	145	19.2/5.1	92	7	2.8	3/4-10
07026	7	26	3.6	120	100	31.2/8.2	144	7	2.8	3/4-10
07042	7	42	3.6	192	100	50.4/13.3	230	7	2.8	3/4-10
07012	7	12	5.4	38	100	14.4/3.8	45	6	1.7	3/4-10
07024	7	24	5.4	77	100	28.8/7.6	92	6	1.7	3/4-10
04039	4	40	5.4	120	58	48.0/12.7	144	6	1.7	3/4-10
04063	4	64	5.4	192	58	76.8/20.3	230	6	1.7	3/4-10

The shipping weight of all pump types is 6/7.2 kg (PVDF/SS)

Materials in contact with medium

Material	Liquid end	Suction/pressure port	Gaskets	Valve balls	Valve seat
PVT	PVDF	PVDF	PTFE	Ceramic	PTFE
SST	Stainless steel material number 1.4404	Stainless steel material number 1.4581	PTFE	Stainless steel material number 1.4401	PTFE

2.1 Vario C Diaphragm Metering Pumps

2.1.2 Identcode Ordering System

Vario Diaphragm Metering Pump

VAMc	Type*	bar	l/h (50 Hz)
	10008	10	8
	10016	10	16
	07026	7	26
	07042	7	42
	07012	7	12
	07024	7	24
	04039	4	40
	04063	4	64
Material Liquid end			
	PVT	PVDF, PTFE seal	
	SST	stainless steel, PTFE seal	
Liquid end version			
	0	no valve spring (standard) PVC	
	1	with 2 valve springs. Hastelloy C4	
Hydraulic connection			
	0	standard connection	
	1	union nut and PVC insert	
	2	union nut and PP insert	
	3	union nut and PVDF insert	
	4	union nut and stainless steel insert	
	7	union nut and PVDF hose nozzle	
	8	union nut and stainless steel hose nozzle	
Version			
	0	with ProMinent® logo (standard)	
	2	without ProMinent® logo	
	M	modified	
Electrical power supply			
	S	3 ph, 230 V / 400 V; 50/60 Hz	
	M	1 ph AC 230 V; AC 50 Hz	
	N	1 ph AC 115 V; AC 60 Hz	
Stroke sensor			
	0	no stroke sensor	
	3	with stroke sensor (Namur)	
Stroke length adjustment			
	0	manual (standard)	

* digits 1 and 2=back pressure [bar]; digits 3, 4, 5=capacity [l/h]

2.1 Vario C Diaphragm Metering Pumps

2.1.3 Spare Parts Kits

Spare parts kits normally include the parts of the liquid ends subject to wear.

Standard delivery package for PVT material version

- 1 pump diaphragm
- 1 suction valve set
- 1 discharge valve set
- 2 valve balls
- 1 set of seals (packing rings, ball seat housings)

Standard delivery package for SST material version

- 1 pump diaphragm
- 2 valve balls
- 1 set of seals (packing rings, flat seals, ball seat)

Vario spare parts kit

Applicable to Identcode: Type VAMc 10008, 10016, 07026, 07042

Delivery unit	Materials in contact with medium	Order no.
FM 042 - DN 10	PVT	1003641
FM 042 - DN 10	SST	910751

Applicable to Identcode: Type VAMc 07012, 07024, 04039, 04063

Delivery unit	Materials in contact with medium	Order no.
FM 063 - DN 10	PVT	1003642
FM 063 - DN 10	SST	910756

Pump diaphragms

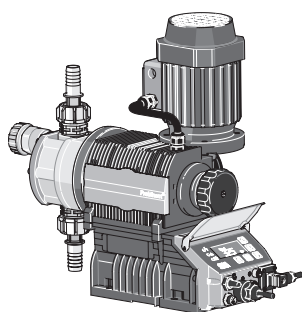


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	Order no.
Vario with FM 042 Type VAMc 10008, 10016, 07026, 07042	811458
Vario with FM 063 Type VAMc 07012, 07024, 04039, 04063	811459

2.2 Sigma/ 1 Diaphragm Metering Pumps

2.2.1 Sigma/ 1 Diaphragm Metering Pumps



pk_2_001
Sigma

The Sigma/1 motor diaphragm metering pump has a high-strength inner metal housing for those component parts subjected to load as well as an additional plastic housing to protect against corrosion. The capacity ranges between 17-144 l/h at a max. backpressure of 4-12 bar. The output can be adjusted by a self-locking rotary knob in 1 % steps via the stroke length (4 mm).

The reproducibility of the metering is better than ± 2 % in the stroke length range of 30% - 100% given defined conditions and correct installation. (The notes in the operating instructions must be observed.)

The rugged, corrosion-resistant metal-plastic housing is combined with three gearbox ratios, three liquid end sizes and two liquid end materials. The Sigma control type (S1Ca) facilitates control via contact or analogue signals (e.g. 0/4-20 mA) which ensures a good adaptation, also to different metering tasks.

For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps without integrated overload protections.

Sigma Basic Type (S1Ba)

The ProMinent® Sigma Basic type is a motor driven metering pump with no internal electronic control system. The ProMinent® S1Ba has a number of different drive options, including the 3 ph. standard (standard IP 55) motor, or the single phase AC motor. We also supply metering pumps with ATEX-approval for use in EXe and EXde zones.

Different flanges are always available so that customers can use their own motor to drive the pump.

Sigma Control Type (S1Ca)

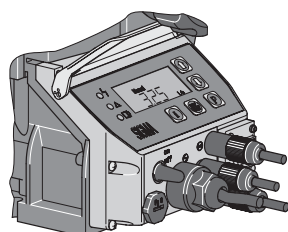
The ProMinent® Sigma microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

The controller has the same control panel as the ProMinent® gamma/ L metering pump.

The microprocessor controller of the Sigma pumps, featuring the optimum combination of variable AC frequency combined with digital stroking frequency, ensures exact metering even in the lower minimum range due to individual stroke control.

The individual pump functions are simply adjusted using the five programming keys. A backlit LCD indicates the current operating status, LEDs function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

Central or decentral adjustment is possible with PROFIBUS® and/or an integrated process timer.



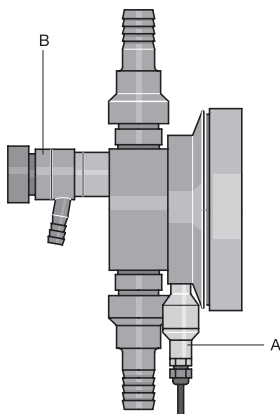
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Sigma Controller



Diaphragm Failure Indication (A)

The liquid end may be supplied with an optional safety diaphragm.

A plastic chemical resistant end disc separates the drive housing from the liquid section, and protects the drive against corrosion in case of diaphragm rupture. The new diaphragm rupture system means that the liquid section is hermetically sealed in the event of diaphragm rupture. This has the great advantage that the feed chemicals cannot escape from the pump. In association with the S1Ca, diaphragm rupture is simultaneously indicated via the LCD. At this point it is possible to opt for continuation of the metering, or to stop the metering pump.



P_PM_0003_SW

Integrated Relief-/Bleed Valve (B)

A liquid end variant with integrated hydraulic relief valve is optionally available for pressure ratings 4, 7, 10 and 12 bar. It protects the pump against overload and potential damage with no additional installation. This represents a considerable saving to the operator.

The integrated pressure relief valve offers the further advantage of effective bleeding of the injection valve during intake.

2.2 Sigma/ 1 Diaphragm Metering Pumps

Technical data

Type	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suction head mWC	Perm. admiss. pressure suction side bar	Connection, suction/pressure side G-DN	Shipping weight kg
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	Delivery rate at max. backpressure		Max. stroke rate Strokes/min					
	bar	l/h		ml/stroke	psi		l/h / gph				
12017 PVT	12	17	4.0	73	174.0	20/5.3	88	7	1	3/4-10	9
12017 SST	12	17	4.0	73	174.0	20/5.3	88	7	1	3/4-10	12
12035 PVT	12	35	4.0	143	174.0	42/11.1	172	7	1	3/4-10	9
12035 SST	12	35	4.0	143	174.0	42/11.1	172	7	1	3/4-10	12
10050 PVT	10	50	4.0	200	145.0	60/15.9*	240	7	1	3/4-10	9
10050 SST	10	50	4.0	200	145.0	60/15.9*	240	7	1	3/4-10	12
10022 PVT	10	22	5.1	73	145.0	26/6.9	88	6	1	3/4-10	9
10022 SST	10	22	5.1	73	145.0	26/6.9	88	6	1	3/4-10	12
10044 PVT	10	44	5.1	143	145.0	53/14.0	172	6	1	3/4-10	9
10044 SST	10	44	5.1	143	145.0	53/14.0	172	6	1	3/4-10	12
07065 PVT	7	65	5.1	200	100.0	78/20.6*	240	6	1	3/4-10	9
07065 SST	7	65	5.1	200	100.0	78/20.6*	240	6	1	3/4-10	12
07042 PVT	7	42	9.7	73	100.0	50/13.2	88	3	1	1-15	10
07042 SST	7	42	9.7	73	100.0	50/13.2	88	3	1	1-15	14
04084 PVT	4	84	9.7	143	58.0	101/26.7	172	3	1	1-15	10
04084 SST	4	84	9.7	143	58.0	101/26.7	172	3	1	1-15	14
04120 PVT	4	120	9.7	200	58.0	144/38.0*	240	3	1	1-15	10
04120 SST	4	120	9.7	200	58.0	144/38.0*	240	3	1	1-15	14

* The 60 Hz performance data apply to the S1Ca pump types (because internal 60 Hz operation), however, at max. 200 strokes/min.

Materials in contact with medium

Material	Liquid end	Suction/pressure port	Gaskets/ ball seat	Balls	Integrated overflow valve
PVT	PVDF	PVDF	PTFE/PTFE	Ceramic	PVDF/FPM or EPDM
SST	Stainless steel 1.4404	Stainless steel 1.4581	PTFE/PTFE	Stainless steel 1.4404	Stainless steel/FPM or EPDM

Sigma Basic Type Control Functions (S1Ba)

Stroke length actuator/controller

Actuator for automatic stroke length adjustment, actuating period approx. 1 sec for 1 % stroke length, 1 k Ohm response signal potentiometer, enclosure rating IP 54.

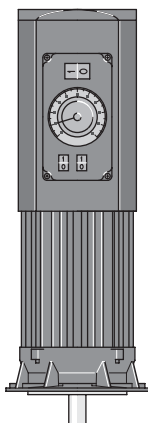
Controller consists of actuator with servomotor and integrated servo control for stroke length adjustment via a standard signal. Standard signal input 0/4-20 mA, corresponds to stroke length 0 - 100 %. Automatic/manual operation selection key for manual stroke adjustment. Mechanical status display of actual stroke length value output 0/4-20 mA for remote display.

Variable speed motors with integrated speed controller (identcode characteristic V)

Power supply 1 ph 230 V, 50/60 Hz, 0.18 kW
 External control with 0/4-20 mA (see pk_2_103)
 Speed Controllers see page → 2-51

Speed controllers in metal housing (identcode characteristic Z)

The speed controller assembly consists of a speed controller and a 0.18 kW variable speed motor.
 Speed Controllers see page → 2-51



pk_2_103

2.2 Sigma/ 1 Diaphragm Metering Pumps

2.2.2 Identcode Ordering System Basic Type (S1Ba)

Sigma Basic Type (S1Ba)

S1Ba	Drive type		
	H	Main drive, diaphragm	
		Pump type*	
		bar	l/h (50 Hz)
		12017	12 17
		12035	12 35
		10050	10 50
		10022	10 22
		10044	10 44
		07065	7 65
		07042	7 42
		04084	4 84
		04120	4 120
		Material Liquid end	
		PV	PVDF
		SS	Stainless steel
		Seal material	
		T	PTFE seal
		Diaphragm	
		0	Standard diaphragm, PTFE version
		1	Double diaphragm with diaphragm rupture indicator (retro fit possible)
		S**	Multilayer safety diaphragm with visual rupture indicator
		A**	Multilayer safety diaphragm with rupture signalling (contact)
		Liquid end version	
		0	No spring
		1	With 2 valve springs, Hastelloy C, 0.1 bar
		4	With pressure relief valve, FPM seal, no valve spring
		5	with overflow valve, FPM gasket with valve springs
		6	with overflow valve, EPDM gasket, without valve spring
		7	with overflow valve, EPDM gasket, with valve spring
		Hydraulic connection	
		0	Standard threaded connector (according to technical data)
		1	Union nut and PVC insert
		2	Union nut and PP insert
		3	Union nut and PVDF insert
		4	Union nut and stainless steel insert
		7	Union nut and PVDF hose nozzle
		8	Union nut and stainless steel hose nozzle
		Version	
		0	With ProMinent® logo (standard)
		1	Without ProMinent® logo
		M	Modified
		Electrical power supply	
		S	3 ph, 230 V/400 V 50/60 Hz, 0.09 kW
		M	1 ph, AC, 230 V/50/60 Hz, 0.09 kW
		N	1 ph, AC 115 V 60 Hz, 0.09 kW
		L	3 ph, 230 V/400 V, 50 Hz, (Exe, Exd)
		P	3 ph, 265 V/440 V, 60 Hz, (Exe, Exd)
		R	3 ph, variable speed motor, 230/400 V, 0.09 kW
		V (0)	Variable speed motor with integrated frequency converter 1 pH, 230 V, 50/60 Hz
		Z	Speed control compl 1 ph 230 V, 50/60 Hz (variable speed motor + FC)
		2	No motor, C 42 flange (NEMA)
		3	No motor, B5 Gr. 56 (DN)
		Enclosure rating	
		0	IP 55 (standard)
		1	Exe motor version ATEX-T3
		2	Exd motor version ATEX-T4
		A	ATEX power end
		Stroke sensor	
		0	No stroke sensor (standard)
		2	Pacing relay (reed relay)
		3	Stroke sensor (Namur) for hazardous locations
		Stroke length adjustment	
		0	Manual (standard)
		1	With stroke positioning motor, 230 V/50/60 Hz
		2	With stroke positioning motor, 115 V/60 Hz
		3	With stroke control motor, 0...20 mA 230 V/50/60 Hz
		4	With stroke control motor 4...20 mA 230 V/50/60 Hz
		5	With stroke control motor 0...20 mA 115 V/60 Hz
		6	With stroke control motor 4...20 mA 115 V/60 Hz

* Item 1 and 2=backpressure [bar]; item 3, 4, 5=output [l/h]

** Available from 3rd quarter of 2009

MaharFan

2.2 Sigma/ 1 Diaphragm Metering Pumps

2.2.3 Identcode Ordering System Control Type (S1Ca)

Sigma Control Type (S1Ca)

The 60 Hz performance data apply to the S1Ca pump types, however, at max. 200 strokes/min.

S1Ca	Drive type	Main drive, diaphragm					
	H	Main drive, diaphragm					
		Pump type*					
		bar	l/h	bar	l/h	bar	l/h
		12017	20	10022	26	07042	50
		12035	42	10044	53	04084	101
		10050	50	07065	65	04120	120
		Material Liquid end					
		PV	PVDF				
		SS	Stainless steel				
		Seal material					
		T	PTFE seal				
		Diaphragm					
		0	Standard diaphragm				
		1	Double diaphragm with rupture indicator incorporating "Pump stopping" function				
		2	Double diaphragm with rupture indicator incorporating "Pump alarm" function				
		S**	Multilayer safety diaphragm with visual rupture indicator				
		A**	Multilayer safety diaphragm with rupture signalling; pump stops				
		B**	Multilayer safety diaphragm with rupture signalling; pump emits alarm				
		Liquid end version					
		0	No spring				
		1	With 2 valve springs, Hastelloy C, 0.1 bar				
		4	With pressure relief valve, FPM seal, no valve spring				
		5	with overflow valve, FPM gasket with valve spring				
		6	with overflow valve, EPDM gasket, without valve spring				
		7	with overflow valve, EPDM gasket, with valve spring				
		Hydraulic connection					
		0	Standard threaded connector (according to technical data)				
		1	Union nut and PVC insert				
		2	Union nut and PP insert				
		3	Union nut and PVDF insert				
		4	Union nut and stainless steel insert				
		7	Union nut and PVDF hose nozzle				
		8	Union nut and stainless steel hose nozzle				
		Version					
		0	With ProMinent® logo (standard)				
		1	Without ProMinent® logo				
		Electrical power supply					
		U	1 ph, 100-230 V, ±10 %, 50/60 Hz				
		Cable and plug					
		A	2 m European		C 2 m Australian		
		B	2 m Swiss		D 2 m USA		
		Relay					
		0	No relay				
		1	With fault indicating relay (normally energised) 1x changeover 230V – 2A				
		3	With fault indicating relay (normally de-energised) 1x changeover 230V – 2A				
		4	As 1 with pacing relay 2x normally open 24 V – 100 mA				
		5	As 3 with pacing relay 2x normally open 24 V – 100 mA				
		A	shut-off and warning relays normally close 2x normally open 24 V – 100 mA				
		C	4-20 mA output = stroke length x frequency 1 x fault-indicating relay make contact 24 V - 100 mA				
		F	Power relay normally closed 1 x changeover 230 V – 8 A				
		Control variant					
		0	Manual + external with pulse control				
		1	Manual + external + pulse control + analogue				
		4	As 0 + process-timer				
		5	As 1 + process-timer				
		P***	As 1 + PROFIBUS® DP-interface, D sub 9				
		R***	as 1 + PROFIBUS® DP interface, M12				
		Access code					
		0	No access code				
		1	With access code				
		Metering monitor					
		0	Input with pulse evaluation				
		Stroke length adjustment					
		0	Manual				
		C	Manual + calibration				

* Item 1 and 2=backpressure [bar]; item 3, 4, 5=output [l/h]

** Available from 3rd quarter of 2009

*** For the option PROFIBUS® no relay can be selected

MahaFan

2.2 Sigma/ 1 Diaphragm Metering Pumps

2.2.4

Spare Parts Kits

The replacement part kit in general includes the wear parts of the delivery units.

Scope of delivery for material PVT

1 x metering diaphragm, 1 x suction valve compl., 1 x pressure valve compl., 2 x valve balls
1 x elastomer gasket kit (EPDM, FPM-B)
2 x ball seat bushing, 2 x ball washer, 4 x formed composite seal

Scope of delivery for material SST

1 x metering diaphragm, 2 x valve balls
2 x gasket kit compl. (packing rings, ball seat washers)
4 x formed composite seals

Spare parts kits Sigma/ 1 for version with standard/double diaphragm

Applicable to Identcode: Type 12017, 12035, 10050

Delivery unit	Materials in contact with medium	Order no.
FM 50 - DN 10	PVT	1010541
FM 50 - DN 10	SST	1010554
FM 50 - DN 10	SST (with 2 valve assemblies)	1010555

Applicable to Identcode: Type 10022, 10044, 07065

Delivery unit	Materials in contact with medium	Order no.
FM 65 - DN 10	PVT	1010542
FM 65 - DN 10	SST	1010556
FM 65 - DN 10	SST (with 2 valve assemblies)	1010557

Applicable to Identcode: Type 07042, 04084, 04120

Delivery unit	Materials in contact with medium	Order no.
FM 120 - DN 15	PVT	1010543
FM 120 - DN 15	SST	1010558
FM 120 - DN 15	SST (with 2 valve assemblies)	1010559

Metering diaphragm (standard diaphragm)

	Order no.
Sigma/ 1 FM 50 (12017; 12035; 10050)	1010279
Sigma/ 1 FM 65 (10022; 10044; 07065)	1010282
Sigma/ 1 FM 120 (07042; 04084; 04120)	1010285

Spare parts kit for integrated overflow valve

consisting of two Hast. C compression springs and four FPM-A and EPDM O-rings each

	For material	Gaskets	Order no.
ETS overflow valve 4 bar	PVT/SST	FPM-A / EPDM	1031199
ETS overflow valve 7 bar	PVT/SST	FPM-A / EPDM	1031200
ETS overflow valve 10 bar	PVT/SST	FPM-A / EPDM	1031201
ETS overflow valve 12 bar	PVT/SST	FPM-A / EPDM	1031202

2.2 Sigma/ 1 Diaphragm Metering Pumps

Motor Data

Identcode characteristic		Voltage supply		Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.09 kW
		250-280 V/440-480 V	60 Hz	0.09 kW
M	1 ph AC, IP 55	230 V ±5%	50/60 Hz	0.12 kW
N	1 ph AC, IP 55	115 V ±5 %	60 Hz	0.12 kW
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	0.12 kW
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	0.18 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	0.12 kW
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	0.18 kW with PTC, speed adjustment range 1:5
R	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.09 kW with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V; 50/60Hz
		245-280 V/440-480 V	60 Hz	0.09 kW
V0	1 ph, IP 55	230 V ±10 %	50/60 Hz	0.18 kW Variable speed motor with integrated frequency converter

For further information, please request motor data sheets.

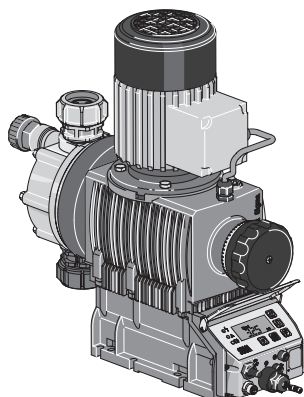
Customised motors or customised motor flanges are available on request.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

2.3 Sigma/ 2 Diaphragm Metering Pumps

2.3.1 Sigma/ 2 Diaphragm Metering Pumps



pk_2_115
Sigma/ 2

The Sigma/ 2 diaphragm metering pump has a high-strength inner metal housing for those component parts subjected to load as well as an additional plastic housing to protect against corrosion. The capacity ranges between 50-420 l/h at a max. backpressure of 4-16 bar. The output can be adjusted by a self-locking rotary knob in 0.5 % steps via the stroke length (5 mm).

The reproducibility of the metering is better than $\pm 2\%$ in the stroke length range of 30% - 100% given defined conditions and correct installation. (The notes in the operating instructions must be observed.)

The rugged, corrosion-resistant metal-plastic housing is combined with three gearbox ratios, two liquid end sizes and two liquid end materials. The Sigma control type (S2Ca) facilitates control via contact or analogue signals (e.g. 0/4-20 mA) which ensures a good adaptation, also to different metering tasks.

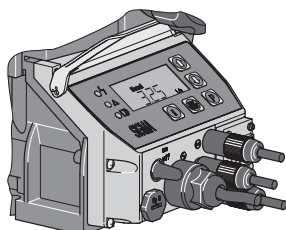
For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps without integrated overload protections.

Sigma Basic Type (S2Ba)

The Sigma Basic type is a motor driven metering pump with no internal electronic control system. The S2Ba offers a variety of different drive options in both the three phase standard motor (standard: IP 55) or the single phase AC versions. We also supply metering pumps with ATEX-approval for use in EXe and EXde zones.

Different flanges are always available so that customers can use their own motor to drive the pump.

Sigma Control Type (S2Ca)



pk_2_104
Sigma Controller

The Sigma microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

The controller has the same control panel as the gamma/ L metering pump.

The microprocessor controller of the Sigma pumps, featuring the optimum combination of variable AC frequency combined with digital stroking frequency, ensures exact metering even in the lower minimum range due to individual stroke control.

The individual pump functions are simply adjusted using the five programming keys. A backlit LCD indicates the current operating status, LEDs function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

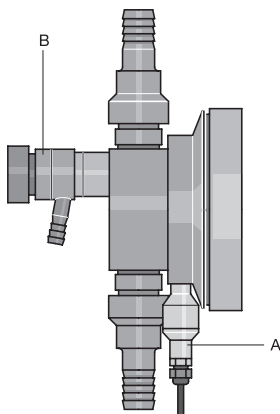
Central or decentral adjustment is possible with PROFIBUS® and/or an integrated process timer.



Diaphragm Failure Indication (A)

The liquid end may be supplied with an optional safety diaphragm.

A plastic chemical resistant end disc separates the drive housing from the liquid section, and protects the drive against corrosion in case of diaphragm rupture. The new diaphragm rupture system means that the liquid section is hermetically sealed in the event of diaphragm rupture. This has the great advantage that the feed chemicals cannot escape from the pump. In association with the S2Ca, diaphragm rupture is simultaneously indicated via the LCD. At this point it is possible to opt for continuation of the metering, or to stop the metering pump.



P_PM_0003_SW

Integrated Relief-/Bleed Valve (B)

A liquid end variant with integrated hydraulic relief valve is optionally available for pressure ratings 4, 7, 10 and 16 bar. It protects the pump against overload and potential damage with no additional installation. This represents a considerable saving to the operator.

The integrated pressure relief valve offers the further advantage of effective bleeding of the injection valve during intake.

2.3 Sigma/ 2 Diaphragm Metering Pumps

Technical data

Type	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suction head mWC	Perm. admiss. pressure suction side bar	Connection suction/discharge side G-DN	Shipping weight kg
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	Delivery rate at max. backpressure		Max. stroke rate Strokes/min					
	bar	l/h		ml/stroke	psi		l/h / gph				
16050 PVT	10	50	11.4	73	145	60/15.9	87	7	3	1-15	15
16050 SST	16	48	11.4	73	232	57/15.1	87	7	3	1-15	20
16090 PVT	10	90	11.4	132	145	108/28.5	156	7	3	1-15	15
16090 SST	16	86	11.4	132	232	103/27.2	156	7	3	1-15	20
16130 PVT	10	130	10.9	198	145	156/41.2**	232	7	3	1-15	15
16130 SST	16	125	10.9	198	232	150/39.6**	232	7	3	1-15	20
07120 PVT	7	120	27.4	73	100	144/38.0	87	5	1	1 1/2-25*	16
07120 SST	7	120	27.4	73	100	144/38.0	87	5	1	1 1/2-25*	24
07220 PVT	7	220	27.7	132	100	264/69.7	156	5	1	1 1/2-25*	16
07220 SST	7	220	27.7	132	100	264/69.7	156	5	1	1 1/2-25*	24
04350 PVT	4	350	29.4	198	58	420/111.0**	232	5	1	1 1/2-25*	16
04350 SST	4	350	29.4	198	58	420/111.0**	232	5	1	1 1/2-25*	24

Note:

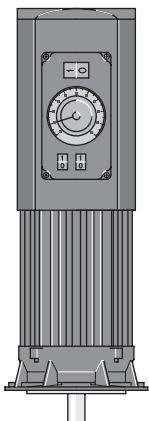
* For the Sigma types 07120, 07220 and 04350, the liquid ends are fitted with DN 25 (G 1 1/2) valves. Since DN 20 is normally large enough for the piping of these versions (see technical data, connection suction/pressure side), the connecting parts identified in the Identcode (e.g. inserts) are already reduced to DN 20, i.e. piping and accessories can be DN 20.

** The 60 Hz performance data apply to the S2Ca pump types (because internal 60 Hz operation), however, at max. 200 strokes/min.

Materials in contact with medium

Material	Liquid end	Suction/pressure port	Gaskets/ball seat	Balls	Integrated overflow valve
PVT	PVDF	PVDF	PTFE/PTFE	Ceramic/glass *	PVDF/FPM or EPDM
SST	Stainless steel 1.4404	Stainless steel 1.4581	PTFE/PTFE	Stainless steel 1.4404	Stainless steel/FPM or EPDM

* for 07120, 07220, 04350



pk_2_103

Sigma Basic Type Control Functions (S2Ba)

Stroke length actuator/controller

Actuator for automatic stroke length adjustment, actuating period approx. 1 sec for 1 % stroke length, 1 k Ohm response signal potentiometer, enclosure rating IP 54.

Controller consists of actuator with servomotor and integrated servo control for stroke length adjustment via a standard signal. Standard signal input 0/4-20 mA, corresponds to stroke length 0 - 100 %. Automatic/manual operation selection key for manual stroke adjustment. Mechanical status display of actual stroke length value output 0/4-20 mA for remote display.

Variable speed motors with integrated frequency converter (Identcode characteristic V)

Voltage supply 1 ph 230 V, 50/60 Hz, 0.37 kW

Externally controllable with 0/4-20 mA (see Fig. pg_2_103)

Speed Controllers see page → 2-51

Speed controls with frequency converter (Identcode characteristic Z)

The speed controller assembly consists of a frequency converter and a 0.37 kW variable speed motor.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

Speed Controllers see page → 2-51

2.3 Sigma/ 2 Diaphragm Metering Pumps

2.3.2 Identcode Ordering System Basic Type (S2Ba)

Sigma Basic Type (S2Ba)

S2Ba	Drive type	
	HM	Main drive, diaphragm
		Pump type*
		bar l/h (50 Hz)
		16050 16 50
		16090 16 90
		16130 16 130
		07120 7 120
		07220 7 220
		04350 4 350
		Material Liquid end
		PV PVDF (max. 10 bar)
		SS Stainless steel
		Seal material
		T PTFE seal
		Diaphragm
		0 Standard diaphragm, PTFE version
		1 Double diaphragm with diaphragm rupture indicator (retro fit possible)
		S** Multilayer safety diaphragm with visual rupture indicator
		A** Multilayer safety diaphragm with rupture signalling (contact)
		Liquid end version
		0 No spring
		1 With 2 valve springs, Hastelloy C4, 0.1 bar
		4 With pressure relief valve, FPM seal, no valve spring
		5 with overflow valve, FPM gasket with valve springs
		6 with overflow valve, EPDM gasket, without valve spring
		7 with overflow valve, EPDM gasket, with valve spring
		Hydraulic connection
		0 Standard threaded connector (according to technical data)
		1 Union nut and PVC insert
		2 Union nut and PP insert
		3 Union nut and PVDF insert
		4 Union nut and stainless steel insert
		7 Union nut and PVDF hose nozzle
		8 Union nut and stainless steel hose nozzle
		Version
		0 With ProMinent® logo (standard)
		1 Without ProMinent® logo (standard)
		M Modified
		Electrical power supply
		S 3 ph, 230 V/400 V 50/60 Hz
		M 1 ph, AC, 230 V/50/60 Hz
		N 1 ph, AC, 115 V/50/60 Hz
		L 3 ph, 230 V/400 V, 50 Hz, (Exe, Exd)
		P 3 ph, 265 V/440 V, 60 Hz, (Exe, Exd)
		R 3 ph, variable speed motor, 230/400 V
		V (0) Variable speed motor with integrated frequency converter 1 pH, 230 V, 50/60 Hz
		Z Speed control compl 1 ph 230 V, 50/60 Hz (variable speed motor + FC)
		1 No motor, with B14 flange (Gr. 71 (DIN))
		2 No motor, C 56 flange (NEMA)
		3 No motor, B5 Gr. 63 (DN)
		Enclosure rating
		0 IP 55 (standard)
		1 Exe motor version ATEX-T3
		2 Exd motor version ATEX-T4
		A ATEX power end
		Stroke sensor
		0 No stroke sensor (standard)
		2 Pacing relay (reed relay)
		3 Stroke sensor (Namur) for hazardous locations
		Stroke length adjustment
		0 Manual (standard)
		1 With stroke positioning motor, 230 V/50/60 Hz
		2 With stroke positioning motor, 115 V/50/60 Hz
		3 With stroke control motor, 0...20 mA 230 V/50/60 Hz
		4 With stroke control motor, 4...20 mA 230 V/50/60 Hz
		5 With stroke control motor, 0...20 mA 115 V/50/60 Hz
		6 With stroke control motor, 4...20 mA 115 V/50/60 Hz

* Item 1 and 2=backpressure [bar]; item 3, 4, 5=output [l/h]

** Available from 2nd quarter of 2009

MaharFan

2.3 Sigma/ 2 Diaphragm Metering Pumps

2.3.3 Identcode Ordering System Control Type (S2Ca)

Sigma Control Type (S2Ca)

The 60 Hz performance data apply to the S2Ca pump types, however, at max. 200 strokes/min.

S2Ca	Drive type				
	HM	Main drive, diaphragm			
		Pump type*			
		bar	l/h	bar	l/h
		16050 16	60	07120 7	144
		16090 16	108	07220 7	264
		16130 16	130	04350 4	350
		Material Liquid end			
		PV	PVDF (max. 10 bar)		
		SS	Stainless steel		
		Seal material			
		T	PTFE seal		
		Diaphragm			
		0	Standard diaphragm		
		1	Double diaphragm with rupture indicator incorporating "Pump stopping" function		
		2	Double diaphragm with rupture indicator incorporating "Pump alarm" function		
		S**	Multilayer safety diaphragm with visual rupture indicator		
		A**	Multilayer safety diaphragm with rupture signalling; pump stops		
		B**	Multilayer safety diaphragm with rupture signalling; pump emits alarm		
		Liquid end version			
		0	No springs		
		1	With 2 valve springs, Hastelloy C4, 0.1 bar		
		4	With relief valve, FPM seal, no valve spring		
		5	with overflow valve, FPM gasket with valve springs		
		6	with overflow valve, EPDM gasket, without valve spring		
		7	with overflow valve, EPDM gasket, with valve spring		
		Hydraulic connection			
		0	Standard threaded connector (according to technical data)		
		1	Union nut and PVC insert		
		2	Union nut and PP insert		
		3	Union nut and PVDF insert		
		4	Union nut and stainless steel insert		
		7	Union nut and PVDF hose nozzle		
		8	Union nut and stainless steel hose nozzle		
		Version			
		0	With ProMinent® logo		
		1	Without ProMinent® logo		
		Electrical power supply			
		U	1 ph 100-230 V ±10 %, 50/60 Hz		
		Cable and plug			
		A	2 m European	C	2 m Australian
		B	2 m Swiss	D	2 m USA
		Relay			
		0	No relay		
		1	With fault indicating relay (normally energised) 1x changeover 230V – 2A		
		3	With fault indicating relay (normally de-energised) 1x changeover 230V – 2A		
		4	As 1 with pacing relay 2x normally open 24 V – 100 mA		
		5	As 3 with pacing relay 2x normally open 24 V – 100 mA		
		A	shut-off and warning relays normally closed 2x normally open 24 V – 100 mA		
		C	4-20 mA output = stroke length x frequency 1 x fault-indicating relay make contact 24 V - 100 mA		
		F	Power relay normally closed 1 x changeover 230 V – 8 A		
		Control variant			
		0	Manual + external with pulse control		
		1	Manual external + pulse control + analogue		
		4	As 0 + process-timer		
		5	As 1 + process-timer		
		P***	As 1 + PROFIBUS® DP-interface, D sub 9		
		R***	as 1 + PROFIBUS® DP interface, M12		
		Access code			
		0	No access code		
		1	With access code		
		Metering monitor			
		0	Input with pulse evaluation		
		Stroke length adjustment			
		0	Manual		
		C	Manual + calibration		

* Item 1 and 2=backpressure [bar]; item 3, 4, 5=output [l/h]

** Available from 2nd quarter of 2009

*** For the option PROFIBUS® no relay can be selected

MahaFan

2.3 Sigma/ 2 Diaphragm Metering Pumps

2.3.4 Spare Parts Kits

The replacement part kit in general includes the wear parts of the delivery units.

Scope of delivery for material PVT

1 x metering diaphragm, 1 x suction valve compl., 1 x pressure valve compl., 2 x valve balls,
1 x elastomer gasket kit (EPDM, FPM-B),
2 x ball seat bushing, 2 x ball washer, 4 x formed composite seals

Scope of delivery for material SST

1 x metering diaphragm, 2 x valve balls, 2 x ball seat washers,
4 x formed composite seals

Spare parts kits Sigma/ 2 for version with standard/double diaphragm

(Applies to identcode: Type 16050, 16090, 16130, 12050, 12090, 12130)

Delivery unit	Materials in contact with medium	Order no.
FM 130 - DN 15	PVT	740324
FM 130 - DN 15	SST	740326
FM 130 - DN 15	SST (with 2 valve sets)	740328

(Applies to identcode: Type 07120, 07220, 04350)

Delivery unit	Materials in contact with medium	Order no.
FM 350 - DN 25	PVT	740325
FM 350 - DN 25	SST	740327
FM 350 - DN 25	SST (with 2 valve sets)	740329

Metering diaphragm (standard diaphragm)

	Order no.
Sigma with FM 130 identcode: Type 12050, 12090, 12130	792495
Sigma with FM 350 identcode: Type 07120, 07220, 04350	792496

Spare parts kit for integrated overflow valve

consisting of two Hast. C compression springs and four FPM-A and EPDM O-rings each

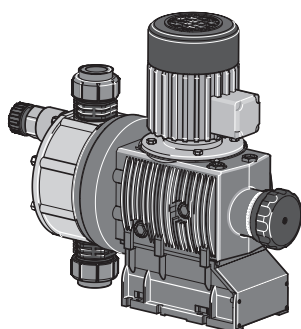
	for material	Gaskets	Order no.
ETS overflow valve 4 bar	PVT/SST	FPM-A / EPDM	1031199
ETS overflow valve 7 bar	PVT/SST	FPM-A / EPDM	1031200
ETS overflow valve 10 bar	PVT	FPM-A / EPDM	1031201
ETS overflow valve 16 bar	SST	FPM-A / EPDM	1031203

Motor Data

Identcode characteristic	Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.25 kW
		250-280 V/440-480 V	60 Hz	0.25 kW
M	1 ph AC, IP 55	230 V ±5%	50/60 Hz	0.18 kW
N	1 ph AC, IP 55	115 V ±5 %	60 Hz	0.18 kW
L1	3 ph, II2GEEExIICT3	220-240 V/380-420 V	50 Hz	0.18 kW
L2	3 ph, II2GEEExdIICT4	220-240 V/380-420 V	50 Hz	0.18 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEExIICT3	250-280 V/440-480 V	60 Hz	0.18 kW
P2	3 ph, II2GEEExdIICT4	250-280 V/440-480 V	60 Hz	0.21 kW
		220-240 V/380-420 V	50 Hz	0.37 kW
R	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.37 kW
		245-280 V/440-480 V	60 Hz	with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V ; 50/60Hz
V0	1 ph, IP 55	230 V ±5 %	50/60 Hz	0.37 kW Variable speed motor with integrated frequency converter

2.4 Sigma/ 3 Diaphragm Metering Pumps

2.4.1 Sigma/ 3 Diaphragm Metering Pumps



pk_2_071
Sigma/ 3

The ProMinent® Sigma/ 3 diaphragm metering pump is designed with a highly robust metal inner housing for load-stressed parts and an additional plastic housing for protection against corrosion. The capacity range extends from 145-1030 l/h at a max. backpressure of 12-4 bar. The feed rate is adjustable by altering the stroke length (6 mm) in 0.5 % increments by means of a self-locking rotating knob.

Under defined conditions and when installed correctly, the reproducibility of the metering is better than ± 2 % at a stroke length of between 30 % and 100 % (instructions in the operating instructions manual must be followed).

The stable, corrosion-resistant metal and plastic housing is combined with four gear ratios, two liquid end sizes and two liquid end materials. The optional control via switch or analogue signal (e.g. 0/4-20 mA) for the Sigma (S3Ca) controller type means that the pump is highly adaptable, even to fluctuating metering requirements.

In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation.

Sigma/ 3 Basic Type (S3Ba)

The ProMinent® Sigma/ 3 basic type is a motor-driven metering pump without internal electronics. The ProMinent® S3Ba offers a variety of different power variations, from the standard three phase motor (standard IP 55) or the single phase AC motors. We also supply metering pumps with ATEX-approval for use in EXe and EXde zones.

Different flange versions are available at any one time and allow the customer to use their own motors to drive the pumps.

Sigma/ 3 Control Type (S3Ca)

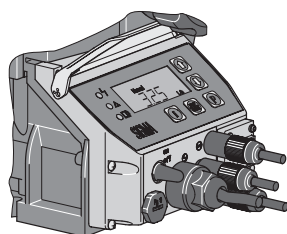
The ProMinent® Sigma/ 3 microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

The control unit has the same control surface as the ProMinent® gamma/ L metering pump.

The microprocessor controller of the Sigma pumps, featuring the optimum combination of variable AC frequency combined with digital stroking frequency, ensures exact metering even in the lower minimum range due to individual stroke control.

With five programming keys the individual pump functions are easy to set. A backlit LCD gives information about the prevailing operating status. LEDs along with a fault-indicating or pacing relay act as operating and warning indicators to ensure monitoring of the pump function.

Central or decentral adjustment is possible with PROFIBUS® and/or an integrated process timer.



pk_2_104
Sigma Controller



Diaphragm Rupture Signaling (A)

The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

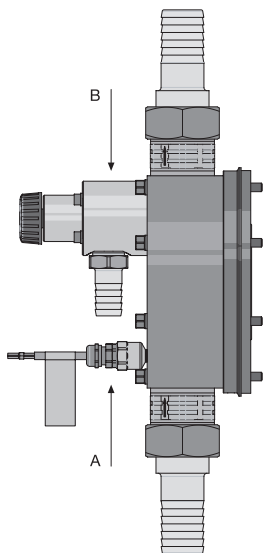
The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no leakages to the outside occur if the diaphragm ruptures. When the diaphragm ruptures, metering medium enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures a reliable metering - even under critical operating conditions.

In connection with the S3Ca, continued metering or alternatively a stopping of the metering pump can be selected.

Integrated overflow/bleed valve (B)

A liquid end variant with integrated hydraulic relief valve is optionally available for pressure ratings 4, 7, 10 and 12 bar. The metering pump is protected against overload and the possible resultant damage without costly additional installation, representing considerable cost savings to the operator.

The integrated bypass valve offers the added advantage of being a simple means of venting air from the metering pump during the suction process.



P_AC_0212_SW

2.4 Sigma/ 3 Diaphragm Metering Pumps

Technical Data

Type	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Perm. ad- miss. pressure suction side	Suction head	Connection, suction/ pressure side	Ship- ping weight
	Delivery rate at max. backpressure		Max. stroke rate	Max. stroke rate	Delivery rate at max. backpressure		Max. stroke rate				
	bar	l/h			ml/ stroke	Strokes/ min					
120145 PVT	10	145	31.5	72	145	174/46.0	86	2	5	1 1/2–25	22
120145 SST	12	145	31.5	72	174	174/46.0	86	2	5	1 1/2–25	26
120190 PVT	10	190	31.5	103	145	228/60.2	124	2	5	1 1/2–25	22
120190 SST	12	190	31.5	103	174	228/60.2	124	2	5	1 1/2–25	26
120270 PVT	10	270	31.5	144	145	324/85.6	173	2	5	1 1/2–25	22
120270 SST	12	270	31.5	144	174	324/85.6	173	2	5	1 1/2–25	26
120330 PVT*	10	330	31.5	180	145			2	5	1 1/2–25	22
120330 SST*	12	330	31.5	180	174			2	5	1 1/2–25	26
070410 PVT	7	410	95.1	72	100	492/130.0	86	1	4	2–32	24
070410 SST	7	410	95.1	72	100	492/130.0	86	1	4	2–32	29
070580 PVT	7	580	95.1	103	100	696/183.9	124	1	4	2–32	24
070580 SST	7	580	95.1	103	100	696/183.9	124	1	4	2–32	29
040830 PVT	4	830	95.1	144	58	1,000/264.2	173	1	3	2–32	24
040830 SST	4	830	95.1	144	58	1,000/264.2	173	1	3	2–32	29
041030 PVT*	4	1,030	95.1	180	58			1	3	2–32	24
041030 SST*	4	1,030	95.1	180	58			1	3	2–32	29

* Available for S3Ba only

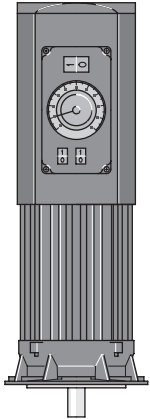
60 Hz performance data apply for S3Ca pump types (due to internal 60 Hz operation).

Materials in contact with medium

Material	Suction/pressure port Liquid end	DN 25 ball valves			DN 32 plate valves			Integrated overflow valve
		Gaskets	Valve balls	Valve seats	Gaskets	Valve plates/ valve spring	Valve seats	
PVT	PVDF	PTFE	Glass	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE	PVDF/FPM or EPDM
SST	Stainless steel 1.4404	PTFE	Stainless steel 1.4404	PTFE	PTFE	Stainless steel 1.4404/Hast. C	PTFE	Stainless steel/FPM or EPDM

** The valve spring is coated with CTFE (resistant similar to PTFE)

2.4 Sigma/ 3 Diaphragm Metering Pumps



pk_2_103

Sigma Basic Type Control Functions (S3Ba)

Stroke length actuator/controller

Actuator with stroke positioning motor for automatic stroke length adjustment. Setting time approx. 1 sec for 1 % stroke length. Resistance potentiometer 1 k Ohm. Enclosure rating IP 54.

Controller consisting of actuator with stroke positioning motor and in-built follower for stroke length adjustment via a standard signal. Standard signal current input 0/4-20 mA, corresponds to stroke length 0 - 100 %. Can be switched between manual and automatic operation, key switch for stroke adjustment for manual operation. Mechanical status display of actual stroke length value output 0/4-20 mA for remote display.

Variable speed motors with integrated speed controller (identcode characteristic V)

Power supply 1 ph 230 V, 50/60 Hz, 0.55 kW.

External control with 0/4-20 mA (see pk_2_103)

Speed Controllers see page → 2-51

Speed controllers in metal housing (identcode characteristic Z)

The speed controller assembly consists of a speed controller and a 0.55 kW variable speed motor.

Speed Controllers see page → 2-51

2.4 Sigma/ 3 Diaphragm Metering Pumps

2.4.2 Identcode Ordering System Basic Type (S3Ba)

Sigma Basic Type (S3Ba)

S3Ba	Drive type	Main drive, diaphragm		
	H	Main drive, diaphragm		
		Pump type*		
		bar	l/h	(50 Hz)
		120145	12	145
		120190	12	190
		120270	12	270
		120330	12	330
		070410	7	410
		070580	7	580
		040830	4	830
		041030	4	1,030
		Material Liquid end		
		PV	PVDF (max. 10 bar)	
		SS	Stainless steel	
		Seals material		
		T	PTFE seal	
		Diaphragm		
		S	Multilayer safety diaphragm with visual rupture indicator	
		A	Multilayer safety diaphragm with rupture signalling (contact)	
		Liquid end version		
		0	No valve springs	
		1	With 2 valve springs, Hastelloy C 4; 0.1 bar (standard for DN 32)	
		4	With bypass valve, FPM seal, no valve springs	
		5	with overflow valve, FPM gasket with valve springs (standard at DN 32)	
		6	with overflow valve, EPDM gasket, without valve spring	
		7	with overflow valve, EPDM gasket, with valve springs (standard at DN 32)	
		Hydraulic connection		
		0	Standard threaded connector (as technical data)	
		1	Union nut and PVC insert	
		2	Union nut and PP insert	
		3	Union nut and PVDF insert	
		4	Union nut and stainless steel insert	
		7	Union nut and PVDF hose nozzle	
		8	Union nut and stainless steel hose nozzle	
		Version		
		0	With ProMinent® logo	
		1	Without ProMinent® logo	
		M	Modified	
		Electrical power supply		
		S	3 ph, 230 V/400 V	
		M	1 ph, 230 V	
		N	1 ph, 115 V	
		L	3 ph, 230 V/400 V, 0.37 kW, 50 Hz, (Exe, Exd)	
		P	3 ph, 265 V/440 V, 0.37 kW, 60 Hz, (Exe, Exd)	
		R	Variable speed stroke control motor, 3 ph, 230 V/400 V	
		V (0)	Variable speed motor with integrated frequency converter	
		V (2)	Variable speed motor with integr. FC Exd (delivery with frame)	
		Z	Speed control compl 1 ph 230 V//400 V (variable speed motor + FC)	
		1	No motor, with B 5 flange, size 80 (DIN)	
		2	No motor, with C 56 flange, (NEMA)	
		3	No motor, B 5 flange, size 71 (DIN)	
		Enclosure rating		
		0	IP 55	
		1	Exe motor version ATEX-T3	
		2	Exd motor version ATEX-T4	
		A	ATEX power end	
		Stroke sensor		
		0	No stroke sensor (standard)	
		2	Pacing relay (read relay)	
		3	Stroke sensor (Namur) for explosion-proof appli.	
		Stroke length adjustment		
		0	Manual (standard)	
		1	With stroke positioning motor, 230 V/50/60 Hz	
		2	With stroke positioning motor, 115 V/50/60 Hz	
		3	With stroke control motor 0...20 mA 230 V/50/60 Hz	
		4	With stroke control motor 4...20 mA 230 V/50/60 Hz	
		5	With stroke control motor 0...20 mA 115 V/50/60 Hz	
		6	With stroke control motor 4...20 mA 115 V/50/60 Hz	

* digits 1 and 2=back pressure [bar]; digits 3, 4, 5=capacity [l/h]

2.4 Sigma/ 3 Diaphragm Metering Pumps

2.4.3 Identcode Ordering System Control Type (S3Ca)

Sigma/ Control Type (S3Ca)

The 60 Hz performance data apply to S3Ca pump types.

S3Ca	Drive type		
	H	Main drive, diaphragm	
		Pump type*	
		bar	l/h
		120145	12 174
		120190	12 228
		120270	12 324
		070410	7 492
		070580	7 696
		040830	4 1,000
		Material Liquid end	
		PVT	PVDF (max. 10 bar)
		SST	Stainless steel
		Displacement body	
		S	Multilayer safety diaphragm with visual rupture indicator
		A	Multilayer safety diaphragm with rupture signalling; pump stops
		B	Multilayer safety diaphragm with rupture signalling; pump emits alarm
		Liquid end version	
		0	No valve springs
		1	With 2 valve springs, Hastelloy C 4; 0.1 bar (standard for DN 32)
		4	With bypass valve, FPM seal, no valve springs
		5	with overflow valve, FPM gasket with valve springs (standard at DN 32)
		6	with overflow valve, EPDM gasket, without valve springs
		7	with overflow valve, EPDM gasket, with valve springs (standard at DN 32)
		Hydraulic connection	
		0	Standard threaded connector
		1	Union nut and PVC insert
		2	Union nut and PP insert
		3	Union nut and PVDF insert
		4	Union nut and stainless steel insert
		7	Union nut and PVDF hose nozzle
		8	Union nut and stainless steel hose nozzle
		Version	
		0	With ProMinent® logo
		1	Without ProMinent® logo
		Electrical power supply	
		W	1 ph 115-230 V ±10 %, 50/60 Hz
		Cable and plug	
		A	2 m Europe
		B	2 m Switzerland
		C	2 m Australia
		D	2 m USA
		Relay	
		0	no relay
		1	fault-indicating relay normally energised 1x changeover 230V – 2A
		3	fault-indicating relay normally de-energised 1x changeover 230V – 2A
		4	as 1 + pacing relay 2x normally open 24 V – 100 mA
		5	as 3 + pacing relay 2x normally open 24 V – 100 mA
		A	shut-off and warning relays normally closed 2x normally open 24 V – 100 mA
		C	4-20 mA output = stroke length x frequency 1 x fault-indicating relay make contact 24 V - 100 mA
		F	Power relay normally closed 1 x changeover 230 V – 8 A
		Control variant	
		0	Manual + external with pulse control
		1	Man. + external + pulse control + analogue
		4	As 0 + process-timer
		5	As 1 + process-timer
		P**	As 1 + PROFIBUS® DP-interface, D sub
		R**	as 1 + PROFIBUS® DP interface, M12
		Access code	
		0	no access code
		1	with access code
		Metering monitor	
		0	input with pulse evaluation
		Stroke length adjustment	
		0	manual
		C	manual + calibration

* Item 1 and 2=backpressure [bar]; item 3, 4, 5=output [l/h]

** For the option PROFIBUS® no relay can be selected

2.4 Sigma/ 3 Diaphragm Metering Pumps

2.4.4

Spare Parts Kits

The replacement part kit in general includes the wear parts of the liquid ends.

Scope of delivery for material PVT

1 x metering diaphragm, 1 x suction valve compl., 1 x pressure valve compl., 2 x valve balls or valve plate with spring for DN 32, 1 x elastomer gasket set (EPDM, FPM-B),
2 x ball seat bushing, 2 x ball seat washer
4 x formed composite seals

Scope of delivery for material SST

1 x metering diaphragm, 2 x valve balls or valve plate with spring for DN 32,
2 x ball seat washers,
4 x formed composite seals

Spare parts kits Sigma/ 3 for version with old standard/double diaphragm

(Applies to identcode: Type 120145, 120190, 120270, 120330)

Delivery unit	Materials in contact with medium	Order no.
FM 330 - DN 25	PVT	1005308
FM 330 - DN 25	SST	1005310
FM 330 - DN 25	SST (with 2 valve set)	1005312

(Applies to identcode: Type 070410, 070580, 040830, 041030)

Delivery unit	Materials in contact with medium	Order no.
FM 1000 - DN 32	PVT/PPT/PCT	1020032
FM 1000 - DN 32	SST	1005311
FM 1000 - DN 32	SST (with 2 valve set)	1005313

Spare parts kits Sigma/ 3 for version with multilayer safety diaphragm

(for Identcode: type 120145, 120190, 120270, 120330)

Delivery unit	Materials in contact with medium	Order no.
FM 330 - DN 25	PVT	1034678
FM 330 - DN 25	SST	1034679
FM 330 - DN 25	SST (with 2 valves compl.)	1034680

(for Identcode: type 070410, 070580, 040830, 041030)

Delivery unit	Materials in contact with medium	Order no.
FM 1000 - DN 32	PVT/PPT/PCT	1034681
FM 1000 - DN 32	SST	1034682
FM 1000 - DN 32	SST (with 2 valves compl.)	1034683

Metering diaphragm (old version)

	Order no.
FM 330 Identcode: Type 120145, 120190, 120270, 120330	1004604
FM 1000 Identcode: Type 070410, 070580, 040830, 041030	1002835

Multilayer safety diaphragm

	Order no.
FM 330 Identcode: type 120145, 120190, 120270, 120330	1029604
FM 1000 Identcode: type 070410, 070580, 040830, 041030	1029603

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2.4 Sigma/ 3 Diaphragm Metering Pumps

Spare parts kit for integrated overflow valve

consisting of two Hast. C compression springs and four FPM-A O-rings each

	for material	Gaskets	Order no.
ETS overflow valve 4 bar	PVA/SSA	FPM-A / EPDM	1031204
ETS overflow valve 7 bar	PVA/SSA	FPM-A / EPDM	1031205
ETS overflow valve 10 bar	PVA	FPM-A / EPDM	1031201
ETS overflow valve 12 bar	SSA	FPM-A / EPDM	1031202

Motor Data

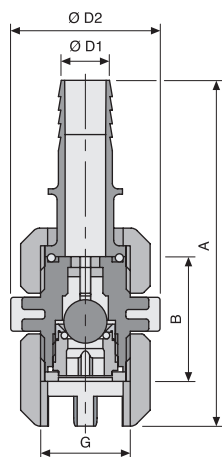
Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.37 kW	
		250-280 V/440-480 V	60 Hz	0.37 kW	
M	1 ph AC, IP 55	230 V ±5%	50/60 Hz	0.55 kW	
N	1 ph AC, IP 55	115 V ±5 %	60 Hz	0.55 kW	
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	0.37 kW	
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	0.37 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	0.37 kW	
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	0.37 kW	with PTC, speed adjustment range 1:5
R	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.55 kW	with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V ; 50/60Hz
		245-280 V/440-480 V	60 Hz		
V0	1 ph, IP 55	230 V ±5 %	50/60 Hz	0.55 kW	Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	0.55 kW	Ex-variable speed motor with integrated frequency converter

2.5 Hydraulic/Mechanical Accessories

2.5.1 Foot Valves

For connection of discharge line to metering system; the injection valves are fitted with ball checks and a Hastelloy C spring (0.5 bar priming pressure), and can be mounted as required. Used to create pressure and to prevent return flow. Materials as in pump liquid ends. Union nuts, hose sleeves and seals are included with DN 10 and DN 15 injection valves.

Important: Injection valves are not intended as completely sealed units.



P_AC_0206_SW

PPE foot valve

PP housing, EPDM seals, spring loaded with ball check.

	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	59	40	101	16	809465
DN 15*	1	66	47	142	20	924516
DN 20	1 1/4	77	55			803721
DN 25	1 1/2	84	60			803722
DN 32**	2	98	74			1006434
DN 40	2 1/4	113	90			1004204

* with union nut and nozzle;

** PVDF/Teflon version

PCB foot valve

PVC housing, FPM seals spring loaded with ball check.

	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	59	40	101	16	809464
DN 15*	1	66	47	142	20	924515
DN 20	1 1/4	77	55			803723
DN 25	1 1/2	84	60			803724
DN 32**	2	98	74			1006434
DN 40	2 1/4	113	90			1004193

* with union nut and nozzle;

** PVDF/Teflon version

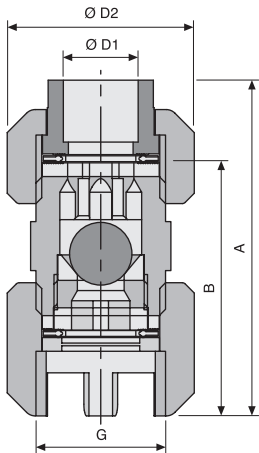
PVT foot valve

PVDF housing, PTFE seals with strainer and ball check.

	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	58	36	92	16	1029471
DN 15*	1	64	48	131	20	1029472
DN 20	1 1/4	78	58			1029473
DN 25	1 1/2	81	65			1029474
DN 32**	2	98	74			1006434
DN 40	2 1/4	108	83			1029475

* with union nut and hose grommet

2.5 Hydraulic/Mechanical Accessories



P_AC_0202_SW

TT foot valve

PTFE housing, PTFE seals spring loaded with ball check

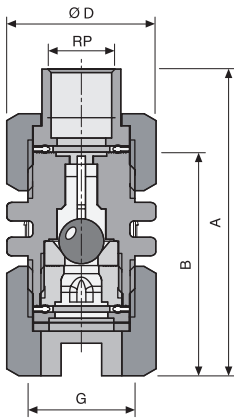
	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	59	40	101	16	809466
DN 15*	1	66	47	142	20	924517
DN 20	1 1/4	81	57			803725
DN 25	1 1/2	86	64			803726
DN 32**	2	98	74			1006434
DN 40	2 1/4	116	89			1004205

* with union nut and insert;

** PVDF/Teflon

SS foot valve

SS housing, PTFE seals spring loaded with ball check (1.4571/1.4581).

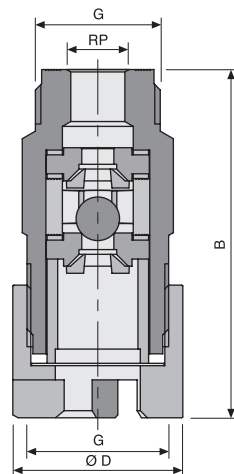


P_AC_0204_SW

	G	A mm	B mm	Rp	Ø D mm	Order no.
DN 10*	3/4	75	56	3/8	37	809467
DN 15*	1	83	59	1/2	48	924518
DN 20	1 1/4		73		55	803727
DN 25	1 1/2		82		63	803728
DN 32	2		92		75	1006435
DN 40	2 1/4		109		90	1004206

* with union nut and insert

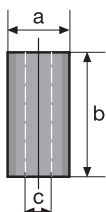
Foot valve SS for high pressure pumps



P_AC_0205_SW

	G	B mm	Rp	Ø D mm	Order no.
DN 10	3/4	70	1/4	41	803730
DN 10	3/4	70	3/8	41	803731

Ceramic weight for vertical alignment



pk_1_082

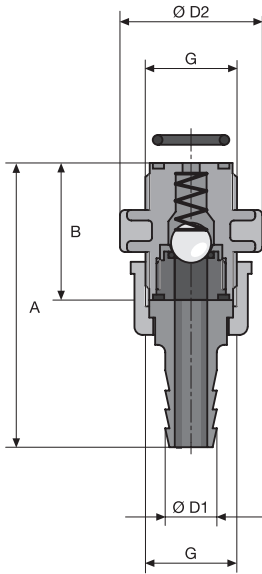
	Ø A mm	B mm	Ø C mm	Weight g	Order no.
Size 3	40	50	24	70	1030189

2.5 Hydraulic/Mechanical Accessories

2.5.2 Injection Valves

For connecting the metering line to the metering station; the metering valves consist of a non-return ball valve and a Hastelloy C spring (0.5 bar prepressure) and can be installed in any position. Used for generating pressure and preventing backflow. Materials matching those in the pump delivery units. Metering valves size DN 10 and 15 come with the required union nut and insert/hose socket.

Important: Metering valves are not suitable for use as tight-sealing shut-off elements.



pk_2_029

PPE injection valve

PP housing, EPDM seals, spring loaded with ball check. (Priming pressure approx. 0.5 bar)

	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	41	40	83	16	809461
DN 15*	1	43	47	108	20	924521
DN 20	1 1/4	55	55			803710
DN 25	1 1/2	60	58			803711
DN 32	2	68	70			1002783
DN 40	2 1/4	85	84			804761

* with union nut and hose grommet

PCB injection valve

PVC housing, FPM seals spring loaded with ball check. (Priming pressure approx. 0.5 bar)

	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	41	40	83	16	809460
DN 15*	1	43	47	108	20	924520
DN 20	1 1/4	55	55			803712
DN 25	1 1/2	60	58			803713
DN 32	2	68	70			1002783
DN 40	2 1/4	85	84			804760

* with union nut and hose grommet

PVT injection valve

PVDF housing, PTFE seals with spring-loaded non-return ball (primary pressure approx. 0.5 bar).

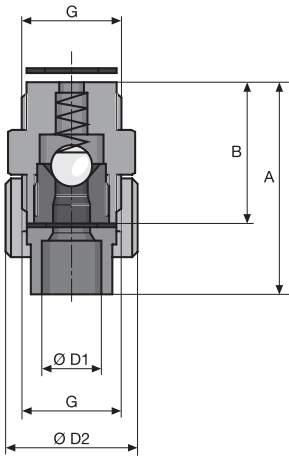
	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	40	36	84	16	1029476
DN 15*	1	43	48	110	20	1029477
DN 20	1 1/4	55	52			1029478
DN 25	1 1/2	61	56			1029479
DN 32	2	68	70			1002783
DN 40	2 1/4	85	81			1029480

* with union nut and hose nozzle

2.5 Hydraulic/Mechanical Accessories

TT injection valve

PTFE housing, PTFE seals spring loaded with ball check. (Priming pressure approx. 0.5 bar)



pk_2_030

	G	B	Ø D2	A	Ø D1	Order no.
		mm	mm	mm	mm	
DN 10*	3/4	38	36	57	16	809462
DN 15*	1	43	48	63	20	924522
DN 20	1 1/4	55	50			803714
DN 25	1 1/2	60	58			803715
DN 32	2	68	70			1002783
DN 40	2 1/4	85	84			804762

* with union nut and insert

SS injection valve

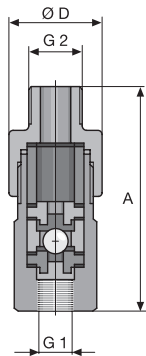
SS housing, PTFE seals spring loaded with ball check (1.4571/1.4581). (Priming pressure approx. 0.5 bar)

	G	B	Ø D2	A	Ø D1	Order no.
		mm	mm	mm		
DN 10*	3/4	38	36	55	3/8	809463
DN 15*	1	43	48	63	1/2	924523
DN 20	1 1/4	55	55			803716
DN 25	1 1/2	60	58			803717
DN 32	2	69	68			1002801
DN 40	2 1/4	85	84			804763

* with union nut and insert

SS Injection valve for Sigma/Meta/Makro TZ-HK

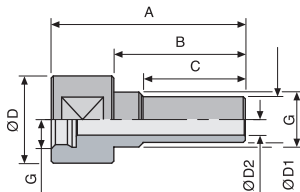
1.4571 housing and valve spring. 1.4401 ball, PTFE seals. (Priming pressure approx. 0.1 bar)



pk_2_028

	G1	G2	Ø D	A	Order no.
			mm	mm	
DN 8	Rp 1/4	Rp 1/2	42	85	803732
DN 10	Rp 3/8	Rp 1/2	42	90	803733

Metering valve adapter PVDF



P_AC_0201_SW

G	B	C	A	Ø D	Ø D1	Ø D2	Order no.
	mm	m	mm	mm	mm	mm	
3/4	63	49	93	42	22	15	1022052
1	65	50	95	47	27	18	1022053
1 1/4	119	104	93	56	27	18	1030508
1 1/2	135	118	171	64	31	20	1030509

2.5 Hydraulic/Mechanical Accessories

2.5.3 Pressure Relief Valves/Overflow Valves

Back pressure valves act to generate a constant back pressure for precise chemical feed, and/or to protect against overdose, or to guarantee metering accuracy with free outlet at atmospheric pressure, where the back pressure is fluctuating below 1 bar, or under positive suction pressure on suction side. They are also used in connection with pulsation dampers for low-pulsation metering.

Relief valves are installed in by-pass, to protect pumps, pipework and housings from excess pressure as a result of operational error or blockage in the main pipework.

The DHV-RM product range are internally-energised, back-pressure-free plunger-diaphragm valves. They are also suitable for use as back pressure valves under conditions of fluctuating back pressure, and as pressure relief valves. They can be assembled anywhere in the pipework system.

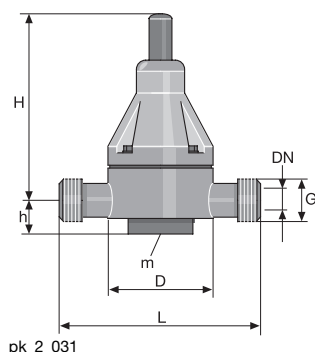
The DH "RM" range of valves replace the "S" and "SR" range.

Important: Back pressure valves are not intended as completely sealed units. All relevant safety measures must be observed when using with dangerous chemicals.

Important: Corresponding safety measures are to be implemented to facilitate use as an overflow valve in connection with sticky media (e. g. milk of lime).

Back pressure valve/relief valve type DHV-RM

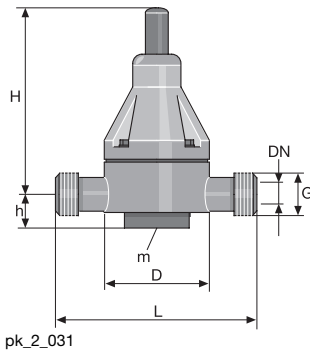
Adjustable pressure 0.5 – 10 bar



Type	G	Nominal diameter	Order no.
PP1	3/4	DN 10	1000031
PP1	1	DN 15	1000032
PP1	1 1/4	DN 20	1000033
PP1	1 1/2	DN 25	1000034
PP1	2	DN 32	1000035
PP1	2 1/4	DN 40	1000036
PCB*	3/4	DN 10	1000037
PCB*	1	DN 15	1000038
PCB*	1 1/4	DN 20	1000039
PCB*	1 1/2	DN 25	1000050
PCB*	2	DN 32	1000051
PCB*	2 1/4	DN 40	1000052
PV1	3/4	DN 10	1000053
PV1	1	DN 15	1000054
PV1	1 1/4	DN 20	1000055
PV1	1 1/2	DN 25	1000056
PV1	2	DN 32	1000057
PV1	2 1/4	DN 40	1000058
TT1	3/4	DN 10	1000059
TT1	1	DN 15	1000060
TT1	1 1/4	DN 20	1000061
TT1	1 1/2	DN 25	1000062
TT1	2	DN 32	1000063
TT1	2 1/4	DN 40	1000064
SS1	3/4	DN 10	1000065
SS1	1	DN 15	1000066
SS1	1 1/4	DN 20	1000067
SS1	1 1/2	DN 25	1000068
SS1	2	DN 32	1000069
SS1	2 1/4	DN 40	1000070

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

2.5 Hydraulic/Mechanical Accessories



pk_2_031

DHV-RM

DN	G	H mm	L mm	h mm	D mm	m
10	3/4	175*	120*	25** / 20***	81	M6
15	1	175*	120*	25** / 20***	81	M6
20	1 1/4	202*	150*	38** / 25***	107	M6
25	1 1/2	202*	150*	38** / 25***	107	M6
32	2	260*	205*	59** / 37***	147	M8
40	2 1/4	260*	205*	59** / 37***	147	M8

* = approx. values;

** = PP, PVC, PVDF;

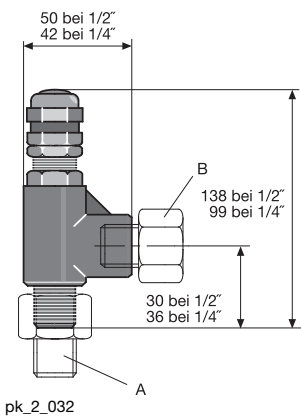
*** = TT, SS

Materials

Type	Housing/Connectors	Plungers	Plunger Seal	Seal/Connectors
PP1	PP	PP	EPDM	EPDM
PC1	PVC	PVC	FPM	FPM
PV1	PVDF	PTFE ²	PTFE ³	FPM
TT1	PTFE with carbon	PTFE ²	PTFE ³	PTFE ³
SS1	1.4571	PTFE ²	PTFE ³	PTFE ³

² PTFE (white)

³ Packing ring PTFE/FPM



pk_2_032

Pressure relief valve/overflow valve for high pressure applications

Use as a pressure relief valve (adjustable) and as a back pressure valve. Overflow valve and corresponding spring must be ordered separately.

Material: stainless steel 316/FPM

Recommended use up to 200 l/h

	Connection	Order no.
Overflow valve	1/4" NPT inner and outer thread	202505
Spring for pressure range	Spring colour	Order no.
3.4 – 24 bar	blue	202519
24.0 – 52 bar	yellow	202520
52.0 – 103 bar	violet	202525
103.0 – 155 bar	orange	202524
155.0 – 207 bar	brown	202523
207.0 – 276 bar	white	202522
276.0 – 345 bar	red	202521

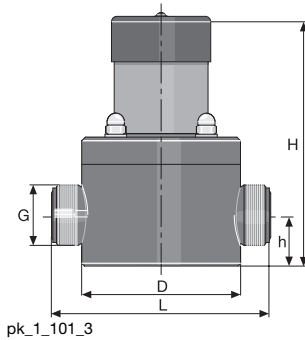
Recommended use up to 300 l/h

	Connection	Order no.
Overflow valve	1/2" NPT inner and outer thread	1005499
Spring for pressure range	Spring colour	Order no.
3.4 – 24 bar	blue	1005500
24.0 – 50 bar	yellow	1005501
50.0 – 100 bar	violet	1005502

2.5 Hydraulic/Mechanical Accessories

Reducing pipe nipple

Connection	Order no.
1/4" NPT inner - 1/4 K outer (A)	359378
1/4" NPT outer - 1/4 inner (B)	359379
1/2" NPT inner - 1/2 K outer (A)	1005503
1/2" NPT outer - 1/2 inner (B)	1005504



Back pressure valve type BPV-DM

Adjustable pressure relief valve for installation in the metering line to generate a constant backpressure or for precise metering given free discharge as well as pre-pressure at the suction side.

Caution: Pressure relief valves are no leak-proof shut-off devices! The installation notes in the operating instructions must be observed!

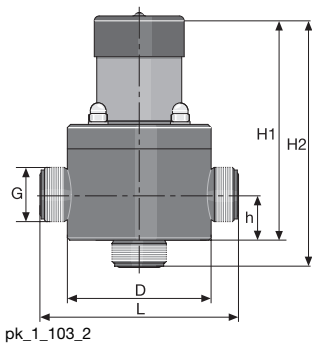
Areas of application: Metering pumps Vario, Sigma/ 1, Sigma/ 2, Sigma/ 3

Pressure: 1.0 – 10 bar , adjustable

G	L ap- prox.	H ap- prox.	D	h
M20x1.5	M20	105	120	65 31
DN 10	G 3/4	120	120	65 31
DN 15	G 1	120	136	88 28
DN 25	G 1 1/2	150	145	98 32.5

Type	G	Nominal diameter	Order no.
PPE	G 3/4	DN 10	1009890
PPE	G 1	DN 15	1009896
PPE	G 1 1/2	DN 25	1009908
PPB	G 3/4	DN 10	1009892
PPB	G 1	DN 15	1009898
PPB	G 1 1/2	DN 25	1009910
PCE	G 3/4	DN 10	1009891
PCE	G 1	DN 15	1009897
PCE	G 1 1/2	DN 25	1009909
PCB	G 3/4	DN 10	1026451
PCB	G 1	DN 15	1026452
PCB	G 1 1/2	DN 25	1026453

2.5 Hydraulic/Mechanical Accessories



G	L	H1	H2	D	h
	ap- prox.	ap- prox.	ap- prox.		
M20x1.5 M20	105	120	143	65	31
DN 10 G 3/4	120	120	148	65	31
DN 15 G 1	120	136	152	88	28
DN 25 G 1 1/2	150	145	173	98	32.5

Pressure relief valve type BPV-SM

Adjustable overflow valve for installation in the metering line to protect against excess pressure. Additional connection for the overflow line at the bottom of the valve body means that no T-piece is required for installation.

Caution: Overflow valves are no leak-proof shut-off devices! The installation notes in the operating instructions must be observed!

Areas of application: Metering pumps Vario, Sigma/ 1, Sigma/ 1, Sigma/ 3

Pressure: 1.0 – 10 bar , adjustable

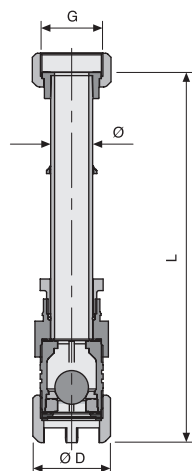
Type	G	Nominal diameter	Order no.
PPE	G 3/4	DN 10	1009893
PPE	G 1	DN 15	1009899
PPE	G 1 1/2	DN 25	1009911
PPB	G 3/4	DN 10	1009895
PPB	G 1	DN 15	1009901
PPB	G 1 1/2	DN 25	1009913
PCE	G 3/4	DN 10	1009894
PCE	G 1	DN 15	1009900
PCE	G 1 1/2	DN 25	1009912
PCB	G 3/4	DN 10	1026446
PCB	G 1	DN 15	1026448
PCB	G 1 1/2	DN 25	1026449

Material combinations

Type	Housing material	Seal material
PPE	PP	EPDM
PPB	PP	FPM B
PCE	PVC	EPDM
PCB	PVC	FPM B

2.5 Hydraulic/Mechanical Accessories

2.5.4 Suction Assembly



P_AC_0203_SW

Suction kit PPE for 1000 l container

Connection	G	Ø mm	Ø D mm	L mm	Order no.
DN 10	3/4	20	47	1,340*	790389
DN 15	1	20	47	1,320*	790394
DN 20	1 1/4	25	55	1,345*	790395
DN 25	1 1/2	32	60	1,315*	790396
DN 32	2	40	74	1,170*	1005524

* The length L can be adapted (shortened) on site by the customer.

Suction fitting PCB for 1,000 l tank*

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

Connection	G	Ø mm	Ø D mm	L mm	Order no.
DN 10	3/4	20	47	1,340*	790387
DN 15	1	20	47	1,320*	790391
DN 20	1 1/4	25	55	1,345*	790392
DN 25	1 1/2	32	60	1,315*	790393
DN 32	2	40	74	1,170*	1005525

* The length L can be adapted (cut) by the customer.

Level switch kit compl. PVDF two-phase

The level switch kit can be ordered together with the suction fittings DN 10 - DN 32.

For level monitoring in the storage tank, two-phase with pre-alarm alarm signalling and deactivation of the metering pump after a further level decrease of 30 mm.

Technical data:

Max. switching voltage: 100 V

Switching current: 0.5 A

Switching capacity: 5 W/5 VA

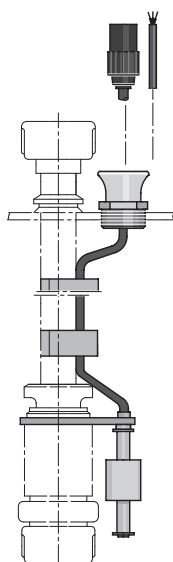
Temperature range: - 10 °C to 65 °C

IP rating: IP 67

Switching mode: for level shortage 2 x NC

Material:

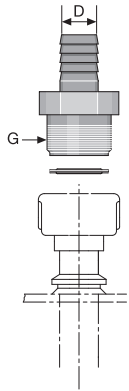
Body level switch PVDF, float PE, mounting strap PVDF, cable bracket PE, anti-kink device PE, cable PE.



pk_2_035

Connection	Type	Cable length m	Order no.
DN10/15	with 3P round plug	3	1034879
DN 20	with 3 pin round plug	3	1005618
DN 25	with 3 pin round plug	3	1005619
DN 32	with 3 pin round plug	3	1005620
DN 10/DN 15	with lead	5	1005621
DN 20	with lead	5	790319
DN 25	with lead	5	790320
DN 32	with lead	5	1005527

2.5 Hydraulic/Mechanical Accessories



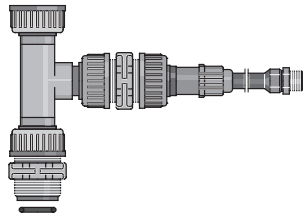
pk_2_140

Intake fitting – hose connection kit

Consisting of PVDF threaded socket and a PTFE-formed composite seal.

Connection	G	Material	Ø D mm	Order no.
DN 10	3/4	PVDF	16	1029486
DN 15	1	PVDF	20	1029487
DN 20	1 1/4	PVDF	25	1029488
DN 25	1 1/2	PVDF	32	1029489
DN 32	2	PVDF	40	1029490

2.5.5 Fittings



pk_1_057

Flushing device

Flushing assemblies for flushing and cleaning liquid end, metering line and metering valve as well as for preventing deposits.

PPE flushing device

Connection	G	Order no.
DN 10	3/4	809917
DN 15	1	809919
DN 20	1 1/4	809921
DN 25	1 1/2	809923

Other sizes on request.

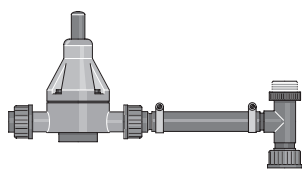
Flushing device PCB*

Connection	G	Order no.
DN 10	3/4	809926
DN 15	1	803960
DN 20	1 1/4	803961
DN 25	1 1/2	803962
DN 40	2 1/4	803963

Other sizes and flushing device automatic for fully automatic flushing of the pump head on request.

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

2.5 Hydraulic/Mechanical Accessories



Relief valves

Consisting of back pressure valve, adjustable between 0.5 and 10 bar. DHV-RM type supplied with connector parts, for assembly directly onto liquid end.

PPE relief valves

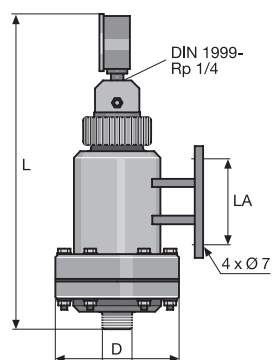
Connection	G	Order no.
G 3/4 - DN 10	3/4	809991
G 1 - DN 15	1	809992

PCB* relief valves

Connection	G	Order no.
G 3/4 - DN 10	3/4	809993
G 1 - DN 15	1	914745

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

2.5.6 Accumulators



Pulsation dampers with separating bubble for providing separation between the gas cushion and metered chemical are used for low-pulsation metering as well as for reducing the resistance to flow in long metering lines and in connection with viscous media. The response pressure of the gas cushion should be approx. 60-80 % of the operating pressure.

Important: When using a pulsation damper, pressure relief valve must be fitted with an adjustable back pressure valve.

PVC accumulators

Accumulator removable, FPM seals.

Volume l	Diaphragm Material	Connection	L mm	Ø D mm	LA mm	Order no.
0.5	Butyl	G 1 DN 15	361	145	100	791691
0.5	FPM	G 1 DN 15	361	145	100	791695
1.0	Butyl	G 1 1/4 DN 20	411	170	100	791692
1.0	FPM	G 1 1/4 DN 20	411	170	100	791696
2.5*	Butyl	G 1 1/2 DN 25	611	170	160	791693
2.5*	FPM	G 1 1/2 DN 25	611	170	160	791697
5.0*	Butyl	G 2 1/4 DN 40	936	170	230	791694
5.0*	FPM	G 2 1/4 DN 40	936	170	230	791698

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

PP accumulators

Accumulator removable, EPDM seals

Volume l	Diaphragm Material	Connection	L mm	Ø D mm	LA mm	Order no.
0.5	Butyl	G 1 DN 15	361	145	100	792128
0.5	FPM	G 1 DN 15	361	145	100	792132
1.0	Butyl	G 1 1/4 DN 20	411	170	100	792129
1.0	FPM	G 1 1/4 DN 20	411	170	100	792133
2.5	Butyl	G 1 1/2 DN 25	611	170	190	792130
2.5	FPM	G 1 1/2 DN 25	611	170	190	792134
5.0	Butyl	G 2 1/4 DN 40	936	170	400	792131
5.0	FPM	G 2 1/4 DN 40	936	170	400	792135

MaharFan

2.5 Hydraulic/Mechanical Accessories

2.5.7 Pulsation damper

In-line pulsation damper PVDF

Function: Hydropneumatic accumulator with baffle

The PVDF accumulator with PTFE diaphragm offers outstanding resistance to chemicals and can therefore be used in connection with a large number of different liquids. The pulsation damper has two liquid connections and can therefore be installed directly in the piping system or be installed diagonally using a blanking plug kit. The baffle in the liquid valve directs the volume flow straight at the diaphragm. This ensures direct contact of the volume flow with the diaphragm. Fluctuations in volume flow are thus optimally balanced out by the enclosed gas volume.

Important: The pulsation dampers must be protected by an overflow valve.

Type	Volume l	Max. Pressure bar	Connection	Order no.
PD In-line	0.2	10	G 1 – DN 15	1026252
PD-Inline	0.2	16	G 1 – DN 15	1033446
PD In-line	0.5	10	G 1 – DN 15	1026736
PD-Inline	0.5	16	G 1 – DN 15	1033447

The preload is approx. 0.6x operating pressure. Medium temperature max. 65 °C. Connecting parts are to be ordered separately.

The accumulator is filled with nitrogen or with compressed air using a commercially available filler fitting (e.g. car tyre inflation fitting) via the VG8 gas filler connection.

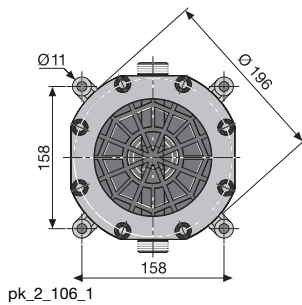
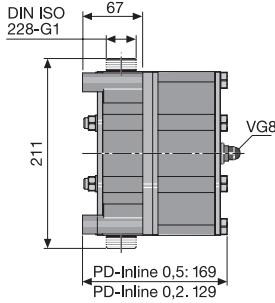
Caution: Nitrogen should be used as the filler gas in connection with combustible liquids. On no account fill with oxygen!

Design: DGRL97/23/EC, other acceptance procedures/countries available on request

Fluid group: 1 and 2

Certificates: Manufacturer's test certificate M DIN55350-18

Manufacturer: HYDAC Technology



Connection/adapter kits

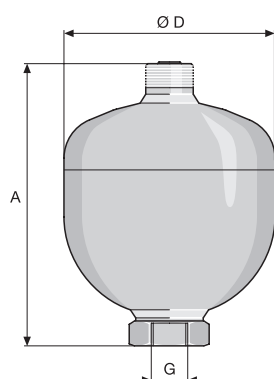
Consisting of PTFE-formed composite seal, insert/adapter and union nut.

Connection PD In-line	Connection Piping	Material	Order no.
G 1 – DN 15	DN 10	PP	1029424
G 1 – DN 15	DN 10	PVC	1029425
G 1 – DN 15	DN 10	PVDF	1029426
G 1 – DN 15	DN 15	PP	1029443
G 1 – DN 15	DN 15	PVC	1029444
G 1 – DN 15	DN 15	PVDF	1029445
G 1 – DN 15	DN 20	PP	1029427
G 1 – DN 15	DN 20	PVC	1029428
G 1 – DN 15	DN 20	PVDF	1029429
G 1 – DN 15	DN 25	PP	1029430
G 1 – DN 15	DN 25	PVC	1029431
G 1 – DN 15	DN 25	PVDF	1029432

Accessories/Spare Parts

	Material	Order no.
Set of plugs	PVDF / PTFE	1029446
Valve tool for Gas valve insert	Steel	1029661
Separating diaphragm	PTFE / NBR	1025235
Gas valve assy	1.4571 / FPM / PTFE / MS	1029513
Gas valve insert	FPM / PTFE / MS	1029514
Gas valve insert	FPM / PTFE / NIRO	1029515
Manometer with connection adapter	-	1031556

2.5 Hydraulic/Mechanical Accessories

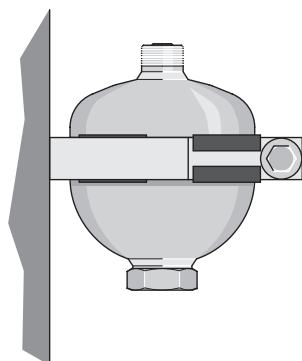


pk_2_101
 Admissible operating temperature: -10 to +80 °C
 Other accumulator/pulsation dampener materials available on request..

Stainless steel pulsation damper

Volume l	Max. Pressure bar	Diaphragm material	Connector G	A mm	Ø D mm	Order no.
0.16	180	NBR	Rp 1/2	124	74	1008609
0.16	180	Butyl	Rp 1/2	124	74	1008610
0.16	180	FPM	Rp 1/2	124	74	1008611
0.32	160	NBR	Rp 1/2	137	93	1008612
0.32	160	Butyl	Rp 1/2	137	93	1008613
0.32	160	FPM	Rp 1/2	137	93	1008644
0.75	140	NBR	Rp 1/2	168	121	1008645
0.75	140	Butyl	Rp 1/2	168	121	1008646
0.75	140	FPM	Rp 1/2	168	121	1008647
2.00	100	NBR	Rp 3/4	224	167	1008648
2.00	100	Butyl	Rp 3/4	224	167	1008649
2.00	100	FPM	Rp 3/4	224	167	1008650
4.00	50	NBR	Rp 3/4	360	170	1008651
4.00	50	Butyl	Rp 3/4	360	170	1008652
4.00	50	FPM	Rp 3/4	360	170	1008653
0.75	140	NBR	Rp 1	168	121	1027617
0.75	140	Butyl	Rp 1	168	121	1027618
0.75	140	FPM	Rp 1	168	121	1027619
2.00	100	NBR	Rp 1 1/2	224	167	1027620
2.00	100	Butyl	Rp 1 1/2	224	167	1027621
2.00	100	FPM	Rp 1 1/2	224	167	1027622
4.00	50	NBR	Rp 1 1/2	360	170	1027623
4.00	50	Butyl	Rp 1 1/2	360	170	1027624
4.00	50	FPM	Rp 1 1/2	360	170	1027625

Mounting clamp for stainless steel pulsation damper



pk_2_102

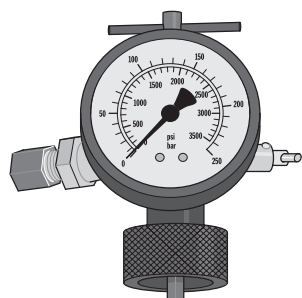
Volume l	Clamps Number of	Ø D mm	Order no.
0.16	1	74	1008664
0.32	1	93	1008665
0.75	1	121	1008666
2.00	1	167	1008667
4.00	2	170	1008668

Inflation and testing unit for pulsation damper

The inflation and testing unit is used to recharge accumulators with nitrogen and check or alter the existing admission pressure.

It contains:

- Checking and filling system with pressure gauge, non-return valve on the inlet, integrated bleed valve, valve stem to open gas inlet valve on accumulator.
- Charging hose, Length 2 m



pk_2_116

Adjustment range	Order no.
up to 25 bar	1008769
up to 100 bar	1008669
up to 250 bar	1008670

2.5 Hydraulic/Mechanical Accessories

Pulsation Damper (in-line)

The pulsation damper is used to produce minimal pulsation metering and to reduce flow resistance in long discharge lines.

The gas cushion between the housing and the line is compressed at a pressure stroke of the metering pump, a partial quantity of the medium being simultaneously metered into the metering line. The excess pressure generated in the gas cushion has the effect that the compressed volume is continued to be transported with the following suction stroke and the original, relieved gas volume is restored.

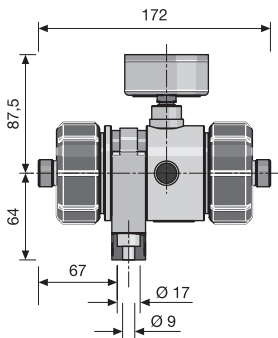
Important notice: The pulsation damper must be used in conjunction with a relief valve.

PP in-line damper

Damper diaphragm is replaceable, seals made from EPDM.

Medium temperature max. 50 °C

Prepressure is approx. 0.6 x operating pressure.



P_AC_0180_SW

	Volume l	Max. pressure bar	Dampener diaphragm	Connection	Order no.
PPE in-line dampener	0.05	10	CSM*	G 3/4 - DN 10	1026769
PPB in-line dampener	0.05	10	FPM	G 3/4 - DN 10	1026772
PDS 2.5	2.50	8	Hypalon	G 2 - DN 32	1001344
PDS 2.5	2.50	8	FPM	G 2 - DN 32	1001345

* chlorosulfonated polyethylene

For other sizes (0.2 l and 0.5 l) see in-line pulsation damper PVDF.

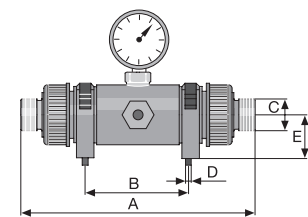
FPM = Fluorine Rubber

The priming pressure is approx. 0.6 x operating pressure.

Max. liquid/chemical temperature 50 °C.

PVC in-line damper

Removable hose, FPM seals.



pk_2_041

Type	Dimensions				
	A	B	C	D	E
PDS 2,5	541	525	G2	11	99,5

	Volume l	Max. pressure bar	Dampener diaphragm	Connection	Order no.
In-line damper PCE	0.05	10	CSM*	G 3/4 - DN 10	1026775
In-line damper PCB	0.05	10	FPM	G 3/4 - DN 10	1026778
PDS 2.5	2.50	8	Hypalon	G 2 - DN 32	1001342
PDS 2.5	2.50	8	FPM	G 2 - DN 32	1001343

* chlorosulfonated polyethylene

For other sizes (0.2 l and 0.5 l) see in-line pulsation damper PVDF.

The priming pressure is approx. 0.6 x operating pressure.

Max. liquid/chemical temperature 50 °C.

2.5 Hydraulic/Mechanical Accessories

2.5.8 Accumulators Without Diaphragm

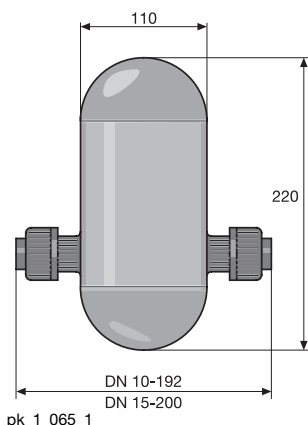
Pulsation dampers with no diaphragm separating the gas cushion and the chemical. They are used to produce minimal pulsation metering and to reduce flow resistance in long pipes and when metering viscous liquids.

Important: When using accumulators or pulsation dampeners it is imperative that relief valve with an adjustable back pressure valve is fitted.

PP in-line pressure accumulator

20 °C - max. operating pressure 10 bar

40 °C - max. operating pressure 6 bar



	Volume	Permissible displacement	Connection	Order no.
	I			
Size II	1	up to 5 ml	d 16-DN 10	243219
Size II	1	up to 5 ml	d 20-DN 15	243220

PVC in-line pressure accumulator

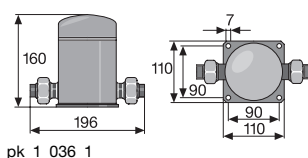
20 °C - max. operating pressure 10 bar

40 °C - max. operating pressure 6 bar

	Volume	Permissible displacement	Connection	Order no.
	I			
Size II	1	up to 5 ml	d 16-DN 10	243204
Size II	1	up to 5 ml	d 20-DN 15	243205

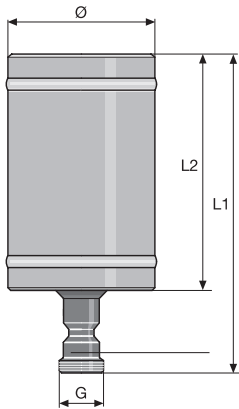
SS in-line pressure accumulator

Max. operating pressure 10 bar



	Volume	Connection	Order no.
	I		
Size II	1	G 3/8-DN 10, seal	914756
Size II	1	R 1 1/2 - DN 15, with insert	914551

2.5 Hydraulic/Mechanical Accessories



pk_2_042

PP pressure accumulator

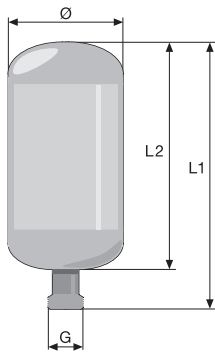
Volume l	Connection	Ø mm	L1 mm	L2 mm	Order no.
2	G 1 1/4 – DN 20, without connection parts	140	290	220	243211
4	G 1 1/2 – DN 25, without connection parts	160	410	320	243212

PVC pressure accumulator

20 °C - max. operating pressure 10 bar

40 °C - max. operating pressure 6 bar

Volume l	Connection	Ø mm	L1 mm	L2 mm	Order no.
2	G 1 1/4 – DN 20, without connection parts	140	290	220	243207
4	G 1 1/2 – DN 25, without connection parts	160	410	320	243208

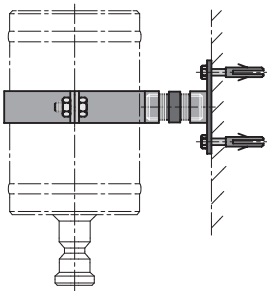


pk_2_033

SS pressure accumulator

Max. operating pressure 10 bar

Volume l	Connection	Ø mm	L1 mm	L2 mm	Order no.
2	G 1 1/4 – DN 20, without connection parts	140	272	222	243214
4	G 1 1/2 – DN 25, without connection parts	160	365	312	243215

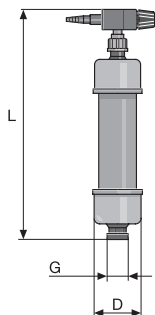


pk_1_061

Wall mounting for Accumulator (without diaphragm)

Consists of pipe clamp, mounting plate and connecting nipple.

	Ø mm	Order no.
for accumulator volume 2 l	110	818502
for accumulator volume 2 l	140	803645
for accumulator volume 4 l	160	803646



pk_2_044

Suction air chamber PVC*

With vacuum pump connector and transparent PVC central housing section, FPM seals.

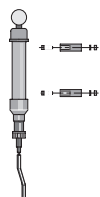
Max. operating pressure 2 bar at 40 °C operating temperature.

Volume l	Connection	L mm	D mm	Order no.
0.5	G 1 – DN 15	380**	78	243591
1.0	G 1 1/4 – DN 20	440**	86	243592
2.5	G 1 1/2 – DN 25	520**	133	243593
5.0	G 2 1/4 – DN 40	630**	155	243594

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

** approx. values

2.5 Hydraulic/Mechanical Accessories



pk_2_045

Vacuum pump kit/extraction aid

For pulsation dampeners, suction side (suction air accumulator).

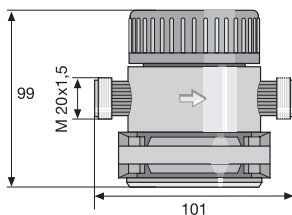
Material	Seal material	Order no.
PVC	EPDM	790019

Suction pressure regulator*

The suction pressure regulator is a spring-loaded diaphragm valve (max. 50 l/h) which opens as a result of the pump suction pressure. This ensures that chemicals cannot flow when the pump is not running, nor can a vacuum be created as a result of tube rupture.

A ball check valve must be fitted to prevent undesirable suction action at the pump outlet (e.g. siphon effect).

An adjustable spring is used to set the maximum required negative pressure for each operating situation up to 400 mbar. For pumps with positive inlet pressure a minimal vacuum of approx. 50 mbar is sufficient. The pump must produce this vacuum in any case, even for an atmospheric pressure inlet.



pk_2_079

Technical data

Max. flow rate	50 l/h
Max. feed pressure	4 bar
Max. intake pressure	0.3 bar
Max. temperature	40 °C
Housing material	PVC
Diaphragm material	FPM
Seal material	FPM
Ball material	Glass
Spring material	Hastelloy C

Type		Connection	Order no.
SDR 50	for solenoid-driven pumps	M 20 x 1.5	1005505
SDR 50	for motor-driven pumps up to 50 l/h	G 3/4 - DN 10	1005506

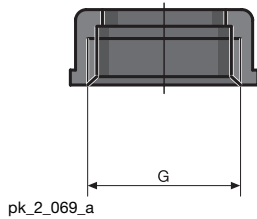
Connections parts to be ordered separately.

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

2.5 Hydraulic/Mechanical Accessories

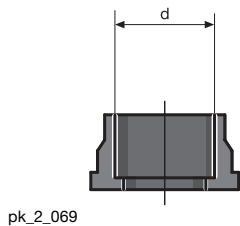
2.5.9 Connector Parts, Seals, Hoses

Union nuts



	Material	Connection	Order no.
Union nut	PP	G 5/8 - DN 8	800665
	PP	G 3/4 - DN 10	358613
	PP	G 1 - DN 15	358614
	PP	G 1 1/4 - DN 20	358615
	PP	G 1 1/2 - DN 25	358616
	PP	G 2 - DN 32	358617
	PP	G 2 1/4 - DN 40	358618
	PP	G 2 3/4 - DN 50	358619
	PVC	G 5/8 - DN 8	800565
	PVC	G 3/4 - DN 10	356562
	PVC	G 1 - DN 15	356563
	PVC	G 1 1/4 - DN 20	356564
	PVC	G 1 1/2 - DN 25	356565
	PVC	G 2 - DN 32	740690
	PVC	G 2 1/4 - DN 40	356567
	PVC	G 2 3/4 - DN 50	356568
	PVDF	G 3/4 - DN 10	358813
	PVDF	G 1 - DN 15	358814
	PVDF	G 1 1/4 - DN 20	358815
	PVDF	G 1 1/2 - DN 25	358816
	PVDF	G 2 - DN 32	1003639
	PVDF	G 2 1/4 - DN 40	358818
	PVDF	G 2 3/4 - DN 50	358819
	1.4571	G 3/4 - DN 10	805270
	1.4571	G 1 - DN 15	805271
	1.4571	G 1 1/4 - DN 20	805272
	1.4571	G 1 1/2 - DN 25	805273
	1.4571	G 2 - DN 32	805274
	1.4571	G 2 1/4 - DN 40	805275
	1.4571	G 2 3/4 - DN 50	805276

Inserts

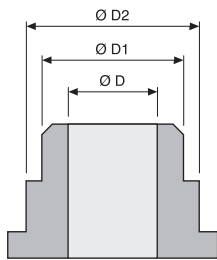


	Material	Connection	Order no.
fusion socket	PP	d 12 - DN 8	800666
	PP	d 16 - DN 10	358603
	PP	d 20 - DN 15	358604
	PP	d 25 - DN 20	358605
	PP	d 32 - DN 25	358606
	PP	d 40 - DN 32	358607
	PP	d 50 - DN 40	358608
	PP	d 63 - DN 50	358609
	PVDF	d 16 - DN 10	358803
	PVDF	d 20 - DN 15	358804
	PVDF	d 25 - DN 20	358805
	PVDF	d 32 - DN 25	358806
	PVDF	d 40 - DN 32	1003640
	PVDF	d 50 - DN 40	358808
	PVDF	d 63 - DN 50	358809

2.5 Hydraulic/Mechanical Accessories

	Material	Connection	Order no.
Fusion coupler, grooved*	PP	d 16 – DN 10	1001785
	PP	d 20 – DN 15	1001395
	PP	d 32 – DN 25	1001787
	PP	d 40 – DN 32	1005105
	PP	d 50 – DN 40	1025960
	PP	d 63 – DN 50	1019207
	PVDF	d 16 – DN 10	358803
	PVDF	d 20 – DN 15	358804
	PVDF	d 32 – DN 25	1001788
	PVDF	d 40 – DN 32	1003640
PVDF	d 50 – DN 40	1025959	
PVDF	d 63 – DN 50	1019208	

* to be used together with ProMinent® formed composite seals PTFE.



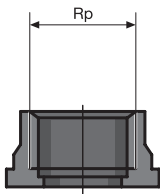
P_AC_0210_SW

	Material	Ø D1 mm	Ø D2 mm	Connection	Order no.
Fusion coupler SS, grooved	1.4404	15.0	19.5	d 12 – DN 10	1006011
	1.4404	21.0	25.6	d 16 – DN 15	1006001
	1.4404	26.7	33.6	d 22 – DN 20	1031457
	1.4404	33.4	39.6	d 28 – DN 25	1031458
	1.4404	42.2	49.6	d 36 – DN 32	1031459
	1.4404	48.3	57.5	d 40 – DN 40	1023643
	1.4404	71.6	60.3	d 54 – DN 50	1031460

	Material	Connection	Order no.
Adhesive socket	PVC	d 16 – DN 10	356572
	PVC	d 20 – DN 15	356573
	PVC	d 25 – DN 20	356574
	PVC	d 32 – DN 25	356575
	PVC	d 40 – DN 32	356576
	PVC	d 50 – DN 40	356577
	PVC	d 63 – DN 50	356578

	Material	Connection	Order no.
Adhesive coupler, grooved*	PVC	d 16 – DN 10	1001784
	PVC	d 20 – DN 15	1001394
	PVC	d 32 – DN 25	1001786
	PVC	d 40 – DN 32	1005104
	PVC	d 50 – DN 40	1025961
	PVC	d 63 – DN 50	1019206

* to be used together with ProMinent® formed composite seals PTFE.

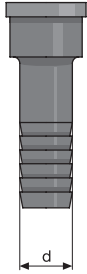


pk_2_069_b

	Material	Connection	Order no.
Threaded pipe socket	1.4571	Rp 3/8 – DN 10	805285
	1.4571	Rp 1/2 – DN 15	805286
	1.4571	Rp 3/4 – DN 20	805287
	1.4571	Rp 1 – DN 25	805288
	1.4571	Rp 1 1/4 – DN 32	805289
	1.4571	Rp 1 1/2 – DN 40	805290
	1.4571	Rp 2 – DN 50	805291

2.5 Hydraulic/Mechanical Accessories

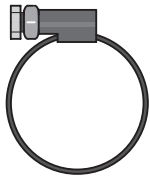
Pressure hose nozzles



pk_2_046

	Material	Connection	Order no.
Pressure hose nozzle	PP	d 16 – DN 10	800657
	PP	d 20 – DN 15	800655
	PP	d 25 – DN 20	800656
	PP	d 32 – DN 25	811418
	PVC	d 16 – DN 10	800554
	PVC	d 20 – DN 15	811407
	PVC	d 25 – DN 20	811408
	PVC	d 32 – DN 25	811409
	PTFE	d 16 – DN 10	811572
	PTFE	d 20 – DN 15	811424
	PTFE	d 25 – DN 20	811425
	PTFE	d 32 – DN 25	811426
	PVDF	d 40 – DN 32	1005106
	1.4571	d 16 – DN 10	810536
	1.4571	d 20 – DN 15	810567
1.4571	d 25 – DN 20	810568	
1.4571	d 32 – DN 25	810569	
1.4571	d 40 – DN 32	1005360	
Hose nozzle, grooved	PVDF	d 16 – DN 10	1002288
	PVDF	d 20 – DN 15	740632
	PVDF	d 25 – DN 20	1006014
	PVDF	d 32 – DN 25	1005560
	PVDF	d 40 – DN 32	1005106

to be used together with ProMinent®formed composite seals PTFE.



pk_1_068

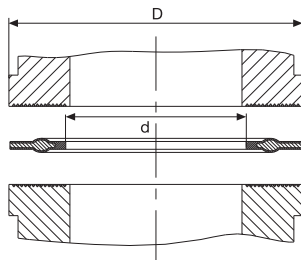
Stainless steel threaded clip

For connecting intake and metering line to pressure hose nozzle.

	Clamping range mm	Order no.
DN 10 clamping ring	16 – 25	359703
DN 15 clamping ring	20 – 32	359705
DN 20 clamping ring	25 – 40	359706
DN 25 clamping ring	32 – 50	359707
DN 32 clamping ring	40 – 60	1002777

PTFE-formed composite seals

Formed composite seals are to be used on grooved sealing surfaces (e.g. pump valve and grooved inserts from ProMinent).

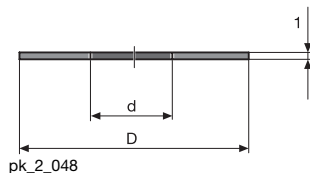


pk_2_130

DN	Material	D mm	d mm	Order no.
DN 10	PTFE	23.8	14.0	1019364
DN 15	PTFE	29.5	18.0	1019365
DN 20	PTFE	38.0	22.6	1019366
DN 25	PTFE	44.0	27.6	1019367
DN 32	PTFE	56.0	34.6	1019353
DN 40	PTFE	62.0	40.6	1019368

2.5 Hydraulic/Mechanical Accessories

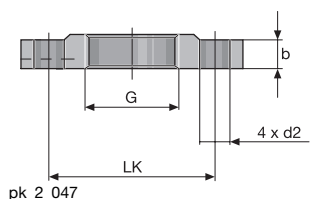
Set of elastomer flat packing seals



Consisting of an EPDM and FPM seal. An elastomer flat packing seal must be used in connection with non-grooved sealing surfaces. Leaks may occur at the connection if a PTFE formed composite seal is used.

	D	d	Order no.
	mm	mm	
DN 10	23.5	14	1024159
DN 15	29.5	18	1024160
DN 25	44.0	28	1024161
DN 32	56.0	36	1024162
DN 40	62.0	41	1029508

Flange mountings

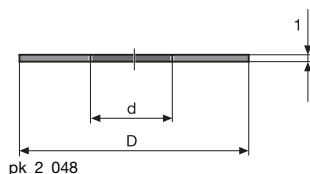


Flange mounting in accordance with DIN 2566 PN 16 for ProMinent® valve sizes. In the case of mounting size 3/4 Inches - DN 10 but increased to DN 15.

Material	G/DN	b	LK	d2	Order no.
		mm	mm	mm	
PP	G 3/4 - DN 15	10	65	14	803945
PP	G 1 - DN 15	10	65	14	803930
PP	G 1 1/4 - DN 20	13	75	14	803931
PP	G 1 1/2 - DN 25	13	85	14	803932
PP	G 2 1/4 - DN 40	18	110	18	803933
PP	G 2 3/4 - DN 50	25	125	18	803934
PP	G 2 1/2 - DN 65	20	145	18	1020465
PVC	G 3/4 - DN 15	10	65	14	806760
PVC	G 1 - DN 15	10	65	14	803920
PVC with saddle	G 1 - DN 15	10	65	14	1006882
PVC	G 1 1/4 - DN 20	13	75	14	803921
PVC	G 1 1/2 - DN 25	13	85	14	803922
PVC with saddle	G 1 1/2 - DN 25	13	85	14	1006883
PVC	G 2 - DN 32	14	100	18	1006878
PVC	G 2 1/4 - DN 40	18	110	18	803923
PVC	G 2 3/4 - DN 50	25	125	18	803924
PVC	G 2 1/2 - DN 65	20	145	18	1020464
1.4404	G 3/4 - DN 15	10	65	14	803946
1.4404	G 1 - DN 15	10	65	14	803940
1.4404	G 1 1/4 - DN 20	13	75	14	803941
1.4404	G 1 1/2 - DN 25	13	85	14	803942
1.4404	G 2 1/4 - DN 40	18	110	18	803943
1.4404	G 2 3/4 - DN 50	25	125	18	1020453
1.4404	G 2 1/2 - DN 65	20	145	18	1010700

Other flange versions are available on request.

Flat seals for previous flange mountings



Material	G/DN	D	d	Order no.
		mm	mm	
PTFE	G 3/4 - DN 15	52	12	483938
PTFE	G 1 - DN 15	52	17	483924
PTFE	G 1 1/4 - DN 20	62	22	483925
PTFE	G 1 1/2 - DN 25	72	27	483926
PTFE	G 2 - DN 32	83	33	1007541
PTFE	G 2 1/4 - DN 40	92	40	483928
PTFE	G 2 3/4 - DN 50	108	50	483929
PTFE	G 3 - DN 65	130	60	1020466
FPM	G 3/4 - DN 15	52	12	483939
FPM	G 1 - DN 15	52	17	483942
FPM	G 1 1/4 - DN 20	62	22	483943
FPM	G 1 1/2 - DN 25	72	27	483944

2.5 Hydraulic/Mechanical Accessories

Material	G/DN	D mm	d mm	Order no.
FPM	G 1 1/2 - DN 25	83	33	1007542
FPM	G 2 1/4 - DN 40	92	40	483946
FPM	G 2 3/4 - DN 50	108	50	483947
FPM	G 3 - DN 65	130	60	1020467

Flange mountings as DIN 2629. To order for Meta HK and Makro TZ HK plunger metering pumps.

FPM = Fluorine Rubber

Straight male adapter stainless steel

Swagelock system, stainless steel SS 316 (1.4401) for connection of pipework to liquid end and valves with internal thread and for SB version.



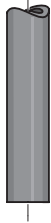
pk_1_028

	Order no.
6 mm - ISO 7 R 1/4	359526
8 mm - ISO 7 R 1/4	359527
12 mm - ISO 7 R 1/4	359528
12 mm - ISO 7 R 3/8	359520
16 mm - ISO 7 R 3/8	359521

Suction line

for metering pumps and accessories. We recommend using the original lines to ensure the mechanical connection in case of clamping ring fittings as well as compressive strength and chemical resistance.

On request, food grade version is possible.



pk_1_013

Material	oØ x iØ mm		Permissible operating pressure bar	Order no.
Flexible PVC	19 x 15	for DN 10	0.5*	037020
Flexible PVC	22 x 18	for DN 15	0.5*	037022

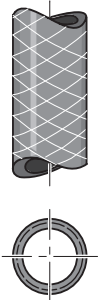
Caution:

The resistance of soft PVC hoses is not identical with that of hard PVC. Please observe the resistance for PVC soft as well as the cleaning instructions when using the equipment for foodstuff applications (see homepage).

* permissible operating pressure at 20 °C, chemical resistance and proper connection assumed.

Suction and discharge line

On request, food grade version is possible.



pk_1_060

Material	oØ x iØ mm		Permissible operating pressure bar	Order no.
Fabric reinforced flexible PVC	24 x 16	for DN 10	16*	037040
Fabric reinforced flexible PVC	27 x 19	for DN 15	16*	037041
Fabric reinforced flexible PVC	34 x 25	for DN 20	12*	037043
Fabric reinforced flexible PVC	40 x 30	for DN 25	10*	1000527
Fabric reinforced flexible PVC	52 x 40	for DN 32	7*	1005508
Stainless steel pipe 1.4435	6 x 5		175*	015738
Stainless steel pipe 1.4435	6 x 4		185*	015739
Stainless steel pipe 1.4435	8 x 7		160*	015740
Stainless steel pipe 1.4435	12 x 10	Sold by meter	200*	015743

Caution:

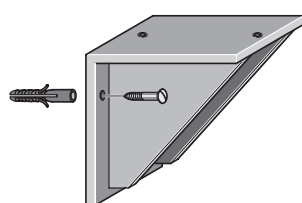
The resistance of soft PVC hoses is not identical with that of hard PVC. Please observe the resistance for PVC soft as well as the cleaning instructions when using the equipment for foodstuff applications (see homepage).

For socket welded and PVC cemented rigid PP and PVDF pipe, pipes and fittings with a pressure rating of PN 16 or PN 10 bar are to be used.

* permissible operating pressure at 20 C, chemical resistance and proper connection assumed.

2.5 Hydraulic/Mechanical Accessories

2.5.10 Metering Pump Wall Mounting Bracket

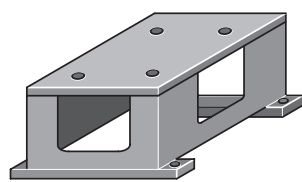


pk_2_036

Metering pump wall mounting bracket for Vario, Sigma and Meta

PP wall mounting, holds pump parallel to the wall, includes fixings.
 Measurements: L x W x H, 230 x 220 x 220 mm

wall mounting bracket	for Vario, Sigma and Meta	Order no. 1001906
------------------------------	---------------------------	-----------------------------



pk_2_037

Floor mounting for Sigma, Meta

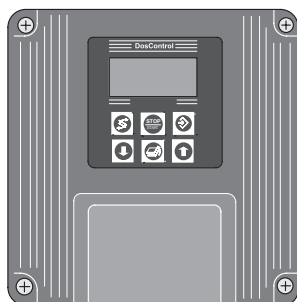
For mounting metering pump, includes fixings. Material PP.
 Measurements: L x W x H 250 x 160 x 150 mm

floor mounting		Order no. 809910
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2.6 Electrical Accessories

2.6.1

Controllers



pk_2_049

DosControl dosing controller

The DosControl metering controller is a universal controller for controlling motor metering pumps and solenoid valves. The design of the controller is based on the hardware of the D1C W controller range. The following functions are available as standard:

1. as preselection counter (default)

- Adjustment of preset stroke rate batch volume via keypad and LCD display (0-29,999 strokes)
- Start contact via keypad or external contact
- Metering pump stroke position response signal via pulse generator relay or stroke sensor
- Metering pump control via power relay (230 V, 5 A), i.e. on/off of voltage supply to motor pump
- Alarm relay output, i.e. combined error message for customer use
- Level monitor, connection for 1-phase level switch

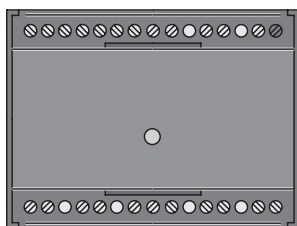
2. as proportional control

- Control of the pump via:
 - potential-free contact input, e.g. of water meter with setting of the transfer factor via keypad and LCD display
 - or internal control via adjustable stroke rate
 - or analogue control via 0/4-20 mA input with adjustable maximum stroke rate
- Metering pump control via power relay (230 V, 5 A), i.e. on/off of voltage supply to motor pump
- Alarm relay output, i.e. combined error message for customer use
- Level monitor, connection for level switch

	Order no.
DosControl 230 V/50/60 Hz	1001306
DosControl 115 V/50/60 Hz	1001925
Mounting kit for control panel installation	792908

Note:

The DosControl dosing controller is configured with "Control setting selection" as per standard. Other configurations are available on request/to order.



pk_2_050

Fourfold contact repeater

Contact repeater with four reed relays for externally controlled simultaneous pulse pacing of up to four metering pumps of any type, or of other devices, e.g. summing counters.

In plastic snap in housing for C bar or wall mounting.

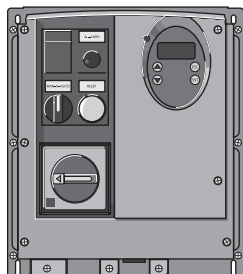
Mains connection:	230 V, 50/60 Hz
Max. contact rating	24 V, 50 mA
Dimensions H x W x D	76 x 112 x 114
Enclosure rating	IP 40

	Order no.
Fourfold contact repeater	914753

2.6 Electrical Accessories

2.6.2 Speed Controllers

Frequency converter for speed controller



Frequency converters are installed in the IP 55 protective enclosure and are suitable for the motor output ratings listed below.

Integrated control unit with various functions that are optimally matched to ProMinent metering pumps: Selectable external/internal control, internal/external reset, temperature monitoring and control via PTC sensor, separate motor fan control as well as evaluation of diaphragm rupture monitoring.

Internal control: via potentiometer
 External control: 0/4-20 mA correspond to 0-50 (60) Hz output frequency

Frequency converters can be used in the range of -10 °C to 40 °C.

P_AC_0185_SW

Max. motor output kW	For pump type	Voltage supply	Voltage supply, external fan	Control range	Order no.
0.37	Sigma/ 2, Meta, Hydro/ 2, MF1a, DR15	1 ph 200-240 V	230 V 50/60 Hz	1:10	1030684
0.75	Sigma/ 3, Hydro/ 3, MF2a	1 ph 200-240 V	230 V 50/60 Hz	1:10	1030685
1.50	Makro TZ, MF2a, MF3a, DR150	1 ph 200-240 V	230 V 50/60 Hz	1:10	1030686
2.20	Makro TZ, MF3a, DR150	1 ph 200-240 V	230 V 50/60 Hz	1:10	1030687
4.00	MF3a, MF4a	3 ph 380-500 V	3 ph 380 V	1:5	1030688

Dimensions and weight

Order no.	B mm	H mm	C mm	Weight kg
1030684	210	240	163	6.3
1030685	210	240	163	6.3
1030686	215	297	192	8.8
1030687	230	340	222	10.7
1030688	230	340	222	10.7

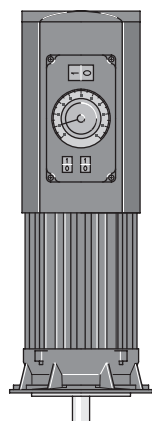
Variable speed motors with integrated speed controller

Externally controllable with 0/4-20 mA

Voltage supply: 1 ph 230 V, 50/60 Hz (0.37-1.1 kW)
 Voltage supply: 3 ph 400 V, 50/60 Hz (1.5-3 kW)

The following functions are integrated in the terminal box cover:

- Start/stop switch
- Switch for manual/external operation
- Potentiometer for speed control in manual operation.



pk_2_103

Max. motor output kW	For pump	Control range	Flange Ø mm	Order no.
0.18	Sigma/ 1	1:20	120	1020229
0.37	Sigma/ 2	1:20	105	1008568
0.37	Hydro/ 2, Meta	1:20	160	1008569
0.55	Sigma/ 3	1:20	160	1008570
0.75	Hydro/ 3	1:20	160	1008571
1.10	Makro TZ (TZMB)	1:20	160	1008572
1.50	Makro TZ	1:20	160	1008573
2.20	Makro TZ	1:20	200	1008574
3.00	Makro/ 5	1:20	250	1027482

MaharFan

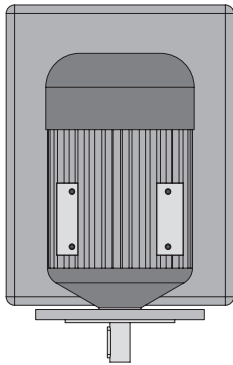
2.6 Electrical Accessories

Operating unit for setting control parameters

	Order no.
With sub-D connector	1020585
With Western connector	1029493

Note:

Version suitable for use in ambient temperatures up to 55°C available on request.



P_AC_0211_SW

Explosion-protected compact drive with integrated frequency converter Protection class II 2G Eexde II C T4

Voltage supply:	400 V, 50/60 Hz
Model:	IM B5
Inputs:	2 x analogue 4...20 mA 2 x digital (includes frequency input 0...100 kHz)
Outputs:	2 x analogue 4...20 mA 4 x digital 0/+20 V, 10 mA 1 x frequency output 0...10 kHz, 0/18...24 V, max. 5 mA
Terminal strip connections:	ON/OFF Locking RESET

Winding and temperature monitoring via PTC resistor with integrated evaluation.

External control circuit: 230 V with internal fuse.

Note:

Delivery on request

Max. motor output kW	For pump	Control range	Flange Ø mm
0.55	Hydro/ 2, Sigma/ 3, Orlita MF	1:10	80
0.75	Hydro/ 3, Orlita MF	1:10	80
1.50	Makro TZ, Orlita MF	1:10	200
2.20	Makro TZ, Orlita MF	1:10	200
4.00	Makro/ 5, Orlita MF	1:10	250

Pumps with compact drive are always delivered on a frame.

2.6 Electrical Accessories

2.6.3 General Electrical Accessories



pk_1_085

Universal control cable

For control of the metering pump via potential-free contact, analogue standard signal and for potential-free ON/ OFF switching - switch-on function.

For Vario, S1Ca, S2Ca and S3Ca with 5P round plug made of plastic and 5-wire cable with open end.

	Cable length m	Order no.
Universal cable	2	1001300
Universal cable	5	1001301
Universal cable	10	1001302



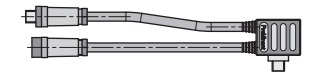
pk_1_055

Profibus adaptor, IP65 protection

from 5-way M12 eurofast to 9-way Sub-D connector, length approx. 300 mm

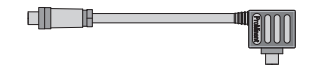


pk_1_009



P_AC_0208_SW

		Order no.
Y-adaptor 2 x M12 x 1 male/female 9-pin, sub D plug	9-pin, sub D plug	1005838
Adapter 1 x M12 x 1 male 9-pin, sub D plug	9-pin, sub D plug	1005839
Y-adaptor 2 x M12 x 1 male/female 9-pin, sub D plug	M12 x 1 male	1024216
Adapter 1 x M12 x 1 male 9-pin, sub D plug	M12 x 1 male	1024219



P_AC_0209_SW

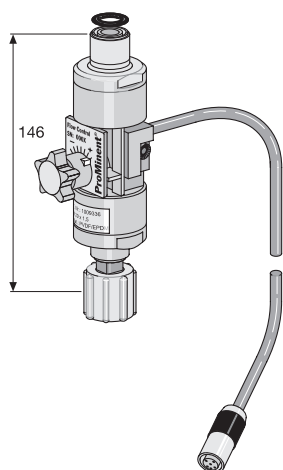
USB adaptor

To connect a laptop to metering pumps in the gamma and Sigma series.

The USB adaptor can be used to transfer timer programmes created using ProTime software to the pump. You will find the ProTime software on our home page.

	Order no.
USB Adapter	1021544

2.6 Electrical Accessories



pk_1_086_2

Flow Control adjustable flow monitor

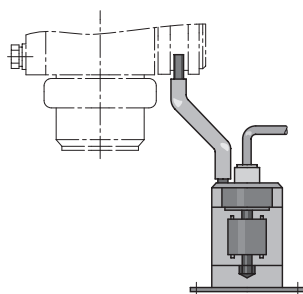
fits series Sigma/ 1 / 2 / 3 in PVT and SST material versions. Supplied complete with connection cable for assembly directly onto the liquid end.

Monitors individual strokes in accordance with float and orifice principle. Using the adjustment screw, the partial dose flowing past the float can be matched to the set lift volume in such a way that any significant shortfall on the target dose will trigger an alarm signal. Using the Sigma Control (S1Ca/S2Ca/S3Ca) the permissible number of uncompleted full strokes can be selected in the range 1-127, enabling optimum matching to your process demands. Recommended operation for Sigma Control is "external switching operation".

Materials

Flow meter: PVDF
 Float: PTFE-coated
 Seals: FPM/EPDM

Flow Control	Seal material	For pump	Order no.
Flow Control DN 10	EPDM	Sigma/ 1	1021168
Flow Control DN 10	FPM	Sigma/ 1	1021169
Flow Control DN 15	EPDM	Sigma/ 1 / 2	1021170
Flow Control DN 15	FPM	Sigma/ 1 / 2	1021171
Flow Control DN 25	EPDM	Sigma/ 2 / 3	1021164
Flow Control DN 25	FPM	Sigma/ 2 / 3	1021165
Flow Control DN 32	EPDM	Sigma/ 3	1021166
Flow Control DN 32	FPM	Sigma/ 3	1021167



pk_1_087

Diaphragm failure indicator

Triggers alarm and switches off metering pump in the event of diaphragm rupture. Consists of float switch, PVC/PE, Acrylic container, connectors and connecting hose. Voltage free making contact, max. contact voltage 60 V AC, 300 mA, 18 W.

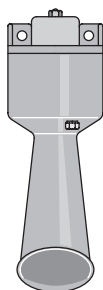
	For pump	Order no.
Diaphragm failure detector	Meta, Makro TZ	803640
diaphragm failure monitor	Makro/ 5	1019528

Siren

HUW 55, 230 V, 50 - 60 Hz,

165 x 60 x 65, 85 phon, indoor.

(e.g. in association with fault indicating relay or relay controller)



pk_1_088

	Order no.
Horn HUW 55	705002

Warning light

Wall mounted, red, 230 V, 50 - 60 Hz.

(e.g. in association with fault indicating relay, pulse generator or relay controller)

	Order no.
Indicator lamp, red	914780

2.7 Special Accessories

2.7.1 Custom Accessories



pk_2_105_1

FPM dosing diaphragm

As standard diaphragm but made of FPM, and without PTFE coating. Designed specifically for crystallising chemicals, e.g. silicate. Max. operating pressure 6 bar.

For pump type	Order no.
Vario 12017, 12026, 12042	811308
Vario 10025, 09039, 07063	811309
Vario 06047, 05075, 04120	811310
Sigma/ 1 12017, 12035, 10050	1010281
Sigma/ 1 10022, 10044, 07065	1010284
Sigma/ 1 07042, 04084, 04120	1010287
Sigma/ 2 16050, 16090, 16130	1018953
Sigma/ 2 07120, 07220, 04350	1018984
Sigma/ 3 120145, 120190, 120270, 120330	1006564
Sigma/ 3 070410, 070580, 040830, 041030	1006566

Additional custom diaphragms for other pump types are available on request.

FPM = Fluorine Rubber



pk_1_103

Liquid end valve springs

with approx. 0.05-0.1 bar pre-pressure for spring loading of the valve balls in the liquid end. Recommended to improve the valve function and to increase the metering accuracy, in particular for viscous metering media above 50 m Pas.

	Order no.
1.4571 valve spring 0.05 bar for 1/4" connector on Meta/Makro TZ HK	469461
1.4571 valve spring 0.05 bar for 3/8" connector on Makro TZ HK	469462
Hastelloy C valve spring 0.1 bar DN 10	469114
Hastelloy C valve spring 0.1 bar DN 15	469107
Hastelloy C valve spring 0.1 bar DN 20	469451
Hastelloy C valve spring 0.1 bar DN 25	469452



pk_1_104

Injection valve springs

With approximately 0.5-1 bar priming pressure for increased metering reproducibility and prevention of suction and siphoning effect.

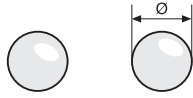
	Order no.
Hastelloy C valve spring 0.5 bar DN 10	469115
Hastelloy C valve spring 1 bar DN 10	469119
Hastelloy C valve spring 0.5 bar DN 15	469108
Hastelloy C valve spring 1 bar DN 15	469116
Hastelloy C valve spring 0.5 bar DN 20	469409
Hastelloy C valve spring 1 bar DN 20	469135
Hastelloy C valve spring 0.5 bar DN 25	469414
Hastelloy C valve spring 1 bar DN 25	469136
Hastelloy C valve spring 0.5 bar DN 40	469104
Hastelloy C valve spring 1 bar DN 40	469137

Hastelloy C valve spring with FEP coating

	Order no.
Hastelloy C/PVDF valve spring 0.5 bar for DN 10	818515
Hastelloy C/PVDF valve spring 0.5 bar for DN 15	818516
Hastelloy C/PVDF valve spring 0.5 bar DN 10	818517
Hastelloy C/PVDF valve spring 0.5 bar DN 25	818518
Hastelloy C/PVDF valve spring 0.5 bar DN 40	818519

MahaFan

2.7 Special Accessories



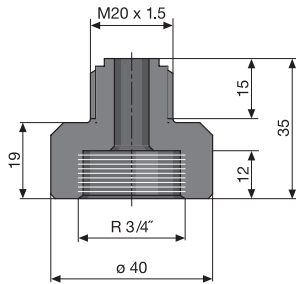
pk_1_102

Custom valve balls

Ball valves and accessories for on site retrofitting of metering pumps when the standard material is unsuitable. Supplied loose only.

	Order no.
PTFE diameter 11.0 for DN 10 valve	404260
PTFE diameter 16.0 for DN 15 valve*	404259
PTFE diameter 20.0 for DN 20 valve	404256
PTFE diameter 25.0 for DN 25 valve	404257
PTFE diameter 38.1 for DN 40 valve	404261
Ceramic diameter 11.1 for DN 10 valve	404277
Ceramic diameter 16.0 for DN 15 valve*	404275
Ceramic diameter 20.0 for DN 20 valve	404273
Ceramic diameter 25.0 for DN 25 valve	404274
Ceramic diameter 38.1 for DN 40 valve	404278

* not suitable for PVT valve material.

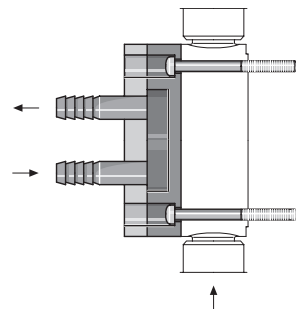


pk_2_058

Adapter for DN 10, 3/4" (Vario, g/ 5) to M20 x 1,5

Fits 12 x 9 hose connector set

	Material	Order no.
Adapter from DN 10, 3/4" inner thread to M20 x 1.5 outer thread	PP	800815
Adapter from DN 10, 3/4" inner thread to M20 x 1.5 outer thread	PVC	800816

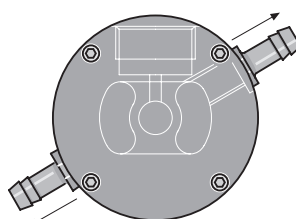


pk_2_059

Cooling/heating equipment, diaphragm metering pumps

For stainless steel liquid end. For assembly, including retrofitting, onto liquid end. 10 mm diameter connectors for hot/cold chemicals with locking screws. Dimensions in mm. Outer diameter A, pitch circle diameter LK.

For pump	Ø A mm	Ø LK mm	Order no.
Meta, Makro TZ FM 130, FM 260	145	127	803751
Meta, Makro TZ FM 530	180	164	803752
Makro TZ FM 1500/2100	248	219	806005
Makro/ 5 FM 4000			1020683
Sigma/ 1 FM 50/65			1025500
Sigma/ 1 FM 120			1025501
Sigma/ 2 FM 130			1002178
Sigma/ 2 FM 350			1002179
Sigma/ 3 FM 330			1006455
Sigma/ 3 FM 1000			1006456
Hydro/ 2/3 FMH 025/060			1024743



pk_2_064

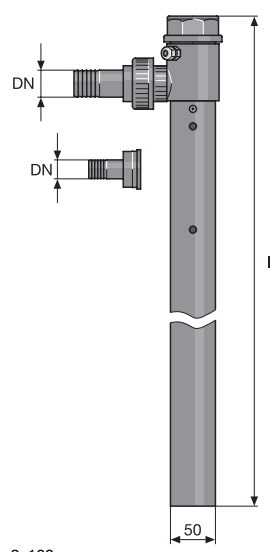
Cooling/heating equipment, plunger metering pumps

The cooling/heater is installed in the liquid end. 10 mm diameter connectors. Cannot be retrofitted.

For pump	Order no.
Sigma HK - 08 S	on request
Meta/Sigma HK - 12,5 S	803551
Meta/Sigma HK - 25 S	803552
Meta/Sigma HK - 50 S	803553

Cooling/heater for Makro TZ HK on request.

2.7 Special Accessories



Suction lance for motor metering pumps*

Universal PVC suction lances with level switch in protective tube Ø 50 incorporating non-return valve (not detachable), hydraulic connector with PVC hose grommets.

DN 10/15 is fitted with a non-return ball valve (borosilicate glass ball; EPDM seals) and DN 20/25, DN 32 is fitted with an EPDM non-return valve.

Size	Float switch	Level connection	l mm	Order no.
DN 10/15	2-stage	3 pin round plug 3 m lead	1,350	1008606
DN 20/25	1-stage	no lead**	1,350	1008607
DN 32	1-stage	no lead**	1,305	1008608

** el. connection in the head of the suction lance with litz wires

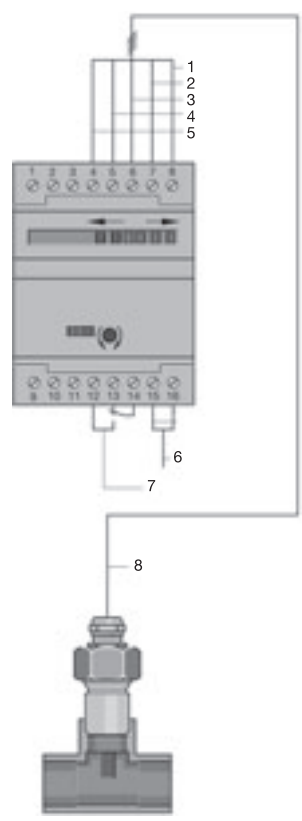
Custom materials/custom lengths/custom functions available on request.

* **Caution:** The product in the material PVC contains adhesive joints with Tangit. Please note the resistance of the Tangit adhesive.

pk_2_100

Thermal dosing monitor

The flow monitor consists of a probe and monitor electronics. It operates on the principle of heat transference from the water flow and can be used with all solenoid and motor driven metering pumps at or above a continuous metering quantity of 0.5 l/h.



Monitor electronics

The fault indicating relay is triggered when normally flowing liquid ceases to flow (switching power 250 V/4 A). At this point the relay opens for 3-20 sec (adjustable). The switch status is indicated by LED. Continuous flow volume adjustment.

Enclosure rating	Enclosure IP 40 Terminal box IP 00
Permissible ambient temperature	0...60 °C

	Electrical connection	Order no.
Evaluation electronics	230 V, 50/60 Hz	792886
Probe T		792889

Single-cell Teflon sensor

Outer thread	G 1/2
Operating temperature	-25 °C to 80 °C medium temperature
Lead length	Fixed input lead. Cable length 2 m
Max. lead length	100 m
Enclosure rating	IP 67
Pressure resistance	5 bar
Adjustment range	1 cm/s to 4 m/s

- pk_1_119
- 1 grey
 - 2 black
 - 3 brown
 - 4 blue
 - 5 white
 - 6 Mains voltage
 - 7 Relay flow control
 - 8 Connecting for sensor

	Order no.
Probe S	792888

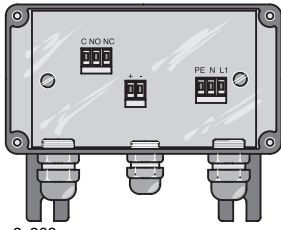
Single-cell, metal-clad sensor, material stainless steel material no. 1.4571

Outer thread	G 1/2
Operating temperature	-25 °C to 80 °C medium temperature
Lead length	Fixed power cable, 2 m
Max. lead length	100 m
Enclosure rating	IP 67
Pressure resistance	30 bar
Adjustment range	1 cm/s to 5 m/s

Required connector parts (T-piece, bypass) must be ordered separately..



2.7 Special Accessories



pk_2_063

Switch amplifier for namur type stroke sensor

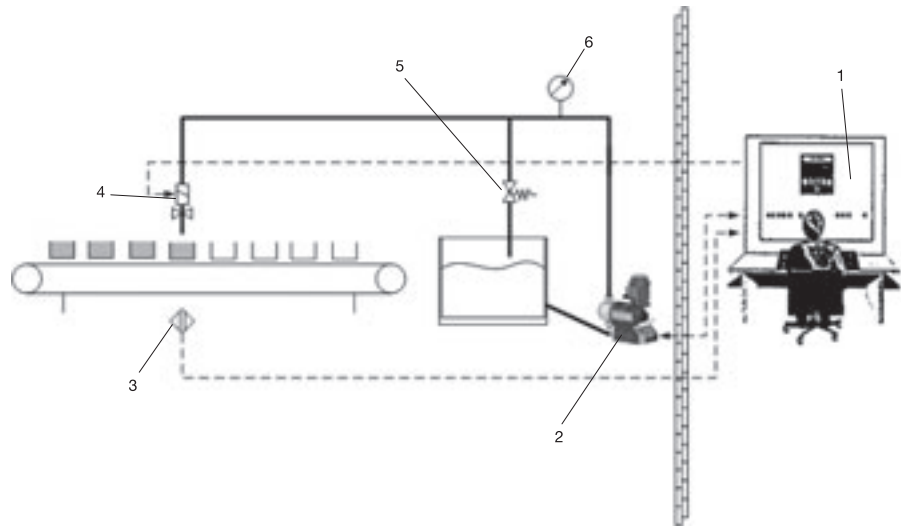
With a voltage free relay output (to take 220 V, 5 A). Controls, for example, a mechanical meter. The relay output can be inverted by an internal switch so that the relay may be actuated by a covered or uncovered stroke sensor face. A jumper may be used to switch the relay to pulse output, i.e. the relay is activated for approx. one second per switch action. Actuated relay is indicated by an LED. The plastic housing (133 x 72 mm) with transparent cover and an enclosure rating of IP 55 has two brackets for wall mounting and PG threaded connectors.

	Mains connection:	Order no.
Switch amplifier for namur type stroke sensor	230 V/50 Hz	914839

2.8 Application Examples

2.8.1 Metering Of Highly Viscous Substances

Product: **Motor pumps**
 Metered medium: **Viscous filler**
 Sector: **Electronics**
 Application: **Part filling**



- 1 Process control system PLS (master)
- 2 Metering pump, type Sigma (field unit)
- 3 Proximity switch
- 4 Solenoid valve
- 5 Overflow valve
- 6 Pressure gauge

pk_2_113

Tasks and requirements

- Metering of a viscous filler in templates
- Metering accuracy $\pm 2\%$
- Varying filling volumes

Operating conditions

- The templates pass the metering point on a conveyor in „stop and go“ operation.
- The pump is started via a proximity switch at the conveyor (external contact control).

Notes on application

- The start is always to begin with a pressure stroke, i.e. controlled stop of the diaphragm at the end of the suction stroke.
- When varying the filling volume, a stroke length as large as possible is to be chosen - this improves the accuracy.
- Short and stable suction and metering lines, no pulsation damper - thus reduction of the flexible (moved) volume.
- If possible work with feed such that the suction lines are always filled with liquid even during longer idle times.
- In order to prevent dripping of the residual quantities, a solenoid valve is required for filling.

Solution

- Metering pump type Sigma Control version with PROFIBUS® connection
- Overflow valve, solenoid valve

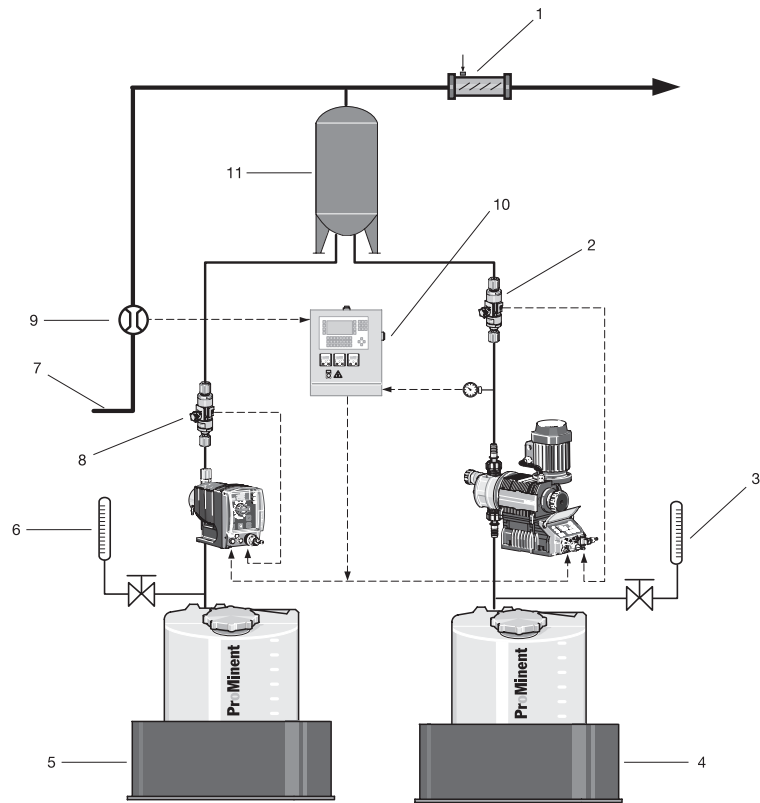
Benefit

- Monitoring of the metering pump and setting of the dosing amount (number of strokes) by PLS in the control centre
- Less electrical installation work required
- Integration into the complete process flow through PROFIBUS®
- Safe and precise metering thanks to overflow and solenoid valves

2.8 Application Examples

2.8.2 Mixing Two Reagents

Product:	Motor pumps, solenoid pumps
Metered medium:	Chlorine activator, oxidant (NaOCl)
Sector:	Process industry, power stations
Application:	Biocide handling in cooling water systems



- 1 Static mixer
- 2 Flow Control
- 3 Feed measuring unit
- 4 NaOCl solution
- 5 Chlorine activator
- 6 Feed measuring unit
- 7 Motive water
- 8 Flow Control
- 9 Flow rate measurement
- 10 Control cabinet
- 11 Reaction chamber

pk_2_114_1

Tasks and requirements

- Biocide treatment of cooling water systems used in combination with chlorination process.
- Chlorine activator is mixed with NaOCl to produce hypobromide acid (HOBr) as an active biocide compound. HOBr is particularly effective at pH values in the range from 7.5 to 9.0.
- A level of 0.5 g/m³ of active HOBr over a period of 1 hour is to be secured twice a day for the purpose of disinfecting the cooling water.

Operating conditions

- Biologically polluted water
- Automatic activation of metering pumps.

Application information

- The mixing ratio of chlorine activator and NaOCl (12.5 % solution) is 10 l to 26 – 52 l. The exact composition is to be determined by means of tests (at customer).
- Metering pump with timer function activates the second pump and is therefore responsible for batch metering.
- Motor pump is protected against overload by a pressure gauge with pressure switch. The pressure gauge is connected to the control system.
- The control system monitors the installation and switches off the flow meter in response to corresponding signals (fault signalling).

MaharFan

2.8 Application Examples

Solution

- gamma/ L metering pump with timer function (possibly with external timer)
- Sigma/ 1 metering pump, control version
- Feed monitoring, flow control
- Feed measuring facility
- Pressure gauge with pressure switch

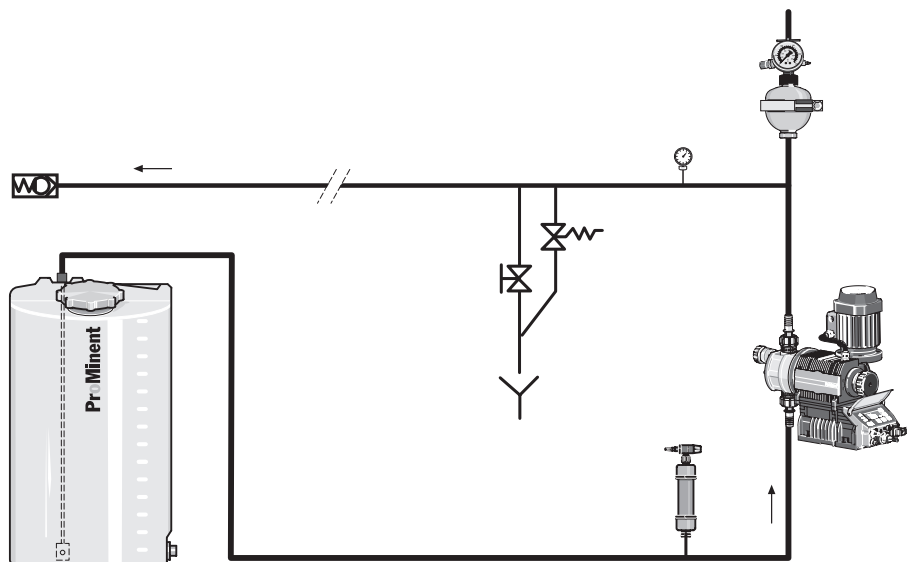
Benefits

- Efficient disinfection in water containing alkali and ammoniac.
- Inexpensive raw material basis that is also stable and non-corrosive.
- High degree of reliability ensured by flow monitoring.
- Simple and effective facility for optimising the chemical composition in connection with feed measuring device.

2.8 Application Examples

2.8.3 Safe And Reliable Chemical Metering With Reduced Pulsation

Product: **Metering pump, accessories**
 Metered medium: **High-viscosity chemicals**
 Application: **Use of pulsation damper (PD)**



pk_2_117

Tasks and requirements

- For process-technical reasons, a low-pulsation metering flow is desired.
- Mass accelerating forces during metering, caused by the oscillating movement of the displacement body in connection with the piping geometry, must be reduced.
- Cavitation-free process flow

Operating conditions/environment

- Long suction/pressure lines
- Line cross-section with small dimensions
- Metering of high-viscosity, inert media

Notes on application

- Pressure surges increase with increasing metering line length and smaller diameter; these may result in impermissible pressure peaks.
- For longer pipings as well as for media of higher viscosity, the need for a PD use using a piping calculation programme is to be evaluated.
- In an oscillating motor metering pump, the maximum flow rate is approx. 3 times greater than the mean, in a solenoid pump approx. 5 times as great. This is to be considered when designing pipings without PD.
- PD should be preloaded with compressed air or nitrogen at approx. 60-80 % of the operating pressure to be expected.

Solution

- ProMinent® metering pumps
- Pressure-relief/overflow valves
- Pulsation dampers

Benefit

- Safe installation which prevents damages to pumps and pipings
- Precise metering through avoiding cavitation
- Compensation of the delivery flow fluctuations

3 Process Metering Pumps

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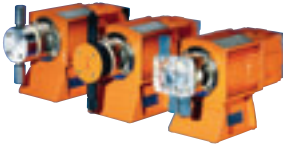
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3.0 Overview Process Metering Pumps

3.0.1

Product Overview



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Diaphragm Metering Pump EXtronic®

The metering of liquid media in explosive areas makes extremely high demands on the components used.

The metering pumps of the series ProMinent EXtronic®, Zone 1, Group II, as well as in the version EXBa S for firedamp-endangered mining operations are optimally designed for use in explosive operating sites.

Capacity range: 0.23 - 60 l/h; 25 - 1.5 bar



pk_2_132

Hydraulic Diaphragm Metering Pumps Hydro

The optimal solution in the lower capacity range up to 100 bar. The two series Hydro/ 2 and 3 can be flexibly combined as single-end, double end or multiplex station. In the standard version with multilayer safety diaphragm and integrated overflow valve, the pump meets the highest safety requirements.

Standard material combinations

- PVT (PVDF liquid end/PFTE multilayer diaphragm)
- SST (SS liquid end/PFTE multilayer diaphragm)
- HCT (Hastelloy liquid end/PFTE multilayer diaphragm)
- Capacity range Hydro/ 2: 3 - 72 l/h; 100 - 25 bar
- Capacity range Hydro/ 3: 10 - 180 l/h; 100 - 25 bar



pk_2_133

Diaphragm, Hydraulic Diaphragm, Plunger Metering Pumps Makro TZ

The right modular solution for any application, be it simple, mechanical diaphragm pumps or high-tec hydraulic diaphragm pumps or highly robust plunger pumps. In the pressure range up to 10 bar, a.o. highly chemical-resistant plastics for the liquid end types are standardised, e.g. PP, PVC, PTFE.

- Capacity range TZMb (mech. actuated diaphragm pump): 260 - 2.100 l/h; 12 - 4 bar
- Capacity range TZHb (hydr. actuated diaphragm pump): 300 - 1.200 l/h; 16 - 10 bar
- Capacity range TZKa (plunger metering pump): 8 - 1.141 l/h; 320 - 11 bar



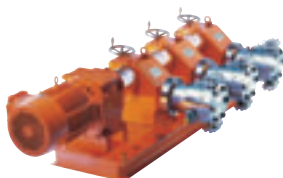
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Diaphragm, Hydraulic Diaphragm, Plunger Metering Pumps Makro/ 5

The Makro/ 5 is a powerful metering pump for numerous types of applications, available as mechanically linked diaphragm pump, high-tec hydraulic diaphragm pump and highly robust plunger pump.

The basic version can be upgraded with modules to a double liquid end or multiplexed station.

- Capacity range M5Ma (mech. actuated diaphragm pump): 1.540 - 4.000 l/h; 4 bar
- Capacity range M5Ha (hydr. actuated diaphragm pump): 450 - 6.000 l/h; 25 - 6 bar
- Capacity range M5Ka (plunger metering pump): 38 - 6.000 l/h; 320 - 6 bar



pk_2_135

Hydraulic Diaphragm Metering Pump ORLITA® MF

The metering pumps of the MF series are modular in construction and basically comprise drive mechanism, crank and liquid end as separate functional groups. The hydraulic diaphragm liquid end is equipped with a PTFE dual diaphragm system with integrated rupture indicator. An integrated relief valve protects the pump against overload.

The pumps have an extraordinary suction capacity (up to 8 m suction height).

They guarantee trouble-free operation thanks to a pump-internal overflow and diaphragm protection and thanks to a valveless and almost nonwearing anti-cavitation device.

The standard capacity range of the 6 MF series is: 2 l/h - 28 m³/h at 700 - 9 bar

3.0 Overview Process Metering Pumps



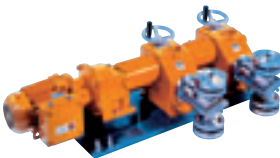
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Hydraulic Diaphragm Metering Pump ORLITA® Mh

Like the MF series, this pump is also extremely flexible in its application, however, designed for highest pressures (up to 3.000 bar). The pump ends are equipped with dual stainless steel diaphragms, designed for maximum operational reliability, are low-wear and can be fitted without special tools.

A relief valve as well as an automatic vent valve for the hydraulic chamber are integrated in the pump end. The valveless forced anti-cavitation of leaked hydraulic fluid is non-wearing and guarantees optimum metering accuracy.

The standard capacity range of the 6 Mh series is: 1 - 773 l/h; pressure up to 900 bar (special version up to 3.000 bar).



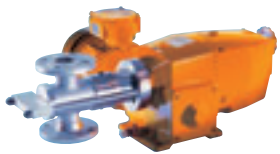
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Plunger Metering Pump ORLITA® PS

The PS pump series convinces by a particularly high hydraulic efficiency, excellent self-cleaning, and a low pressure loss. The PS pumps can be used in a wide range of temperatures (up to 400 °C), are easy to maintain, attractively priced and robust.

The plunger packing can also be adjusted in operation using the front clamp screw.

The standard capacity range of the 6 series is: 1 l/h - 37m³/h; 400 - 8 bar.



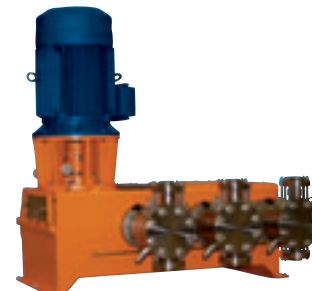
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Valveless Plunger Metering Pump ORLITA® DR

Valveless plunger-type metering end. It functions by means of a simultaneous oscillating and rotating plunger action. The displacement body itself opens and closes the suction and pressure side. The pump thus does not need any valves and can be operated in a broad stroke frequency range.

This functional principle facilitates very precise metering of high to highly viscous media (up to 1,000,000 mPas). Even liquids with solid fractions can be smoothly metered by the valveless plunger metering pumps. Products with a temperature between -40 °C and +400°C can be continuously delivered from 0-100 %.

The standard capacity range of the 2 series is: 1 - 4,000 l/h; 400 - 4 bar.



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Process Diaphragm Pump TriPower 674

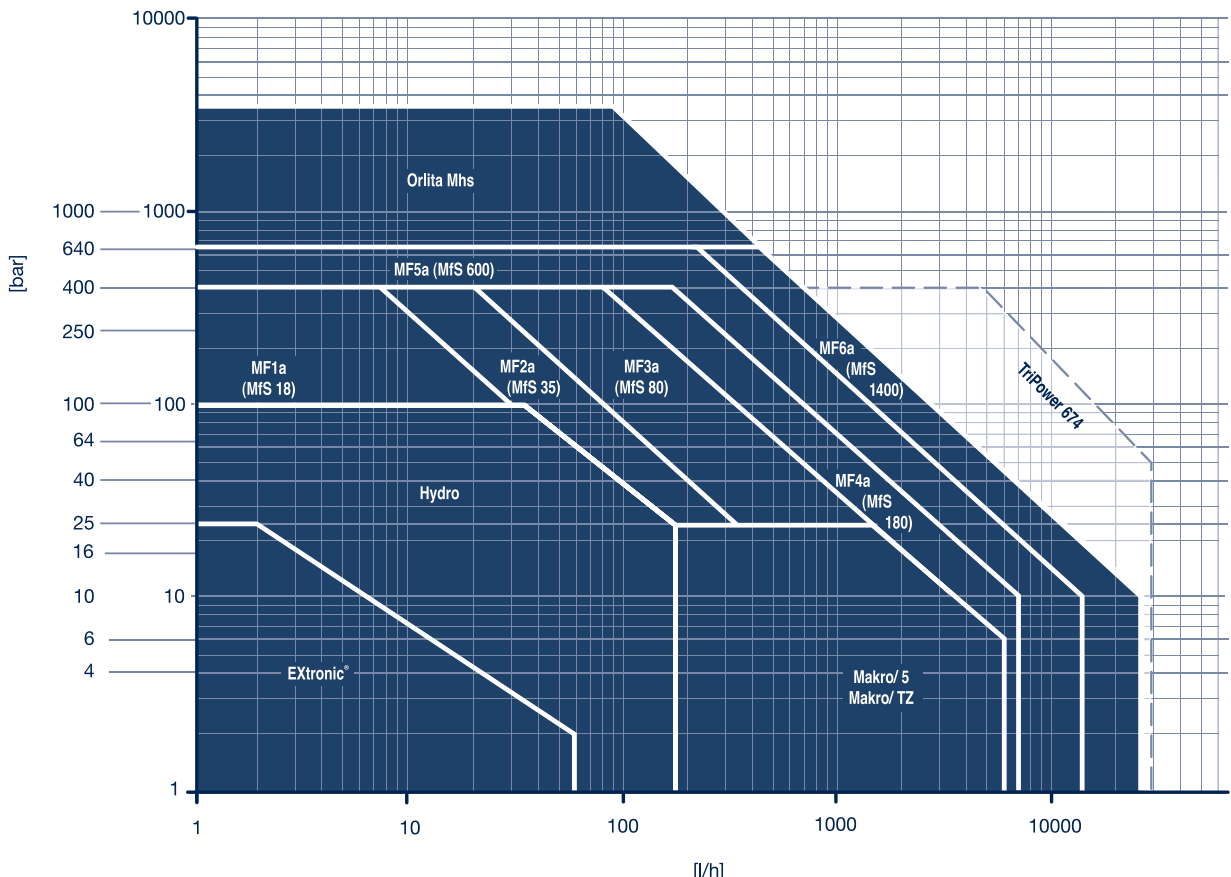
The process diaphragm pump TriPower 674 by ProMinent offers high performance with smallest footprint. The pump delivers up to 38 m³/h at pressures of up to 415 bar. Thanks to the compact TriPower design, the pump has a considerably smaller footprint than conventionally designed pumps.

The proven Orlita® MF liquid head offers optimal safety with PTFE dual diaphragm system and integrated overflow valve.

Standard output range: 4-38 m³/h; 415-50 bar.

3.0 Overview Process Metering Pumps

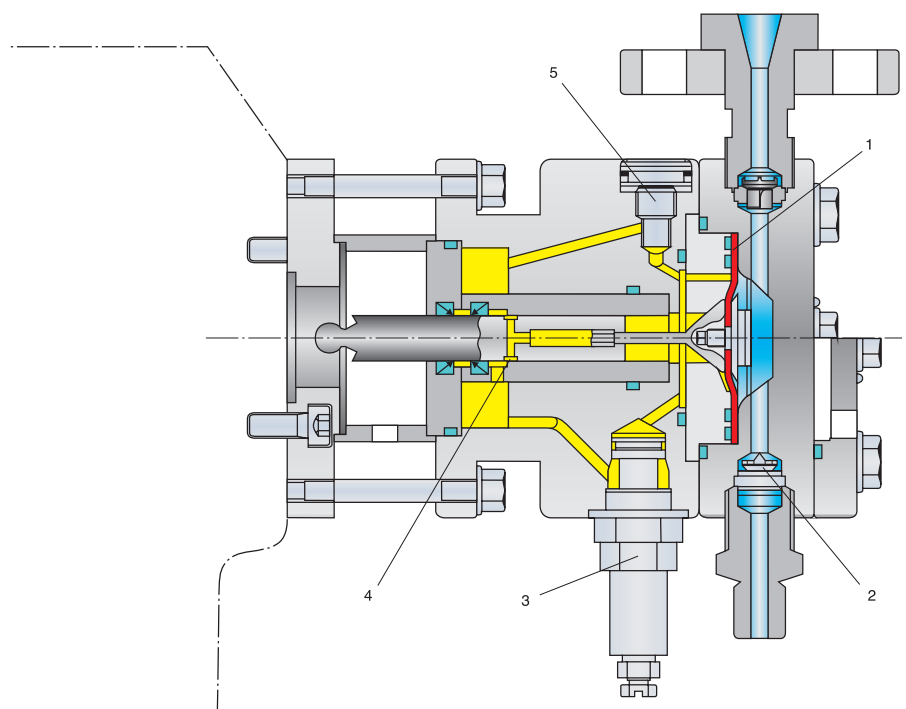
3.0.2 Selection Guide



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Back pressure [bar] as a function of feed rate [l/h]

Detail On ORLITA® MF Delivery Unit

Pump end with hydraulically displaced diaphragm. The dual PTFE diaphragm hermetically seals off the areas in contact with the product from the hydraulic component.



- 1 PTFE multilayer safety diaphragm
- 2 Valves with self-cleaning effect
- 3 Integrated pressure relief valve
- 4 Oil anti-cavitation device
- 5 Gas vent valve

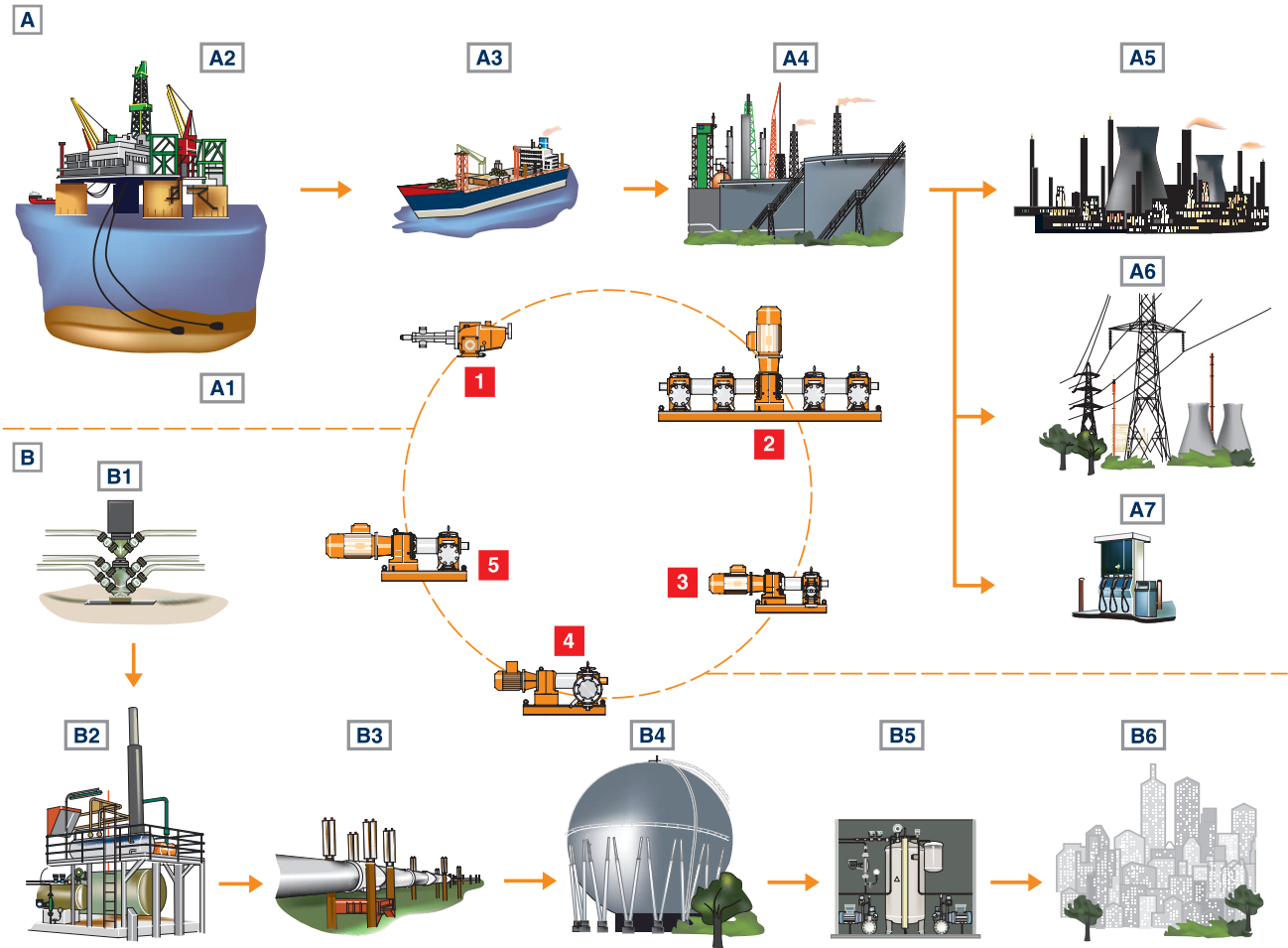
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3.0 Overview Process Metering Pumps

3.0.3 Installation Applications

- | | |
|---|---|
| A Oil industry | B Gas industry |
| A1 Well | B1 Well |
| A2 Platform | B2 Gas treatment/gas drying |
| A3 Transportation (tanker, pipeline) | B3 Transportation (tanker, pipeline) |
| A4 Refinery | B4 Gas storage tank |
| A5 Petrochemical | B5 Local distribution/odorization |
| A6 Industry/power plants | B6 Industry/power plants |
| A7 Filling stations | |



1 Valveless piston-type dosing pump DR

2 Multiplexed dosing pumps

3 Piston-type dosing pump PS

4 Hydraulic diaphragm-driven dosing pump Mh (metal diaphragm)

5 Hydraulic diaphragm-driven dosing pump Mf (PTFE diaphragm)

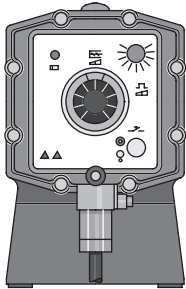
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3.1 ProMinent EXtronic® Metering Pumps

3.1.1 ProMinent EXtronic® Diaphragm Metering Pumps

The series ProMinent EXtronic®, approved according to the new EU EX Directive 94/9/EU (ATEX), for metering of liquid media in gas-explosive operating sites as well as firedamp-endangered mining operations.

- Operating voltage 500 V. The application field for ProMinent EXtronic® equipment is thereby expanded, e.g. in conjunction with the new EXBb M version for firedamp-endangered mining operations.
- The short stroke solenoid drive is combined with the liquid ends of the gamma series. The SB material version is recommended for use with flammable media.
- The control inputs „external contact“, „analogue“ and „potential-free ON/OFF“ are available as EXBb intrinsically safe - approved according to EN 50020.
- Type 2501 SSM/SBM with diaphragm failure messaging, e.g. for the use in gas odorisation



pk_1_020

Control type „Internal“ Stroke length adjustment 1:10, Stroking rate adjustment 1:25, total adjustment range 1:250.

The output ranges from 0.19l/h to 60l/ at backpressures of up to max. 25 bar.

The ProMinent EXtronic® is tested and approved according to the harmonised EU regulations of EN 50014/50018 for the type of protection „flameproof enclosure“. It possesses the highest degree of protection of this IP rating. This approval is recognised in the EU countries as well as by many other foreign authorities. The short-stroke solenoid and the complete pump control are integrated in the pump housing. Protection against contact and moisture according to DIN 40050 is IP 65, also with opened front cover.

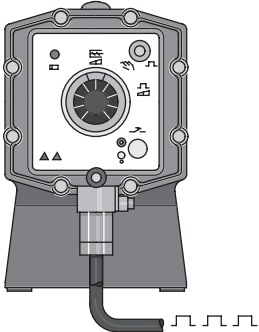
This means:

- 6 No ingress of dust; complete protection against contact
- 5 Protection against water projected by a nozzle from any direction

The liquid ends with the proven DEVELOPAN® metering diaphragms with Teflon coating and the proven liquid ends made of plexiglass, polypropylene (PP), PTFE Teflon® stainless steel, material no. 1.4404, and SB for flammable media guarantee highest operating safety, also for the ProMinent EXtronic® .

For outgassing media, self-venting liquid ends made of plexiglass (NS) and PVC (PS) are available.

The micrometer adjusting knob for the stroke length guarantees precise adjustment and a high level of reproducibility. In addition, a comprehensive range of Ex-protected accessories and pump accessories is available.



pk_1_019

Control type „External Contact“ Stroke length adjustment 1:10, Stroke frequency control 0 - 100% dependant upon external switch contacts. *)

EXBg G for the use in areas at risk by gasses and vapours IP rating EEx [i, a] d IIC T6

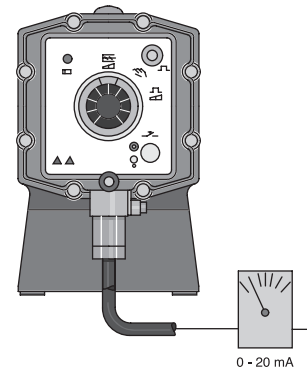
This means:

- EEx - equipment conforms to European standards
- [i, a] - control input intrinsically safe if two independent faults occur
- d - type of protection, flameproof enclosure
- IIC - explosion group II for all explosion-endangered areas with the exception of mining, sub-group IIC (includes IIA and IIB)
- T6 - temperature class, permissible for gases and vapours with ignition temperature > 85°C

EXBb M for use in firedamp-endangered mining operations (IP rating EEx d I/II C T6

This means:

- EEx - equipment conforms to European standards
- d - type of protection, flameproof enclosure
- IC - explosion group I for firedamp-endangered mining operations
- IIC - explosion group II for all other explosion-endangered areas, sub-group IIC (includes IIA and IIB)
- T6 - temperature class, permissible for gasses and vapours with ignition temperature > 85 °C. This is the highest temperature class, it includes T 1 through T5



pk_1_018

Control type „Analogue“ Stroke length adjustment 1:10, Stroke frequency control 0 - 100% proportional to analogue signal 0/4 - 20 mA. *)

*) The electrical cables for mains connection, contact or analogue control are already connected to the pump. Observe all instructions concerning connecting and activating electrical systems.

3.1 ProMinent EXtronic® Metering Pumps

Technical data

Type	Delivery rate at max. back-pressure			Delivery rate at medium back-pressure			Number of strokes Strokes/min	oØ x iØ mm	Suction head mWC	Shipping weight PP, NP, TT-SS kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke				
EXBb										
1000	10.0	0.19	0.03	5.0	0.27	0.04	120	6 x 4	1.5	12
2501	25.0	1.00	0.15	20.0	1.10	0.17	120	6 x 4	5.0	
1601	16.0	1.10	0.15	8.0	1.30	0.18	120	6 x 4	5.0	12
1201	12.0	1.70	0.23	6.0	2.00	0.28	120	6 x 4	5.0	12
0803	8.0	3.70	0.51	4.0	3.90	0.54	120	6 x 4	3.0	12
1002	10.0	2.30	0.31	5.0	2.70	0.38	120	8 x 5	5.0	12
0308	3.0	8.60	1.20	1.5	10.30	1.43	120	8 x 5	5.0	12
2502	25.0	2.00	0.28	20.0	2.20	0.31	120	8 x 5	5.0	13
1006	10.0	6.00	0.83	5.0	7.20	1.00	120	8 x 5	5.0	13
0613	6.0	13.10	1.82	3.0	14.90	2.07	120	8 x 5	5.5	13
0417	3.5	17.40	2.42	2.0	17.90	2.49	120	12 x 9	4.5	13
2505	25.0	4.20	0.64	20.0	4.80	0.73	110	8 x 5	5.0	16
1310	13.0	10.50	1.59	6.0	11.90	1.80	110	8 x 5	5.0	16
0814	8.0	14.00	2.12	4.0	15.40	2.33	110	12 x 9	5.0	16
0430	3.5	27.00	4.09	2.0	29.50	4.47	110	DN 10	5.0	16
0260	1.5	60.00	9.09				110	DN 15	1.5	16
EXtronic® metering pumps for high viscosity media										
1002	10.0	2.30	0.31	5.0	2.70	0.38	120	DN 10	1.8	
1006	10.0	6.00	0.83	5.0	7.20	1.00	120	DN 10	2.0	
1310	10.0	10.50	1.59	5.0	11.90	1.80	110	DN 15	2.8	
0814	8.0	14.00	2.12	4.0	15.40	2.33	110	DN 15	2.0	
EXtronic® metering pumps with self-venting liquid end										
1601	16.0	0.66	0.09				120	6 x 4	1.8	
1201	12.0	1.00	0.14				120	6 x 4	2.0	
0803	8.0	2.40	0.33				120	6 x 4	2.8	
1002	10.0	1.80	0.25				120	6 x 4	2.0	

* shipping weight for EXBb M version... additional 14 kg

** The data given here represent guaranteed minimum values, achieved with medium water at room temperature.

Materials in contact with medium

	Liquid end	Suction/pressure port	Gaskets	Balls (connection 6-12 mm)	Balls (connection DN 10 and DN15)
PP1	Polypropylene	Polypropylene	EPDM	Ceramic	Borosilicate glass
PP4*	Polypropylene	Polypropylene	EPDM	-	Ceramic
NP1	Plexiglass	PVC	FPM A	Ceramic	Borosilicate glass
NP3	Plexiglass	PVC	FPM B	Ceramic	-
NS3**	Plexiglass	PVC	FPM B	Ceramic	-
PS3**	PVC	PVC	FPM B	Ceramic	-
TT1	PTFE with carbon	PTFE with carbon	PTFE	Ceramic	Ceramic
SS ..	Stainless steel W. No. 1.4404	Stainless steel W. No. 1.4404	PTFE	Ceramic	Stainless steel W. No. 1.4404

* PP4 with valve springs made of Hastelloy C

** NS3 and PS3 with valve springs made of Hastelloy C, valve insert made of PVDF
FPM = fluororubber

3.1 ProMinent EXtronic® Metering Pumps

3.1.2 Identcode Ordering System

EXBb	Enclosure rating
G	Gas-EX-proof
M	Fire and explosion protection, permitted liquid end material: stainless steel and PTFE
Capacity	
	bar l/h
1000	10 0.19
2501	25 1.00 (only available in SS and SB)
1601	16 1.10
1201	12 1.70
0803	8 3.70
1002	10 2.30
0308	3 8.60
2502	25 2.00
1006	10 6.00 (available in SS and SB only)
0613	6 13.10
0417	4 17.40
2505	25 4.20 (only available in SS and SB)
1310	13 10.50 (only available in NP, PP4, SS and SB)
0814	8 14.00
0430	4 27.00
0260	2 60.00
Liquid end material	
PP1	Polypropylene with EPDM O-ring
PP4	HV Polypropylene for high viscosity liquids with EPDM O-ring and Hastelloy C valve springs (Types 1002, 1006, 1310 and 0814 only)
NP1	Acrylic with FPM A O-ring *
NP3	Acrylic with FPM B O-ring
NS3	Acrylic with FPM B O-ring, self bleeding (Types 1601, 1201, 0803 and 1002 only)
PS3	PVC with FPM B O-ring, self bleeding (Types 1601, 1201, 0803 and 1002 only)
TT1	PTFE with carbon, PTFE seal
SS1	Stainless steel, no. 1.4404, with PTFE seal
SS2	Stainless steel with 1/4" NPT internal thread, PTFE seal
SB1	Stainless steel with ISO 7 Rp 1/4 internal thread, ISO 7 Rp 1/2 on type 0260, PTFE seal (recommended for flammable materials)
SSM	as SS1, with diaphragm rupture indicator Type 2501 only
SBM	as SB1, with diaphragm rupture indicator Type 2501 only
Valve springs	
0	No springs
1	With 2 valve springs, 1.4571, 0.1 bar
Electrical connection	
A	230 V, 50/60 Hz
B	115 V, 50/60 Hz
E	500 V, 50/60 Hz
Cable length 5m, open end	
Control type	
0	manual stroking rate adjustment via potentiometer
1	External contact
2	Analogue 0-20 mA
3	Analogue 4-20 mA
4	External contact, intrinsically safe [i,a]
5	Analogue 0-20 mA, intrinsically safe [i,a]
6	Analogue 4-20 mA, intrinsically safe [i,a]
7	manual with zero volts ON/OFF
8	manual with zero volts ON/OFF, intrinsically safe [i,a]
Control Variants	
0	With potentiometer (control type 0, 7 and 8 only)
1	With manual auxiliary key for maximum stroking rate (control type 1-6 only)
2	With manual auxiliary frequency changer key for maximum stroking rate (control type 1-6 only)
Approved/Language	
0	BVS - Europe, German, 100 V - 500 V
1	BVS - Europe, English, 100 V - 500 V
2	FM - USA, English, 115 V
3	CSA - Canada, English, 115 V, 230 V

* FPM = Fluorine Rubber

3.1 ProMinent EXtronic® Metering Pumps

Connectors

PP, NP, NS, PS and TT	6, 8 and 12 mm	hose sleeve with clamping ring fitting
SS1/SSM stainless steel	6, 8 and 12 mm	Swagelok screw fitting system
SS2 stainless steel	6, 8 and 12 mm	internal thread 1/4" NPT
SB1/SBM stainless steel	6, 8 and 12 mm	internal thread ISO 7 Rp 1/4
PP and NP	DN 10 and DN 15	hose sleeve d 16 - DN 10 and d 20 - DN 15
TT	DN 10 and DN 15	fusion joint d 16 - DN 10 and d 20 - DN 15 (PVDF)
SS1 stainless steel	DN 10 and DN 15	insert, internal thread R 3/8 and R 1/2
SB1 stainless steel	DN 10 and DN 15	internal thread ISO 7 Rp 1/4 and 1/2

Reproducible metering accuracy $\pm 2\%$ when correctly installed, refer to operating instructions manual.
 $\pm 5\%$ for type 1601 with self bleeding liquid end.

Permissible ambient temperature $-20\text{ }^{\circ}\text{C}$ to $+45\text{ }^{\circ}\text{C}$.

Power supply: 500 V $\pm 6\%$, 50/60 Hz
 230 V $\pm 10\%$, 50/60 Hz
 115 V $\pm 10\%$, 50/60 Hz

Protection: IP 65, insulation class F

Medium power consumption at max. stroking rate (W)/peak power consumption at dosing stroke (A) at 230 V, 50/60 Hz:

EXBb	Type 1000, 2501, 1601, 1201, 0803, 1002, 0308	13 W/0.7 A	at 120 strokes/min
EXBb	Type 2502, 1006, 0613, 0417	26 W/1.7 A	at 120 strokes/min
EXBb	Type 2505, 1310, 1014, 0430, 0260	45 W/2.0 A	at 110 strokes/min

Included in delivery: Metering pump with 5 m mains cable, connector set for hose/pipe connections as described in tables.

3.1.3 Spare Parts Kits

Spare parts kits ProMinent EXtronic®

Supplied for PP and NP versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 1 seal set
- 1 connector set

Supplied for TT-PTFE versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 discharge valve compl.
- 2 valve balls
- 2 ball seat discs
- 1 seal set
- 1 connector set

Supplied for NS3 and PS3 versions:

- 1 pump diaphragm
- 1 suction valve compl.
- 1 connector parts set
- 1 discharge valve compl.
- 1 bleeding valve set
- 1 connector set

Supplied for SS stainless steel versions:

- 1 pump diaphragm
- 4 valve balls
- 4 ball seat discs
- 1 seal set
- 1 connector set

3.1 ProMinent EXtronic® Metering Pumps

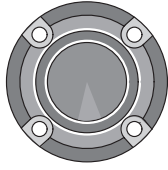
Pump type	Materials in contact with medium	Order no.
EXBb 1000	PP1	740357
	NP3	740354
	TT	910776
	SS/SK	910777
EXBb 2501	SBM	1020281
	SSM	1020282
EXBb 1601	PP1	740361
	NP3	740358
	NS3/PS3	792033
	TT	910778
	SS/SK	910779
EXBb 1201	PP1	740380
	NP3	740362
	NS3/PS3	792034
	TT	910780
EXBb 0803	SS/SK	910781
	PP1	740384
	NP3	740381
	NS3/PS3	792035
	TT	910782
EXBb 1002/2502	SS	910783
	PP1	740388
	NP3	740385
	NS3/PS3	792036
	TT	910784
EXBb 0308/1006/2505	SS	910785
	HV/PP 4 (Type 1002)	910743
	PP1	740497
	NP1	740498
	TT	910957
EXBb 0613/1310	SS	910959
	HV/PP4 (Type 1006)	910939
	PP1	740504
	NP1	740505
	TT	910969
EXBb 0417/0814	SS	910971
	HV/PP4 (Type 1310)	910941
	PP1	740501
	NP1	740502
	TT	910977
EXBb 0430-DN 10	SS	910979
	HV/PP4	910943
	PP1	740507
	NP1	740508
	TT	910993
	SS	910995

Replacement parts set as DN 10 with one way ball valves.

3.1 ProMinent EXtronic® Metering Pumps

PTFE pump diaphragms

ProMinent® DEVELOPAN® pump diaphragms in EPDM with woven inner layer, integrally vulcanised steel core and PTFE Teflon coating on the side in contact with the dosing chemical.



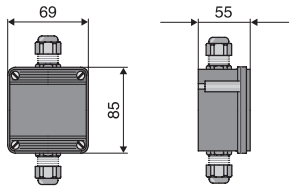
pk_1_008

For pump type	Description	Order no.
1000	31.0 x 6.0	811453
2501	35.0 x 11.5	1000246
1601	48.0 x 9.5	811453
1201	48.0 x 12.5	811454
0803	48.0 x 18.5	811455
1002, 2502	60.0 x 17.0	811456
0308, 2505, 1006	60.0 x 28.0	811457
1310, 0613	76.0 x 37.0	811458
0814, 0417	76.0 x 45.0	811459
0430, 0230	127.5 x 63.0	811460
0260	127.5 x 91.0	811461

3.1.4 Ex-Proof Ancillary Equipment

Plastic terminal box: Type I

IP 66, EEx e II T 6, max. 380 V for mains connection, e.g. of ProMinent EXtronic® in the EX field.

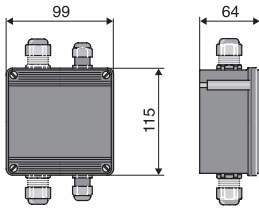


pk_1_023

Order no.
1 input, 1 output for power supply cable. 2 terminals + PE and 2 M 20-12 screw glands
1000071

Plastic terminal box: Type II

IP 6, EEx e II T 6, max. 380 V. As type I, but with additional connector for controller cable (e.g. for contact water meter or DULCOMETER® controller).

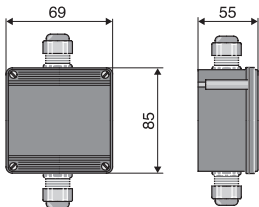


pk_1_021

Order no.
2 inputs (mains and controller cable), 2 outputs 2 terminals + PE, 1 partition, 2 terminals and 2 M 20-12 screw glands and 2 M 16-0.8 screw glands
1000072

Plastic terminal box: EExi Type I

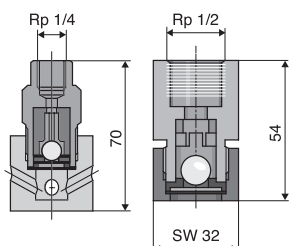
IP 66, EEx ia II T 6 for intrinsically safe controller cable



pk_1_022

Order no.
1 input, 1 output for controller cable, 2 terminals and 2 M 16-0.8, blue screw glands
1000073

3.1 ProMinent EXtronic® Metering Pumps

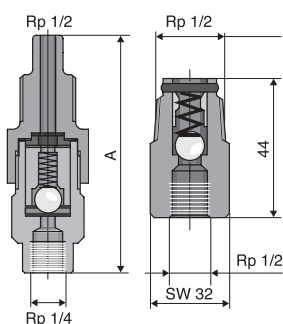


pk_1_30 / pk_1_031

Stainless steel foot valve 1.4404 „SB“

With filter and ball check valve, designed for use with flammable materials. Materials: 1.4404/1.4401/PTFE/ceramic

	Order no.
Connector ISO 7 Rp 1/4 SB version for ProMinent EXtronic®	809301
Connector ISO 7 Rp 1/2 SB version for ProMinent EXtronic®	924561

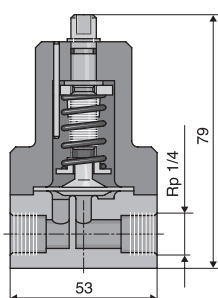


pk_1_032_2 / pk_1_027

Stainless steel 1.4404 „SB“ dosing valve

Spring loaded ball check valve designed for use with flammable materials. Materials: 1.4404/1.4401/Hastelloy C/PTFE/ceramic

	Order no.
Connector ISO 7 Rp 1/4 - R 1/2, pre-pressure approx. 0.5 bar	809302
Connector ISO 7 Rp 1/2 - R 1/2, pre-pressure approx. 0.5 bar	924560



pk_1_029

Adjustable „SB“ back pressure valve

	Order no.
Operating range approx. 1-10 bar, closed version, designed for use with flammable materials.	924555

To generate a constant back pressure for accurate dosing with a free outlet. Can also be used as an overflow valve.

PTFE dosing pipe

Carbon-filled, surface resistance <math> < 10^7 \Omega </math>

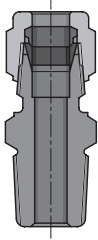
Material	Length	Connection size	Permissible operating pressure	Order no.
	m	o \varnothing x i \varnothing mm		
Carbon-filled PTFE	By the metre	6 x 4	12*	1024831
	By the metre	8 x 5	16*	1024830
	By the metre	12 x 9	9*	1024832

* permissible operating pressure at 20 °C in accordance with EN ISO 7751, 1/4 of the bursting pressure, assuming chemical resistance and correct connection.

Additional ancillary equipment, i.e. foot valves, dosing valves and back pressure valves in the usual material combinations, identical to gamma ancillary equipment and/or for connector DN 15 Vario ancillary equipment.

(Hydraulic/Mechanical Accessories see p. → 2-27 → 2-27)

3.1 ProMinent EXtronic® Metering Pumps



pk_1_028

Stainless steel straight threaded connectors

Swagelok system in stainless steel SS 316 (1.4401) for connection of pipework to liquid ends and valves with internal thread and for SB version.

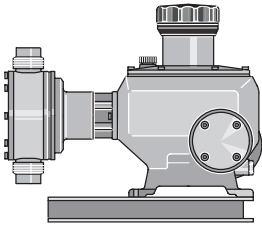
Normal thread seal compounds required.

	Order no.
6 mm - ISO 7 R 1/4	359526
8 mm - ISO 7 R 1/4	359527
12 mm - ISO 7 R 1/4	359528
16 mm - ISO 7 R 1/2	359529

3.2 Makro TZ Diaphragm Metering Pumps

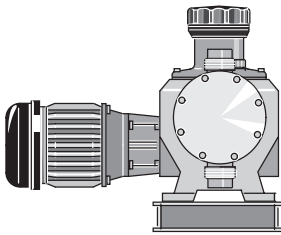
3.2.1

Makro TZ Motor Driven Diaphragm Metering Pumps



The Makro TZ diaphragm metering pump is a 0.75 kW dual-wound three phase motor driven metering pump, 230/400 V, 50/60 Hz, enclosure rating IP 55, insulation class F.

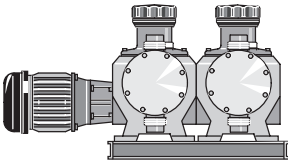
The stroke length can be adjusted by means of the shift ring mechanism from 0-10 mm (TZMb), with 0.5 % accuracy. The 5-speed gearbox is encased in a cast, seawater resistant, acrylic resin lacquered housing. Liquid ends are available in different material combinations to suit differing applications. The suction lift varies according to the density and viscosity of the medium, the dimension of the pipework and the pump stroke rate. Reproducibility of metering is better than ± 2 % in the stroke length range from 30 % -100 % subject to defined conditions and correct installation. (You must follow the instructions in the operating instruction manual). All motor driven metering pumps must be fitted with appropriate cut-out systems for safety reasons.



Makro TZ TZMbA Add-On Pumps

The Makro TZ main diaphragm metering pump can be converted to a duplex or triplex pump with the Makro TZ add-on diaphragm pump (several add-on pumps can be operated at reduced back pressure). Multiplex pumps can also be retrofitted by the operator; all the necessary components and fittings are included with the TZMbA. Different stroke rates can be achieved with the add-on pump independently of the main pump as each TZMbA has its own reducing gear. The main power end can be fitted for this purpose with a more powerful drive motor. A base frame is required when using add-on power ends.

pk_2_012

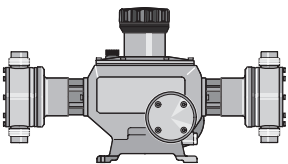


Makro TZ Double Head Version TZMbD/TZMbB

The double head version of the Makro TZ is similar to the simplex pump.

It is, however, fitted with a second liquid end. The liquid ends work in push-pull mode by means of a coupling element in the gearbox.

pk_2_013



Actuation of Makro TZ Metering Pumps

Makro TZ stroke length-actuator/stroke controller

Makro TZ stroke actuator

Stroke adjustment motor for automatic stroke length adjustment, adjustment time approx. 1 sec. for 1 % stroke length, fitted with 2 limit switches for min. /max. setting, 1 k [xFFCE][xFFA9] feedback potentiometer; enclosure rating: IP 54. Power supply 230 V (± 10 %), 50/60 Hz, 40 W. Mech. stroke length indicator fitted to Makro TZ power end.

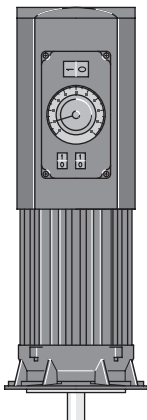
Alternative current / higher enclosure rating / Ex-protection to order.

Makro TZ stroke controller

Stroke controller comprising actuator with stroke adjustment motor and integrated microprocessor controller for stroke length adjustment via a standard signal. Technical data see actuator.

Version: Standard 0/4-20 mA current input, corresponds to 0-100 % stroke length. Change over switch for manual/automatic mode. Key switch for stroke adjustment in manual operating mode. 0/4-20 mA actual value output for remote display.

pk_2_014



pk_2_103

Variable speed motors with integrated frequency converter (Identcode characteristic V)

Power supply 1 ph 230 V, 50/60 Hz, 1.5 kW.

Optional 0/4-20 mA external control. (see Fig. pk_2_103)

(Speed Controllers see p. → 2-51)

Speed controllers in metal housing (Identcode characteristic Z)

The speed controller kit comprises a frequency converter in a separate metal housing and 1.5 kW variable speed motor.

(Speed Controllers see p. → 2-51)

3.2 Makro TZ Diaphragm Metering Pumps

3.2.2 Identcode Ordering System

Motor-Driven Metering Pump TZMb Makro TZ 10 (mechanically driven add-on diaphragm pump)

TZMb		Drive type	
H	Main drive		
A	Add-on drive		
D	Double main drive		
B	Double add-on drive		
Type*			
120260	070430	040840	
120340	070570	041100	
120430	070720	041400	
120510	070860	041670	
120650	071070	042100	
Material Liquid end**			
PC	PVC		
PP	Polypropylene		
SS	Stainless steel		
TT	PTFE + 25% carbon		
Sealing material			
T	PTFE		
Displacement body			
1	Multi-layer safety diaphragm with rupture indicator		
Liquid end version			
0	No valve springs		
1	With valve springs		
Hydraulic connection			
0	Standard connection		
1	PVC union nut and insert		
2	PP union nut and insert		
3	PVDF union nut and insert		
4	SS union nut and insert		
Version			
0	with ProMinent® logo		
2	no ProMinent® logo		
A	with ProMinent® logo, with frame, simplex		
B	with ProMinent® logo, with frame, duplex		
C	with ProMinent® logo, with frame, triplex		
M	Modified		
Electrical power supply			
S	3 ph. 230/400 V 50/60 Hz (WBS)		
P	3 ph. 230/400 V 60 Hz (Exe, Exd)		
L	3 ph. 230/400 V 50 Hz (Exe, Exd)		
R	Variable speed motor 4 pole 230/400 V		
V (0)	Variable speed motor with integr. frequency converter		
V (2)	variable speed motor with integr. frequency converter (Exd)		
Z	Speed control kit		
4	No motor, with 56 C flange		
7	No motor, with 120/80 flange		
8	No motor, with 160/90 flange		
0	No motor, externally mounted drive		
Enclosure rating			
0	IP 55 (Standard) ISO class F		
1	Exe version ATEX-T3		
2	Exd version ATEX-T4		
A	ATEX power end		
Stroke sensor			
0	No stroke sensor		
1	With stroke sensor (Namur)		
Stroke length adjustment			
0	Stroke length adjustment, man.		
1	230 V stroke actuator		
2	115 V stroke actuator		
3	230 V 0-20 mA stroke controller		
4	230 V 4-20 mA stroke controller		
5	115 V 0-20 mA stroke controller		
6	115 V 4-20 mA stroke controller (servo motors for Ex zones on request)		
Application			
0	Standard		

* Digits 1 + 2=back pressure [bar]; digits 3 - 6=feed rate [l/h]

** material version PCT/PPT/TTT max. 10 bar

MaharFan

3.2 Makro TZ Diaphragm Metering Pumps

Technical data

Type TZMbH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz				Suction head mWC	Connection, in- take/pressure side G-DN	Shipping weight PP,NP,TT-SS kg
	Delivery rate at max. backpressure			Max. stroke rate Strokes/ min	Delivery rate at max. backpressure		Max. stroke rate Strokes/ min				
	bar	l/h	ml/ stroke		psi	l/h		gph			
120260	12	260	60	72	174	312	82	86	4.0	1 1/2-25	46/54
120340	12	340	60	96	174	408	108	115	4.0	1 1/2-25	46/54
120430	12	430	60	120	174	516	136	144	4.0	1 1/2-25	46/54
120510	12	510	60	144	174	612	162	173	4.0	1 1/2-25	46/54
120650	12	640	60	180	174				4.0	1 1/2-25	46/54
070430	7	430	99	72	100	516	136	86	3.5	2-32	50/64
070570	7	570	99	96	100	684	181	115	3.5	2-32	50/64
070720	7	720	99	120	100	864	228	144	3.5	2-32	50/64
070860	7	860	99	144	100	1,032	273	173	3.5	2-32	50/64
071070	7	1,070	99	180	100				3.5	2-32	50/64
040840	4	840	194	72	58	1,008	266	86	3.0	2 1/4-40	56/80
041100	4	1,100	194	96	58	1,320	349	115	3.0	2 1/4-40	56/80
041400	4	1,400	194	120	58	1,680	444	144	3.0	2 1/4-40	56/80
041670	4	1,670	194	144	58	2,004	529	173	3.0	2 1/4-40	56/80
042100	4	2,100	194	180	58				3.0	2 1/4-40	56/80

Stroke length 10 mm

Polymer version: max. 10 bar back pressure

The admissible priming pressure on the suction side is 50 % of the maximum back pressure.

Materials in contact with medium

Liquid end	Suction/ pressure port	DN 25 ball valves			DN 32/DN 40 plate valves **		
		Gaskets	Valve balls	Valve seats	Gaskets	Valve plates/ valve spring	Valve seats
PPT Polypropylene	PVDF	PTFE	Borosilicate glass	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
PCT PVC	PVDF	PTFE	Borosilicate glass	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
TTT PTFE with carbon	PVDF	PTFE	Ceramic	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
SST Stainless steel W. No. 1.4571/1.4404	Stainless steel W. No. 1.4581	PTFE	Stainless steel W. No. 1.4401	PTFE	PTFE	Stainless steel 1.4404/Hast. C	PTFE

Multilayer safety diaphragms with PTFE coating.

** The valve spring is coated with CTFE (similar to PTFE)
Special versions on request.

3.2 Makro TZ Diaphragm Metering Pumps

Motor Data

Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.75 kW	
		250-280 V/440-480 V	60 Hz	0.75 kW	
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	0.75 kW	
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	0.75 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	0.75 kW	
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	0.75 kW	with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	1.5 kW	with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V ; 50/60Hz
V0	1 ph, IP 55	230 V ±5 %	50/60 Hz	1.1 kW	Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	1.5 kW	Ex-variable speed motor with integrated frequency converter

For further information, please request motor data sheets.

Customised motors or customised motor flanges are available on request.

3.2.3 Spare Parts Kits

The spare parts kit generally includes liquid end consumables.

- 1 pump diaphragm
- 1 suction valve assembly.
- 1 discharge valve assembly
- 2 valve balls (Multi-layer safety diaphragm DN 32/DN 40 with shim and springs)
- 1 set of seals (O-rings, ball seat discs, ball seat housings)

Spare Parts Kits Makro TZ (TZMb)

Identcode: 120260, 120340, 120430, 120510, 120650

Delivery unit	Materials in contact with medium	Order no.
FM 650 - DN 25	PCT, PPT, TTT	1025164
	SST	1022896
	SST (without valve cpl.)	1022895

Identcode: 070430, 070570, 070720, 070860, 071070

Delivery unit	Materials in contact with medium	Order no.
FM 1100 - DN 32	PCT, PPT, TTT	1025167
	SST	1022917
	SST (without valve cpl.)	1022916

Identcode: 040840, 041100, 041400, 041670, 042100

Delivery unit	Materials in contact with medium	Order no.
FM 2100 - DN 40	PCT, PPT, TTT	1025169
	SST	1022930
	SST (without valve cpl.)	1022929

3.2 Makro TZ Diaphragm Metering Pumps

Multi-layer safety diaphragm for TZMb

ProMinent® multi-layer safety diaphragm with diaphragm rupture indication and PTFE Teflon coating on the wetted side.

Pump type	Order no.
Identcode: 120260, 120340, 120430, 120510, 120650; Makro TZ FM 650	1022887
Identcode: 070430, 070570, 070720, 070860, 071070; Makro TZ FM 1100	1022900
Identcode: 040840, 041100, 041400, 041670, 042100; Makro TZ FM 2100	1022921

Makro TZ spare parts kits for TZMa

Identcode: 120190, 120254, 120317, 120381

Delivery unit	Materials in contact with medium	Order no.
Liquid end FM 530 - DN 25	PP	910452
	P	910455
	T	910458
	S (without valve cpl.)	910475
	S	910461

Identcode: 060397, 060529, 060661, 060793

Delivery unit	Materials in contact with medium	Order no.
Liquid end FM 530 - DN 25	PP	910453
	P	910456
	T	910459
	S (without valve cpl.)	910476
	S	910462

Identcode: 030750, 031000, 031250, 031500, 031875, 031050 , 031395, 031740, 032100, 032500

Delivery unit	Materials in contact with medium	Order no.
Liquid end FM 1500/2100	PP	1001573
	P	1001574
	T	1001575
	S (without valve cpl.)	1001577
	S	1001576

3.2 Makro TZ Diaphragm Metering Pumps

PTFE pump diaphragms for TZMa

ProMinent® DEVELOPAN® pump diaphragms with a generously-sized steel core vulcanised into fibre reinforced EPDM, with a PTFE Teflon coating on the process-wetted side.

Pump type	Order no.
Identcode: 100190, 120190, 100254, 100317, 120317, 100381, 120381; Makro TZ FM 260	811471
Identcode: 060397, 060529, 060661, 060793; Makro TZ FM 530	811472
Identcode: 030750, 031000, 031250, 031500, 031050, 031395, 031740, 032100, 032500; Makro TZ FM 1500/FM 2100	811473

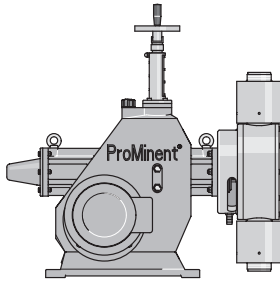
Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.3 Makro/ 5 Diaphragm Metering Pumps

3.3.1

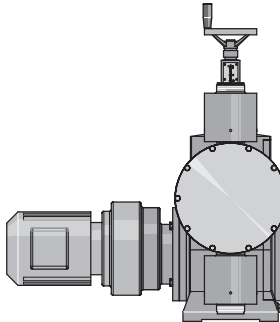
Makro/ 5 Diaphragm Metering Pumps



pk_2_099

The Makro/ 5 HM is supplied as standard with a 3 kW spur wheel geared 3-phase motor, 230/400 V, 50/60 Hz, enclosure rating IP 55, insulation class F. The stroke length can be adjusted between 0...20 mm. The gearbox is encased in a seawater resistant acrylic resin lacquered cast housing. The diaphragm liquid ends are available in different material combinations which are suited to different applications (see table). The metering reproducibility under defined conditions and if installed correctly is better than $\pm 2\%$ in the stroke length range between 30-100 %. The priming lift varies with the density and viscosity of the chemical, the connection pipework and the stroking rate of the pump. For technical safety reasons, appropriate equipment must be installed to prevent current overload (instructions in the operating instruction manual must be followed).

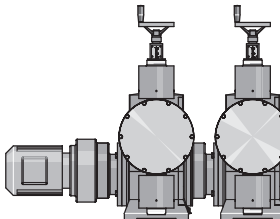
Makro/ 5 Add-On Pump M5MaA



pk_2_093

The Makro/ 5 add on pump can be connected to the Makro/ 5 main power end to form a duplex or triplex pump. (At reduced back pressure, up to four add on power ends can be combined with a main power end.) Add on power ends can be fitted on site. If required, the main drive can be fitted with a 3 kW and/ or 5.5 kW motor. You will require a base frame when connecting add on power ends.

Makro/ 5 Double-Head Pump M5MaD M5MaB

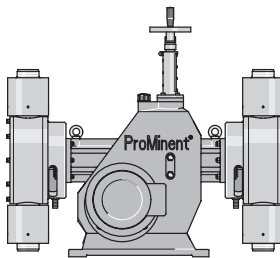


pk_2_098

Essentially the same instructions apply for the Makro/ 5 HMD and AMD pumps as for single pumps. They are, however, fitted with a second liquid end.

The liquid ends operate in counter-cycle.

Makro/ 5 Pump Control



pk_2_095

Makro/ 5 stroke length actuator

Servomotor for automatic stroke length adjustment, adjusting time approx. 100 sec. for 100 % stroke length, fitted with 2 limit switches for min./max. settings. Feedback potentiometer 1 k Ohm; enclosure rating: IP 54. Power supply 230 V ($\pm 10\%$), 50/60 Hz, approx. 40 W, mech. stroke rating display at Makro/ 5 power end.

Custom voltage ratings/higher enclosure ratings/Ex-proof available on request.

Includes:

Standard signal input 0/4-20 mA, (corresponds to stroke length 0-100 %); internal switch for manual/automatic operation, key switch for stroke length adjustment in manual operating mode, actual value output 0/4-20 mA for remote display.

Frequency inverter for speed controller in metal housing, enclosure rating IP 54

Frequency inverter encased in safety housing, IP 54, with integrated controller and main switch for the stated motor output.

Optional external control via 0/4-20 mA and/or 0-10 V correspond to 0-50 (60) Hz output frequency.

Integrated controller with versatile functions including switching between external/internal control. In the case of internal control, frequency input via arrow keys, multi-lingual fault message display etc.

Incorporates equipment for monitoring motor temperature (thermistor protection).

Stroke sensor with namur signal

Mounted onto the crank drive of the Makro/ 5 gearbox. For precise detection of each metering stroke, comprising trip cam and inductive proximity switch, Namur-type switch signal. Suitable for batch metering in conjunction with electronic timers and/or for proportional metering in conjunction with proportional controller.

Retrofitting on factory premises only.

Permitted for ex-proof operation with enclosure rating EEx ia II C T6.

3.3 Makro/ 5 Diaphragm Metering Pumps

Technical data

Type M5MaH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz				Suction head mWC	Connec- tion, intake/ pressure side G-DN	Shipping weight kg
	Delivery rate at max. backpressure		Max. stroke rate	Strokes/ min	Delivery rate at max. backpressure		Max. stroke rate	Strokes/ min			
	bar	l/h ml/stroke			psi	l/h					
041540	4	1,540	427	60	58	1,822	481	71	3.0	2 3/4-50	320
041900	4	1,900	427	75	58	2,254	595	89	3.0	2 3/4-50	320
042600	4	2,600	427	103	58	3,104	820	123	3.0	2 3/4-50	320
043400	4	3,400	427	133	58	4,064	1,074	159	3.0	2 3/4-50	320
044000	4	4,000	427	156	58				3.0	2 3/4-50	320

Stainless steel version: Shipping weight 340 kg

The permissible admission pressure on the intake side is approx. 50 % of the maximum permissible backpressure.

Materials in contact with medium

	Liquid end	Suction/pressure valve	DN 50 plate valves		
			Gaskets	Valve plates/valve spring	Valve seats
PPT	Polypropylene	Polypropylene	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
PCT	PVC	PVC	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
TTT	PTFE with carbon	PTFE with carbon	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
SST	Stainless steel W. No. 1.4571/ 1.4404	Stainless steel W. No. 1.4571/ 1.4404	PTFE	Stainless steel W. No. 1.4404/Hast. C	PTFE

DEVELOPAN® metering diaphragm with PTFE coating.

** The valve spring is coated with CTFE (similar to PTFE)
Special versions on request.

Motor Data

Identcode characteristic	Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	3 kW
		250-280 V/440-480 V	60 Hz	3 kW
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	3.6 kW
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	4 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	3.6 kW
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	4 kW with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	3 kW with PTC, speed adjustment range 1:5
V0	3 ph, IP 55	400 V ±10 %	50/60 Hz	3 kW Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	4 kW Ex-variable speed motor with integrated frequency converter

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.3 Makro/ 5 Diaphragm Metering Pumps

3.3.2 Identcode Ordering System

Motor-Driven Metering Pump M5Ma (mechanically driven diaphragm pump)

M5Ma		Drive type	
H	Main drive		
D	Double main drive		
A	Add-on drive		
B	Double add-on drive		
Type			
041540			
041900			
042600			
043400			
044000			
Material Liquid end			
PC	PVC		
PP	Polypropylene		
SS	Stainless steel		
TT	PTFE + 25 % carbon		
Sealing material			
T	PTFE		
Displacement body			
T	Pump diaphragm with PTFE coating		
Liquid end version			
1	With valve springs, Hast. C; 0.1 bar		
Hydraulic connection			
0	Standard connection		
1	PVC union nut and insert		
2	PP union nut and insert		
3	PVDF union nut and insert		
4	SS union nut and insert		
Version			
0	with ProMinent® logo, no frame		
1	without ProMinent® logo, no frame		
A	with ProMinent® logo, with frame, simplex		
B	with ProMinent® logo, with frame, duplex		
C	with ProMinent® logo, with frame, triplex		
D	with ProMinent® logo, with frame, quadruplex		
M	Modified		
Electrical power supply			
S	3 ph. 230/400 V 50/60 Hz (WBS)		
P	3 ph. 460 V 60 Hz (Exe, Exd)		
L	3 ph. 230/400 V 50 Hz (Exe, Exd)		
R	Variable speed motor 4 pole 230/400 V (R 1:5)		
V (0)	Variable-speed motor with integrated frequency converter		
V (2)	Variable speed motor with integr. frequency converter (Exd)		
5	No motor, with IEC 100 gearbox		
6	No motor, with IEC 112 gearbox		
0	No motor, no gearbox		
Enclosure rating			
0	IP 55 (Standard) ISO class F		
1	Exe version ATEX-T3		
2	Exd version ATEX-T4		
A	ATEX power end		
Stroke sensor			
0	No stroke sensor		
1	With stroke sensor (Namura)		
Stroke length adjustment			
0	Stroke length adjustment, man.		
3	230 V 0-20 mA stroke controller		
4	230 V 4-20 mA stroke controller		
5	115 V 0-20 mA stroke controller		
6	115 V 4-20 mA stroke controller		
Application			
0	Standard		

3.3 Makro/ 5 Diaphragm Metering Pumps

3.3.3 Spare Parts Kits

The replacement part kit in general includes the wear parts of the liquid ends.

- 1 Metering diaphragm
- 1 Suction valve compl.
- 1 Pressure valve compl.
- 2 Valve plate and Hast. C spring
- 1 Gasket kit complete (envelope rings, valve seat/valve seat bushing)

Spare parts kit Makro/ 5 HM

Delivery unit	Order no.
FM 4000 PCT	1008172
FM 4000 PPT	1008171
FM 4000 TTT	1008173
FM 4000 SST (without valves cpl.)	1008174

PTFE metering diaphragm

DEVELOPAN® diaphragm made of EPDM with woven fabric inlay, large-area, vulcanised aluminium core and PTFE-Teflon layer on the side in contact with the medium.

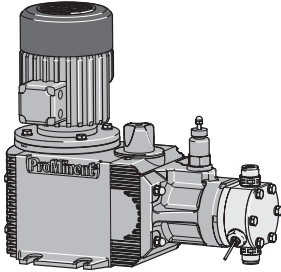
	Order no.
Metering diaphragm for Makro/ 5 FM 4000	1009023

3.4 Hydro Hydraulic Diaphragm Metering Pumps

3.4.1

Hydro Hydraulic Diaphragm Metering Pumps

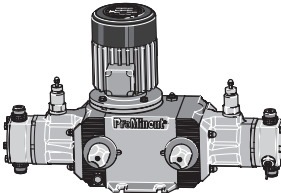
Hydro main pump H



pk_2_074

The hydraulic diaphragm metering pump is a standard sized metering pump with a 0.37/0.75 kW dual wound three phase motor, 230/400 V, 50/60 Hz, enclosure rating IP 55, insulation class F. The stroke length is 15 mm and is adjustable within 1 % accuracy. The cast aluminium housing is combined at any one time with 4 gear reductions. Comes in 2 liquid end sizes and 2 liquid end materials. All pump types are standard sized and fitted with a preset bypass valve integrated into the hydraulics, as well as a multi-layer diaphragm with diaphragm rupture signalling. Metering reproducibility under defined conditions and when installed correctly, is better than ± 1 % in a stroke length range of between 20 and 100 % (instructions in the operating instructions manual must be followed precisely).

Hydro double-head version



pk_2_073

The double-head version is fitted with a second liquid end which operates on a push-pull action (Boxer principle). Each liquid end is provided with a separate stroke length-adjusting knob so that each liquid end can operate at an independent feed rate.

Hydro add-on pumps

For the Hydro add-on pumps the same basic instructions apply as for the simplex pumps. A main power end can be combined with an add-on power end in both simplex and duplex forms.

Hydro Pump Controller

Stroke length actuator/controller

Actuator with stroke positioning motor for automatic stroke length adjustment. Setting time approx. 1 sec. for 1 % stroke length, fitted with limit switches for min./max. settings. Resistance potentiometer 1 k Ohm for scanning the current setting. Enclosure rating IP 54.

Variable **speed controller** consisting of actuator with stroke positioning motor and inbuilt follower for stroke length adjustment via a standard signal. Standard signal current input 0/4-20 mA, corresponds to stroke length of 0-100 %. Can be switched between manual and automatic operation, key switch for stroke adjustment for manual operation, mechanical position display of stroke length actual value - output 0/4-20 mA for remote display.

Variable speed motors with integrated speed controller (Identcode characteristic V)

Power supply 1 ph, 230 V, 50/60 Hz (HP2a- 0.37 kW; HP3a- 0.75 kW). Can be externally controlled via 0/4-20 mA (see fig. pk_2_103).

The following functions are integrated into the snap on lid (see 2.17.2)

- Start/stop switch
- Manual/external switch
- Potentiometer for speed control during manual operation

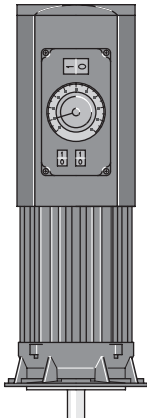
Speed controllers in metal housing (Identity code characteristic Z)

Frequency changer housed in IP 55 protective housing with integrated control unit and main switch, designed for max. 0.37/0.75 kW motor output (see chapter 2.17.2).

Externally controlled with 0/4-20 mA / 0-10 V to correspond to 0-50 (60) Hz output frequency.

Integrated controller with versatile functions e.g. switching between external/internal control. In the case of internal control, frequency input via arrow keys. Multi-lingual fault message display etc. and motor temperature monitoring (thermistor-protection).

The speed controller assembly consists of a speed controller and a variable speed motor (see also identity code characteristic R).



pk_2_103

3.4 Hydro Hydraulic Diaphragm Metering Pumps

Technical data

Type HP2aH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suc- tion head mWC	Perm. ad- miss. pres- sure suction side bar	Conne- ction suc- tion/ discharge side G-DN	Ship- ping weight kg
	Delivery rate at max. backpressure		Max. stroke rate Strokes/ min	Delivery rate at max. backpressure		Max. stroke rate Strokes/ min					
	bar	l/h		ml/ stroke	psi		l/h / gph				
100003*	100	3	0.8	60	1,450	3.6/1.0	72	3.0	5	Rp 3/8-10	31
100006*	100	6	0.8	125	1,450	7.0/1.8	150	3.0	5	Rp 3/8-10	31
100007*	100	7	0.8	150	1,450	8.0/2.1	180	3.0	5	Rp 3/8-10	31
100009*	100	9	0.8	187	1,450	11.0/2.9	224	3.0	5	Rp 3/8-10	31
100010*	100	10	0.8	212				3.0	5	Rp 3/8-10	31
064007	64	7	2.0	60	928	8.4/2.2	72	3.0	5	G 3/4-10	31
064015	64	15	2.0	125	928	18.0/4.8	150	3.0	5	G 3/4-10	31
064018	64	18	2.0	150	928	21.0/5.5	180	3.0	5	G 3/4-10	31
064022	64	22	2.0	187	928	26.0/6.9	224	3.0	5	G 3/4-10	31
064025	64	25	2.0	212				3.0	5	G 3/4-10	31
025019	25	19	5.3	60	362	23.0/6.1	72	3.0	5	G 3/4-10**	31
025040	25	40	5.3	125	362	48.0/12.7	150	3.0	5	G 3/4-10**	31
025048	25	48	5.3	150	362	58.0/15.3	180	3.0	5	G 3/4-10**	31
025060	25	60	5.3	187	362	72.0/19.0	224	3.0	5	G 3/4-10**	31
025068	25	68	5.3	212				3.0	5	G 3/4-10**	31

Material version PVDF max. 25 bar.

Optional double ball valve SST with RP 3/8

* Material SST/HCT with double-ball valve

** HV version G1-DN 15

Materials in contact with medium

Material	Liquid End	Suction/Discharge connector	Seals/ball seat	Valve Balls
SST	stainless steel no. 1.4571/1.4404	stainless steel no. 1.4581	PTFE/ZrO ₂	stainless steel
PVT	PVDF (Polyvinylidenfluoride)	PVDF (Polyvinylidenfluoride)	PTFE/PTFE	ceramic
HCT	Hast. C	Hast. C	PTFE/Hast. C	ceramic

Motor Data

Identcode characteristic		Voltage supply		Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.37 kW
		250-280 V/440-480 V	60 Hz	0.37 kW
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	0.37 kW
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	0.37 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	0.37 kW
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	0.37 kW with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	0.37 kW with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V ; 50/60Hz
V0	1 ph, IP 55	230 V ±10 %	50/60 Hz	0.37 kW Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	0.55 kW Ex-variable speed motor with integrated frequency converter

For further information, please request motor data sheets. Customised motors or customised motor flanges are available on request.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

MaharFan

3.4 Hydro Hydraulic Diaphragm Metering Pumps

3.4.2 Identcode Ordering System

Hydro/ 2 (HP2a)

HP2a	Drive type	
H	Main drive	
D	Main drive, Double-head version	
E	Main drive for add on drive	
F	Main drive, Double-head version for add-on drive	
A	Add-on drive	
B	Double-head version add-on drive	
Type*		
	bar	l/h
100003	100	3
100006	100	6
100007	100	7
100009	100	9
100010	100	10
	bar	l/h
064007	64	7
064015	64	15
064018	64	18
064022	64	22
064025	64	25
	bar	l/h
025019	25	19
025040	25	40
025048	25	48
025060	25	60
025068	25	68
Material Liquid end		
SS	Stainless steel	
PV	PVDF	
HC	Hastelloy C	
Sealing material*		
T	PTFE	
Displacement body*		
0	Standard multilayer diaphragm with rupture signalling facility	
Liquid end version		
0	No valve springs (standard)	
1	With valve springs	
D	Double ball valve	
H	HV version (only for 025019-025060)	
Hydraulic connection		
0	Standard threaded connector	
E	With DIN ISO flange	
F	With ANSI flange	
Version		
0	with ProMinent® logo	
1	without ProMinent® logo	
M	Modified	
Electrical power supply		
S	3 ph, 230/400 V, 50/60 Hz, 0,37 kW	
L	3 ph, 230/400 V, 50 Hz (Exe, Exd), 0,37 kW	
P	3 ph, 265/400 V, 60 Hz (Exe, Exd), 0,37 kW	
R	3 ph, Variable speed motor, 230 V/400 V, 0,37 kW	
V (0)	Variable speed motor with integrated frequency converter	
V (2)	Variable speed motor with integr. frequency converter (Exd)	
Z	1 ph, Variable speed control set, 230 V, 50/60 Hz	
3	No motor, with B 5 flange, size 71	
4	No motor, with C 56 flange, (NEMA)	
0	Add on drive	
Enclosure rating		
0	IP 55 (standard)	
1	Exe motor version ATEX-T3	
2	Exde motor version ATEX-T4	
A	ATEX power end	
Stroke sensor		
0	No stroke sensor (standard)	
1	Stroke sensor (for explosion-proof applications)	
Stroke length adjustment		
0	Manual (standard)	
1	With stroke positioning motor, 230 V/50/60 Hz	
2	With stroke positioning motor, 115 V/60 Hz	
A	With stroke control motor 0...20 mA 230 V/50/60 Hz	
B	With stroke control motor 4...20 mA 230 V/50/60 Hz	
C	With stroke control motor 0...20 mA 115 V/60 Hz	
D	With stroke control motor 4...20 mA 115 V/60 Hz	
Hydraulic oil		
0	Standard	
1	Food products grade	
2	Low temperature to -25 °C	

* PVT max. 25 bar

3.4 Hydro Hydraulic Diaphragm Metering Pumps

Technical data

Type HP3aH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suc- tion head mWC	Perm. ad- miss. pres- sure suction side bar	Conne- ction suc- tion/ discharge side G-DN	Shipping weight kg
	Delivery rate at max. backpressure		Max. stroke rate Strokes/ min	Delivery rate at max. backpres- sure		Max. stroke rate Strokes/ min					
	bar	l/h		ml/ stroke	psi		l/h / gph				
100010*	100	10	2.8	60	1,450	12.0/3.2	72	3.0	5	Rp 3/8-10	41
100021*	100	21	2.8	125	1,450	25.0/6.6	150	3.0	5	Rp 3/8-10	41
100025*	100	25	2.8	150	1,450	30.0/7.9	180	3.0	5	Rp 3/8-10	41
100031*	100	31	2.8	187	1,450	37.0/9.8	224	3.0	5	Rp 3/8-10	41
100035*	100	35	2.8	212	1,450			3.0	5	Rp 3/8-10	41
064019	64	19	5.3	60	928	23.0/6.1	72	3.0	5	G 3/4-10**	41
064040	64	40	5.3	125	928	48.0/12.7	150	3.0	5	G 3/4-10**	41
064048	64	48	5.3	150	928	58.0/15.3	180	3.0	5	G 3/4-10**	41
064060	64	60	5.3	187	928	72.0/19.0	224	3.0	5	G 3/4-10**	41
064068	64	68	5.3	212	928			3.0	5	G 3/4-10**	41
025048	25	48	13.4	60	362	58.0/15.3	72	3.0	5	G 1-15***	41
025100	25	100	13.4	125	362	120.0/31.7	150	3.0	5	G 1-15***	41
025120	25	120	13.4	150	362	144.0/38.0	180	3.0	5	G 1-15***	41
025150	25	150	13.4	187	362	180.0/47.6	224	3.0	5	G 1-15***	41
025170	25	170	13.4	212	362			3.0	5	G 1-15***	41

PVDF material version max. 25 bar.

alternatively to G 3/4-DN 10, a double-ball valve SST with RP 3/8 is available.

* Material SST/HCT with double-ball valve

*** HV version with connection G1-DN 15

** HV version with 1 1/4 DN 20 connector

Materials in contact with medium

Material	Liquid End	Suction/Discharge connector	Seals/ball seal	Valve Balls
SST	Stainless steel no. 1.4571/1.4404	Stainless steel no. 1.4581	PTFE/Z ₂ O ₂	Stainless steel
PVT	PVDF (Polyvinylidenfluoride)	PVDF (Polyvinylidenfluoride)	PTFE/PTFE	Ceramic
HCT	Hast. C	Hast. C	PTFE/Hast. C	Ceramic

Motor Data

Identcode characteristic		Voltage supply		Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.75 kW
		250-280 V/440-480 V	60 Hz	0.75 kW
L1	3 ph, II2GEEExIIIT3	220-240 V/380-420 V	50 Hz	0.75 kW
L2	3 ph, II2GEEExdIIICT4	220-240 V/380-420 V	50 Hz	0.75 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEExIIIT3	250-280 V/440-480 V	60 Hz	0.75 kW
P2	3 ph, II2GEEExdIIICT4	250-280 V/440-480 V	60 Hz	0.75 kW with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	0.75 kW with PTC, speed adjustment range 1:20 with separate fan 1 ph 230 V ; 50/60 Hz
V0	1 ph, IP 55	230 V ±10 %	50/60 Hz	0.75 kW Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEExdIIICT4	400 V ±10 %	50/60 Hz	Ex-variable speed motor with integrated frequency converter

For further information, please request motor data sheets. Customised motors or customised motor flanges are available on request.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

MaharFan

3.4 Hydro Hydraulic Diaphragm Metering Pumps

3.4.3 Identcode Ordering System

Hydro/ 3 (HP3a)

HP3a	Drive type	
H	Main drive	
D	Main drive, Double-head version	
E	Main drive for add-on drive	
F	Main drive, Double-head version for add-on drive	
A	Add-on drive	
B	Double-head version add-on drive	
Type*		
	bar	l/h
100010	100	10
100021	100	21
100025	100	25
100031	100	31
100035	100	35
064019	64	19
064040	64	40
064048	64	48
064060	64	60
064068	64	68
025048	25	48
025100	25	100
025120	25	120
025150	25	150
025170	25	170
Material Liquid end		
SS	Stainless steel	
PV	PVDF	
HC	Hastelloy C	
Sealing material*		
T	PTFE	
Displacement body*		
0	Standard multilayer diaphragm with rupture signalling facility	
Liquid end version		
0	No valve springs (standard)	
1	With valve springs	
D	Double ball valve (for 100010-100035, 064019-064060)	
H	HV-Version	
Hydraulic connection		
0	Standard threaded connector	
E	With DIN ISO flange	
F	With ANSI flange	
Version		
0	with ProMinent® logo	
1	without ProMinent® logo	
M	Modified	
Electrical power supply		
S	3 ph, 230/400 V, 50/60 Hz, 0.75 kW	
L	3 ph, 230/400 V 50 Hz (Exe, Exd), 0.75 kW	
P	3 ph, 265/440 V 60 Hz (Exe, Exd), 0.75 kW	
R	3 ph, variable speed motor, 230 V/400 V, 0.75 kW	
V (0)	Variable speed motor with integrated frequency converter	
V (2)	Variable speed motor with integr. frequency converter (Exd)	
Z	1 ph, variable speed control set, 230 V, 50/60 Hz	
3	No motor, with B 5 flange, size 80	
4	No motor, with C 56 flange, (NEMA)	
0	Add on drive	
Enclosure rating		
0	IP 55 (standard)	
1	Exe motor version ATEX-T3	
2	Exd motor version ATEX-T4	
A	ATEX power end	
Stroke sensor		
0	No stroke sensor (standard)	
1	Stroke sensor (for explosion-proof applications)	
Stroke length adjustment		
0	Manual (Standard)	
1	With stroke positioning motor, 230 V/50/60 Hz	
2	With stroke positioning motor, 115 V/60 Hz	
A	With stroke control motor 0-20 mA 230 V/50/60 Hz	
B	With stroke control motor 4-20 mA 230 V/50/60 Hz	
C	With stroke control motor 0-20 mA 115 V/60 Hz	
D	With stroke control motor 4-20 mA 115 V/60 Hz	
Hydraulic oil		
0	Standard	
1	Food products grade	
2	Low temperature to -25 °C	

* PVT max. 25 bar

3.4 Hydro Hydraulic Diaphragm Metering Pumps

3.4.4 Spare Parts Kits

The spare parts kits generally include liquid end consumables.

Supplied as standard for SST/HCT stainless steel material version

- 1 metering diaphragm
- 2 valve balls
- 1 seal set

Supplied as standard for PVT material version

- 1 metering diaphragm
- 1 suction connector set
- 1 discharge connector set
- 2 valve balls
- 1 seal set

Spare parts kits Hydro/ 2

Applies to identcode: Type 100010, 100009, 100007, 100006, 100003, 064025, 064022, 064018, 064015, 064007

Delivery unit	Materials in contact with medium	Order no.
FMH 25 - DN 10	PVT	1005548
	SST	1005549
	HCT	1009571
	SST (with valve set)	1005550
	SST (for double ball valves)	1005551

Applies to identcode: Type 025068, 025060, 025048, 025040, 025019

Delivery unit	Materials in contact with medium	Order no.
FMH 60 - DN 10	PVT	1005552
	SST	1005553
	HCT	1009573
	SST (with valve set)	1005554
	SST (for double ball valves)	1005555

Spare parts kits Hydro/ 3

Applies to identcode: Type 100035, 100031, 100025, 100021, 100010, 064068, 064060, 064048, 064040, 064019

Delivery unit	Materials in contact with medium	Order no.
FMH 60 - DN 10	PVT	1005552
	SST	1005553
	HCT	1009573
	SST (with valve set)	1005554
	SST (for double ball valves)	1005555

Applies to identcode: Type 025170, 025150, 025120, 025100, 025048

Delivery unit	Materials in contact with medium	Order no.
FMH 150 - DN 15	PVT	1005556
	SST	1005557
	HCT	1009575
	SST (with valve set)	1005558

3.4 Hydro Hydraulic Diaphragm Metering Pumps

Hydro/ 2 PTFE dosing diaphragms / 1.4404

Delivery unit	Order no.
FMH 25 applies to identcode (SST): 100010, 100009, 100007, 100006, 100003, 064025, 064022, 064018, 064015, 064007	1005545
FMH 60 applies to identcode (SST): 026068, 025060, 025048, 025040, 025019	1005546

Hydro/ 2 Pump diaphragms PTFE/Hast. C coated

Delivery unit	Order no.
FMH 25 Applies to identcode (PVT/HCT): 064025, 064022, 064018, 064015, 064007	1006481
FMH 60 Applies to identcode: 025068, 025060, 025048, 025040, 025019	1006482

Hydro/ 3 pump diaphragm PTFE/1.4404

Delivery unit	Order no.
FMH 60 Applies to identcode (SST): 064068, 064060, 064048, 064040, 064019, 100035, 100031, 100025, 100021, 100010	1005546
FMH 150 Applies to identcode (SST): 025170, 025150, 025120, 025100, 025048	1005547

Hydro/ 3 pump diaphragm PTFE/Hastelloy C coated

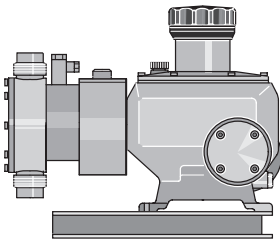
Delivery unit	Order no.
FMH 60 Applies to identcode (PVT/HCT): 064068, 064060, 064048, 064040, 064019	1006482
FMH 150 Applies to identcode (PVT/HCT): 025170, 025150, 025120, 025100, 025048	1006483

3.4 Hydro Hydraulic Diaphragm Metering Pumps

3.5 Makro TZ Hydraulic Diaphragm Metering Pumps

3.5.1

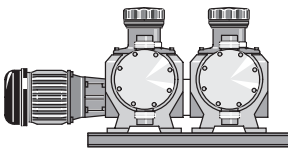
Makro Hydraulic Diaphragm Metering Pumps



pk_2_021

The Makro TZ is fitted as standard with a 230/400 V dual-wound three phase motor, 50/60 Hz, 1.5 kW, enclosure rating IP 55, insulation class F. The stroke length is 20 mm and can be adjusted with 0.5 % precision. The worm gear and shift ring mechanisms, in a choice of 5 reduction ratios, are built into a salt water-resistant and acrylic resin coated cast housing. Liquid ends are available in different material combinations to suit different metering applications (see table). The suction lift varies depending upon the density and viscosity of the feed chemical, and connecting pipe work dimensions. Under defined conditions and providing installation is correct, reproducible metering accuracy is better than $\pm 1\%$ at a stroke length range of between 10 % and 100 %.(You must follow the instructions in the operating instruction manual)

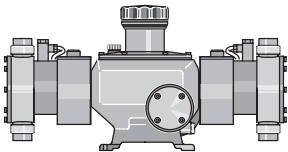
Makro TZ TZHaA Add-On Pumps



pk_2_022

The Makro TZ main diaphragm metering pump can be converted to a duplex or triplex pump with the Makro TZ add-on diaphragm pump (several add-on pumps can be operated at reduced back pressure). Multiplex pumps can also be retrofitted by the operator; all the necessary components and fittings are included with the TZHaA. Different stroke rates can be achieved with the TZ add-on pump independently of the TZ main pump as each TZ add-on pump has its own reducing gear. The main power end can be fitted for this purpose with a more powerful drive motor. A base frame is required when using add-on power ends.

Makro TZ Double Head Version TZHaD/TZHaB



pk_2_023

The double head version of the ProMinent® Makro TZ is similar to the simplex pump. It is, however, fitted with a second liquid end.

The liquid ends work in push-pull mode by means of a coupling element in the gearbox.

Actuation Of Makro TZ Metering Pumps

Makro TZ stroke length-actuator/stroke controller

Makro TZ stroke actuator

Stroke adjustment motor for automatic stroke length adjustment, adjustment time approx. 1 sec. for 1 % stroke length, fitted with 2 limit switches for min./max. setting, 1 k Ohm feedback potentiometer; enclosure rating: IP 54. Power supply 230 V ($\pm 10\%$), 50/60 Hz, 40 W. Mech. stroke length indicator fitted to Makro TZ power end.

Alternative current / higher enclosure rating / Ex-protection to order.

Makro TZ stroke controller

Stroke controller comprising actuator with stroke adjustment motor and integrated microprocessor controller for stroke length adjustment via a standard signal. Technical data see actuator.

Version:

Standard 0/4-20 mA current input, corresponds to 0-100 % stroke length. Change over switch for manual/automatic mode. Key switch for stroke adjustment in manual operating mode. 0/4-20 mA actual value output for remote display.

Variable speed motors with integrated frequency converter (Identcode characteristic V)

Voltage supply 3 ph 400 V, 50/60 Hz

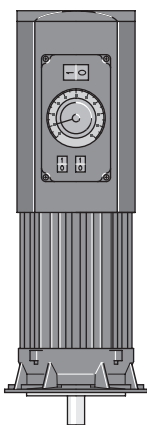
Externally controllable with 0/4-20 mA (see Fig. pg_2_103)

(Speed Controllers see p. → 2-51)

Speed controllers in metal housing (Identcode characteristic Z)

The speed controller kit comprises a frequency converter in a separate metal housing and 2.2 kW variable speed motor.

(Speed Controllers see p. → 2-51)



pk_2_103

3.5 Makro TZ Hydraulic Diaphragm Metering Pumps

3.5.2 Identcode Ordering System

Makro TZ 20 hydraulic diaphragm pump

TZHa	Drive type	
H	Main drive	
A	Add-on drive	
D	Double main drive	
B	Double add-on drive	
	Type*	
160300	100502	
160400	100669	
160500	100836	
160600	101004	
160750	101204	
	Material Liquid end	
PC	PVC	
PP	Polypropylene	
SS	Stainless steel	
TT	PTFE + 25% carbon	
	Sealing material*	
T	PTFE	
	Displacement body*	
T	PTFE coating composi diaphragm, with rupture indicator	
	Liquid end version	
0	No valve springs	
1	With valve springs	
	Hydraulic connection	
0	Standard connection	
1	PVC union nut and insert	
2	Union nut and insert PP	
3	PVDF union nut and insert	
4	SS union nut and insert	
	Version	
0	with ProMinent® logo, no frame	
2	no ProMinent® logo, no frame	
A	with ProMinent® logo, with frame, simplex	
B	with ProMinent® logo, with frame, duplex	
C	with ProMinent® logo, with frame, triplex	
M	Modified	
	Electrical power supply	
S	3 ph. 230/400 V 50/60 Hz (WBS)	
P	3 ph. 230/400 V 60 Hz (Exe, Exd)	
L	3 ph. 230/400 V 50 Hz (Exe, Exd)	
R	Variable speed motor 4 pole 230/400 V	
V (0)	Variable speed motor with integr. frequency converter	
V (2)	With integrated frequency converter (Exd)	
Z	1 ph, variable speed control set 1 ph, 230 V, 50/60 Hz	
4	No motor, with 56 C flange	
7	No motor, with 120/80 flange	
8	No motor, with 160/90 flange	
0	Externally mounted drive	
	Enclosure rating	
0	IP 55 (Standard) ISO class F	
1	Exe version ATEX-T3	
2	Exd version ATEX-T4	
A	ATEX power end	
	Stroke sensor	
0	No stroke sensor	
1	With stroke sensor (Namur)	
	Stroke length adjustment	
0	Stroke length adjustment, man.	
1	230 V stroke actuator	
2	115 V stroke actuator	
3	230 V 0-20 mA stroke controller	
4	230 V 4-20 mA stroke controller	
5	115 V 0-20 mA stroke controller	
6	115 V 4-20 mA stroke controller	
	Application	
0	Standard	
3	Low temperature to -25 °C	

* Material version PCT/PPT/TTT max. 10 bar

3.5 Makro TZ Hydraulic Diaphragm Metering Pumps

Technical data

Type TZHa	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suc- tion head mWC	Conne- ction, intake/ pressure side G-DN	Shipping weight kg	Plunger Ø mm
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	max. backpressure	Max. stroke rate Strokes/min	Delivery rate at max. backpressure	Max. stroke rate Strokes/min				
	bar	l/h									
160300	16	300	69.4	72	232	424.0/112.0	86	3.0	G 1 1/2-25	80*	70
160400	16	400	69.4	96	232	480.0/126.8	115	3.0	G 1 1/2-25	80*	70
160500	16	500	69.4	120	232	600.0/158.5	144	3.0	G 1 1/2-25	80*	70
160600	16	600	69.4	144	232	720.0/190.2	173	3.0	G 1 1/2-25	80*	70
160750	16	750	69.4	180	232			3.0	G 1 1/2-25	80*	70
100502	10	502	116.2	72	145	602.0/159.0	86	3.0	G 2 1/4-40	81*	90
100669	10	669	116.2	96	145	802.0/211.9	115	3.0	G 2 1/4-40	81*	90
100836	10	836	116.2	120	145	1,003.0/265.0	144	3.0	G 2 1/4-40	81*	90
101004	10	1,004	116.2	144	145	1,204.0/318.1	173	3.0	G 2 1/4-40	81*	90
101204	10	1,204	116.2	180	145			3.0	G 2 1/4-40	81*	90

Custom designs to order.

The permissible admission pressure on the suction side is approx. 50 % of max. permissible back pressure.

Material version PPT/PCT/TTT max. 10 bar.

* Stainless steel version 95 kg.

Materials in contact with medium

Liquid end	Suction/pres- sure port	DN 25 ball valves			DN 40 plate valves **		
		Gas- kets	Valve balls	Valve seats	Gas- kets	Valve plates/ valve spring	Valve seats
PPT Polypropylene	PVDF	PTFE	Borosilicate glass	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
PCT PVC	PVDF	PTFE	Borosilicate glass	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
TTT PTFE with carbon	PVDF	PTFE	Ceramic	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
SST Stainless steel W. No. 1.4571/1.4404	Stainless steel W. No. 1.4581	PTFE	Stainless steel W. No. 1.4401	PTFE	PTFE	Stainless steel 1.4404/Hast. C	PTFE

Patented multilayer diaphragm, vacuum-packed.

** The valve spring is coated with CTFE (similar to PTFE)
Special versions on request.

Motor Data

Identcode characteristic	Voltage supply				Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	1.5 kW	
		250-280 V/440-480 V	60 Hz	1.5 kW	
L1	3 ph, II2GEEExIIIT3	220-240 V/380-420 V	50 Hz	1.5 kW	with PTC, speed adjustment range 1:5
L2	3 ph, II2GEEExIIICT4	220-240 V/380-420 V	50 Hz	1.5 kW	
P1	3 ph, II2GEEExIIIT3	250-280 V/440-480 V	60 Hz	1.5 kW	with PTC, speed adjustment range 1:5
P2	3 ph, II2GEEExIIICT4	250-280 V/440-480 V	60 Hz	1.5 kW	
R	3 ph, IP 55	230 V/400 V	50/60 Hz	2.2 kW	with PTC, speed adjustment range 1:20 with separate fan 1 ph 230 V ; 50/60 Hz
V0	3 ph, IP 55	400 V ±10 %	50/60 Hz	2.2 kW	Variable speed motor with integrated fre- quency converter
V2	3 ph, II2GEEExIIICT4	400 V ±10 %	50/60 Hz	2.2 kW	Ex-variable speed motor with integrated fre- quency converter

For further information, please request motor data sheets.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.



3.5 Makro TZ Hydraulic Diaphragm Metering Pumps

3.5.3 Spare Parts Kits

Spare parts kits Makro TZ (TZHa)

The spare parts kits generally includes liquid end consumables.

- 1 dosing diaphragm
- 1 suction valve set
- 1 discharge valve set
- 2 valve balls (DN 40 with plate and Hast. C springs)
- 1 seal set (O rings, valve seat, valve seat housings)

Identcode: 160300, 160400, 160500, 160600, 160750

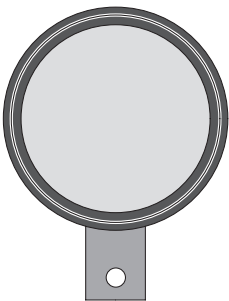
Delivery unit	Materials in contact with medium	Order no.
FMH 70 - 20	PPT	911903
	PCT	911901
	TTT	911905
	SST	911908
	SST (no valve cpl.)	911907

Identcode: 100502, 100669, 100836, 10100, 101204

Delivery unit	Materials in contact with medium	Order no.
FMH 90 - 20	PPT	911904
	PCT	911902
	TTT	911906
	SST	911910
	SST (no valve cpl.)	911909

Makro TZ 20 (TZHa) dosing diaphragms for FMH 70-20; 90-20

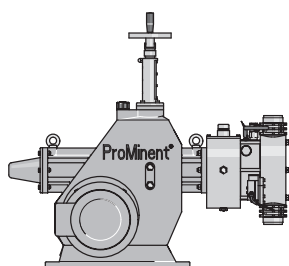
	Order no.
metering diaphragm, patented composite dosing diaphragm, vacuum packed	806938



pk_2_024

3.6 Makro/ 5 Hydraulic Diaphragm Metering Pumps

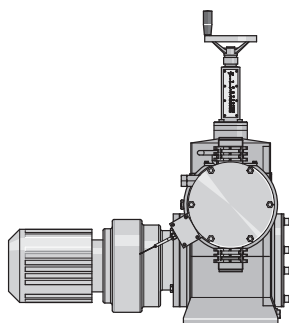
3.6.1 Makro/ 5 Hydraulic Diaphragm Metering Pumps



pk_2_096

The Makro/ 5 HMH is driven as standard by a 3 kW spur wheel geared motor, 230/400 V, 50/60 Hz, enclosure rating IP 55, insulation class F. The stroke length can be adjusted between 0...50 mm. The gearbox is encased in a seawater resistant acrylic resin lacquered cast housing. The diaphragm liquid ends are available in different material combinations which are suited to different applications (see table). The metering reproducibility under defined conditions and if installed correctly is better than $\pm 1\%$ in the stroke length range between 10-100 % (you must read notes in the operating instructions). The priming lift varies with the density and viscosity of the chemical, the connection pipework and the stroking rate of the pump. For technical safety reasons, appropriate equipment must be installed to prevent current overload (you must read the notes in the operating instructions).

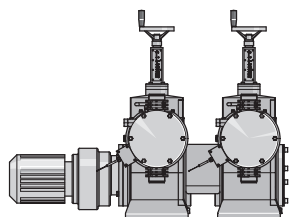
Makro/ 5 Add-On Pumps M5Ha A



pk_2_097

The ProMinent® Makro/ 5 add on pump can be connected to the Makro/ 5 main power end to form a duplex or triplex pump. (At reduced back pressure, up to four add on power ends can be combined with a main power end). Add on power ends can be fitted on site. If required, the main drive can be fitted with a 3 kW and/or 5.5 kW motor. You will require a base frame when connecting add on power ends.

Makro/ 5 Double Head Version M5HaD (Main Pump) /M5HaB (Add-On Pump)



pk_2_094

Essentially the same instructions apply for the Makro/ 5 HMHD and AMHD pumps as for single pumps. They are, however, fitted with a second liquid end.

The liquid ends operate in counter-cycle.

Makro/ 5 Pump Control

Makro/ 5 stroke length actuator

Servomotor for automatic stroke length adjustment, adjusting time approx. 100 sec. for 100 % stroke length, fitted with 2 limit switches for min./max. settings. Feedback potentiometer 1 k Ohm; enclosure rating: IP 54. Power supply 230 V ($\pm 10\%$), 50/60 Hz, approx. 40 W, mech. stroke rating display on Makro/ 5 power end.

Custom voltage ratings/higher enclosure ratings/Ex-proof available on request.

Makro/ 5 stroke length controller

Controller comprising actuator with servomotor and integrated microprocessor controller for stroke length adjustment via standard signal. Technical data, see actuator.

Includes:

Standard signal input 0/4-20 mA, (corresponds to stroke length 0-100 %); internal switch for manual/automatic operation, key switch for stroke length adjustment in manual operating mode, actual value output 0/4-20 mA for remote display.

Frequency control for speed controller, enclosure rating IP 55

Frequency inverter encased in safety housing, IP 55, with integrated controller and main switch for the stated motor output.

Optional external control via 0/4-20 mA and/or 0-10 V corresponds to 0-50 (60) Hz output frequency.

Integrated controller with versatile functions including switching between external/internal control. In the case of internal control, frequency input via arrow keys, multi-lingual fault message display etc.

With evaluation equipment for motor temperature monitoring (thermistor protection).

Stroke sensor namur signal

Mounted onto the crank drive of the Makro/ 5 gearbox. For precise detection of each metering stroke, comprising trip cam and inductive proximity switch, Namur-type switch signal. Suitable for batch metering in conjunction with electronic timers and/or for proportional metering in conjunction with proportional controller.

Retrofitting on factory premises only.

Permitted for ex-proof operation with enclosure rating EEx ia II C T6.

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3.6 Makro/ 5 Hydraulic Diaphragm Metering Pumps

Technical data

Type M5HaH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz				Suction head mWC	Connection suction/ discharge side G-DN	Shipping weight kg	Plunger Ø mm
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	Delivery rate at max. backpressure		Max. stroke rate Strokes/min						
	bar	l/h		ml/stroke	psi		l/h	gph				
250450	25	450	125.0	60	362	537	142	72	3.0	G 2-32	320	60
250562	25	562	125.0	75	362	671	177	89	3.0	G 2-32	320	60
250772	25	772	125.0	103	362	922	244	123	3.0	G 2-32	320	60
250997	25	997	125.0	133	362	1,191	315	159	3.0	G 2-32	320	60
251170	25	1,170	125.0	156						G 2-32	320	60
160616	16	616	171.2	60	232	736	194	72	3.0	G 2 1/4-40	320	70
160770	16	770	171.2	75	232	920	243	89	3.0	G 2 1/4-40	320	70
161058	16	1,058	171.2	103	232	1,264	334	123	3.0	G 2 1/4-40	320	70
161366	16	1,366	171.2	133	232	1,633	431	159	3.0	G 2 1/4-40	320	70
161602	16	1,602	171.2	156					3.0	G 2 1/4-40	320	70
120716	12	716	199.0	60	174	855	226	72	3.0	G 2 1/4-40	320	75
120895	12	895	199.0	75	174	1,069	282	89	3.0	G 2 1/4-40	320	75
121229	12	1,229	199.0	103	174	1,469	388	123	3.0	G 2 1/4-40	320	75
121588	12	1,588	199.0	133	174	1,898	501	159	3.0	G 2 1/4-40	320	75
121862	12	1,862	199.0	156					3.0	G 2 1/4-40	320	75
120919	12	919	255.3	60	174	1,098	290	72	3.0	G 2 1/4-40	320	85
121148	12	1,148	255.3	75	174	1,372	362	89	3.0	G 2 1/4-40	320	85
121577	12	1,577	255.3	103	174	1,885	498	123	3.0	G 2 1/4-40	320	85
122037	12	2,037	255.3	133	174	2,435	643	159	3.0	G 2 1/4-40	320	85
122389	12	2,389	255.3	156		2,856	754		3.0	G 2 1/4-40	320	85
101345	10	1,345	374.0	60	145	1,607	425	72	3.0	G 2 3/4-50	330	100
101680	10	1,680	374.0	75	145	2,008	530	89	3.0	G 2 3/4-50	330	100
102310	10	2,310	374.0	103	145	2,761	729	123	3.0	G 2 3/4-50	330	100
102980	10	2,980	374.0	133	145	3,562	941	159	3.0	G 2 3/4-50	330	100
103500	10	3,500	374.0	156					3.0	G 2 3/4-50	330	100
062305	6	2,305	641.0	60	87	2,755	728	72	3.0	Flange-65*	330	130
062880	6	2,880	641.0	75	87	3,443	910	89	3.0	Flange-65*	330	130
063960	6	3,960	641.0	103	87	4,734	1,251	123	3.0	Flange-65*	330	130
065110	6	5,110	641.0	133	87	6,108	1,614	159	3.0	Flange-65*	330	130
066000	6	6,000	641.0	156					3.0	Flange-65*	330	130

Material Version PPT/PCT/TTT max. 10 bar

* SST version with G 2 1/2" thread

Materials in contact with medium

	Liquid end	Suction/ pressure valve	DN 32/DN 40/DN 65 plate valves			DN 40 plate valves **		
			Gaskets	Valve balls	Valve seats	Gaskets	Valve plates/ valve spring	Valve seats
PPT	Polypropylene	Polypropylene	PTFE	Ceramic/ Hast C. + CTFE**	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
PCT	PVC	PVC	PTFE	Ceramic/ Hast C. + CTFE**	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
TTT	PTFE with carbon	PTFE with carbon	PTFE	Ceramic/ Hast C. + CTFE**	PTFE	PTFE	Ceramic/ Hast C. + CTFE**	PTFE
SST	Stainless steel W. No. 1.4571/ 1.4404	Stainless steel W. No. 1.4571/ 1.4404	PTFE	Stainless steel 1.4404/Hast. C	PTFE	PTFE	Stainless steel 1.4404/Hast. C	PTFE

Patented multilayer diaphragm, vacuum-packed.

Special versions on request.

** The valve spring is coated with CTFE (similar to PTFE)



3.6 Makro/ 5 Hydraulic Diaphragm Metering Pumps

3.6.2 Identcode Ordering System

Motor-driven metering pump M5Ha

M5Ha	Drive type					
H	Main drive					
A	Add-on power end					
D	Double main drive					
B	Double add-on power end					
		Type*				
250450	160616	120716	120919	101345	062305	
250562	160770	120895	121148	101680	062880	
250772	161058	121229	121577	102310	063960	
250997	161366	121588	122037	102980	065110	
251170	161602	121862	122389	103500	066000	
		Material Liquid end				
PC	PVC					
PP	Polypropylene					
SS	Stainless steel					
TT	PTFE + 25 % carbon					
		Sealing material				
T	PTFE					
		Displacement body				
T	Composite diaphragm, PTFE coating, with rupture indicator					
		Liquid end version				
1	With valve springs					
		Hydraulic connection				
0	Standard connection					
1	PVC union nut and insert					
2	Union nut and insert PP					
3	PVDF union nut and insert					
4	SS union nut and insert					
		Version				
0	with ProMinent® logo, no frame					
1	without ProMinent® logo, no frame					
A	with ProMinent® logo, with frame, simplex					
B	with ProMinent® logo, with frame, duplex					
C	with ProMinent® logo, with frame, triplex					
D	with ProMinent® logo, with frame, quadruplex					
M	Modified					
		Electrical power supply				
S	3 ph. 230/400 V 50/60 Hz (WBS)					
P	3 ph. 230/400 V 60 Hz (Exe, Exd)					
L	3 ph. 230/400 V 50 Hz (Exe, Exd)					
R	Variable speed motor 4 pole 230/400 V					
V (0)	Motor with integr. frequency converter					
V (2)	Motor with integr. frequency converter (Exd)					
5	No motor, with gearbox IEC 100					
6	No motor, with gearbox IEC 112					
0	No motor, no gearbox					
		Enclosure rating				
0	IP 55 (Standard) ISO class F					
1	Exe version ATEX-T3					
2	Exd version ATEX-T4					
A	ATEX power end					
		Stroke sensor				
0	No stroke sensor					
1	With stroke sensor (Namur)					
		Stroke length adjustment				
0	Stroke length adjustment, man.					
3	230 V 0-20 mA stroke controller					
4	230 V 4-20 mA stroke controller					
5	115 V 0-20 mA stroke controller					
6	115 V 4-20 mA stroke controller					
		Application				
0	Standard					
3	Low temperature to -25 °C					

* Material version PC/PP/TT max. 10 bar

3.6 Makro/ 5 Hydraulic Diaphragm Metering Pumps

3.6.3 Spare Parts Kits

Spare parts kits Makro/ 5 HMH

The spare parts kits generally contain the consumable components for the liquid ends.

- 1 dosing diaphragm
- 1 suction valve set
- 1 discharge valve set
- 1 seal set (O-rings, packing rings, valve seat, valve seat housings)

Identcode: 250450, 250562, 250772, 250997, 251170

Delivery unit	Materials in contact with medium	Order no.
Liquid end FMH 60-50	S (with 2 additional valve assemblies)	1008170
	S (no valve set)	1008169

Identcode: 160616, 160770, 161058, 161366, 161602, 120716, 120895, 121229, 121588, 121862, 120919, 121148, 121577, 122037, 122389

Delivery unit	Materials in contact with medium	Order no.
Liquid end FMH 70/75/85-50	PPT	911904
	PCT	911902
	TTT	911906
	SST	911910
	SST (no valve cpl.)	911909

Identcode: 101345, 101680, 102310, 102980, 103500

Delivery unit	Materials in contact with medium	Order no.
Liquid end FMH 100-50	PP	1008246
	P	1008247
	T	1008248
	S (with valve set)	1008250
	S (no valve set)	1008249

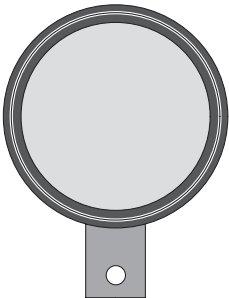
Identcode: 062305, 062880, 063960, 065110, 066000

Delivery unit	Materials in contact with medium	Order no.
Liquid end FMH 130-50	PP	1008251
	P	1008252
	T	1008253
	S (with valve set)	1008265
	S (no valve set)	1008264

Makro/ 5 HMH dosing diaphragms

patented composite diaphragm, vacuum packed

Delivery unit	Order no.
FMH 60/70/75/85-50	1007298
FMH 100/130-50	1007852



pk_2_024

3.6 Makro/ 5 Hydraulic Diaphragm Metering Pumps

Motor Data

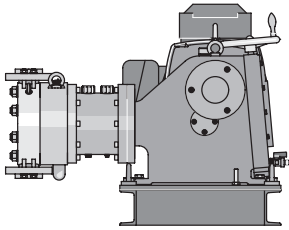
Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	3 kW	
		250-280 V/440-480 V	60 Hz	3 kW	
L1	3 ph, II2GEEExIIIT3	220-240 V/380-420 V	50 Hz	3.6 kW	
L2	3 ph, II2GEEExdIICT4	220-240 V/380-420 V	50 Hz	4 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEExIIIT3	250-280 V/440-480 V	60 Hz	3.6 kW	
P2	3 ph, II2GEEExdIICT4	250-280 V/440-480 V	60 Hz	4 kW	with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	3 kW	with PTC, speed adjustment range 1:5
V0	3 ph, IP 55	400 V \pm 10 %	50/60 Hz	3 kW	Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEExIICT4	400 V \pm 10 %	50/60 Hz	4 kW	Ex-variable speed motor with integrated frequency converter

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

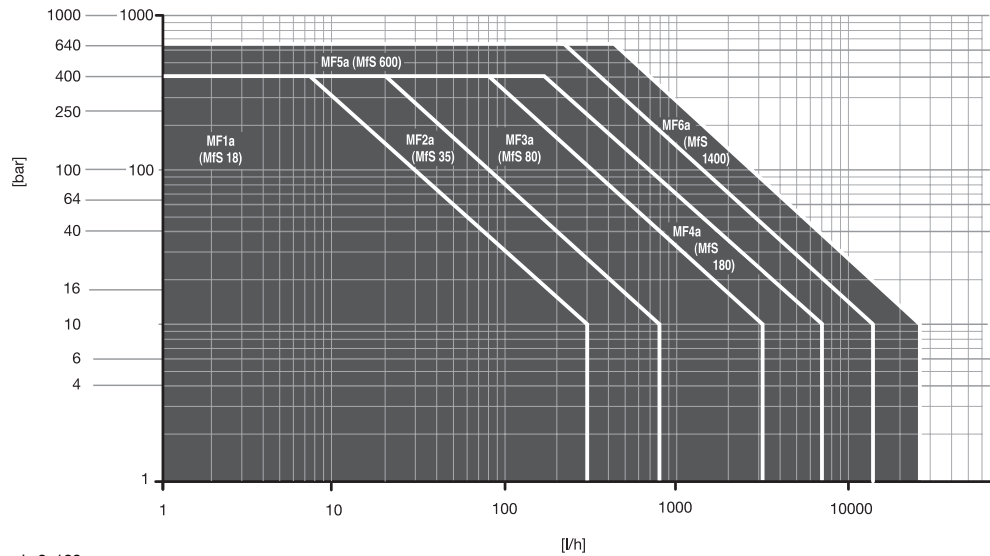
3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.1 ORLITA® MF Hydraulic Diaphragm Pump



pk_2_121
MFS 600-75

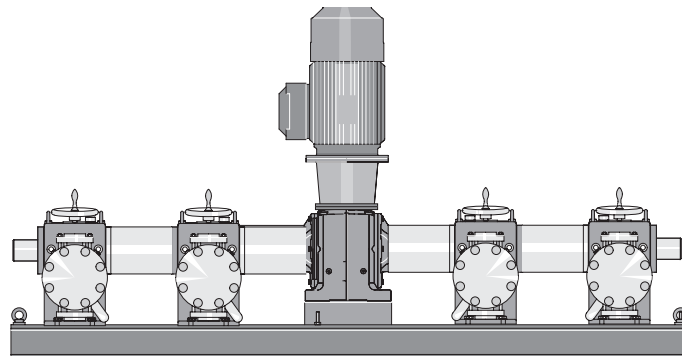
Dosing pumps in the ORLITA® MF product range are modular in construction and basically comprise drive mechanism, crank and liquid end as separate functional groups. The hydraulic diaphragm liquid end is equipped with a PTFE dual membrane system with integrated rupture indicator. An integrated pressure relief valve protects the pump from overload. Reproducible metering accuracy under defined conditions and adjusted installation is $\pm 0.5\%$ in the 10-100% stroke length adjustment range.



pk_2_128
Pressure [bar] as a function of metered quantity [l/h] at 50 Hz

Multiplexed Metering Pumps

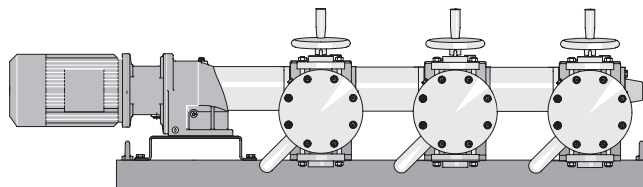
The ORLITA® MF range's modular construction enables variable combination of drives, motors and dosing heads e.g. quadruple MF dosing pumps with central drive.



pk_2_128
Orlita multiplexed pump

Triplex Metering Pumps

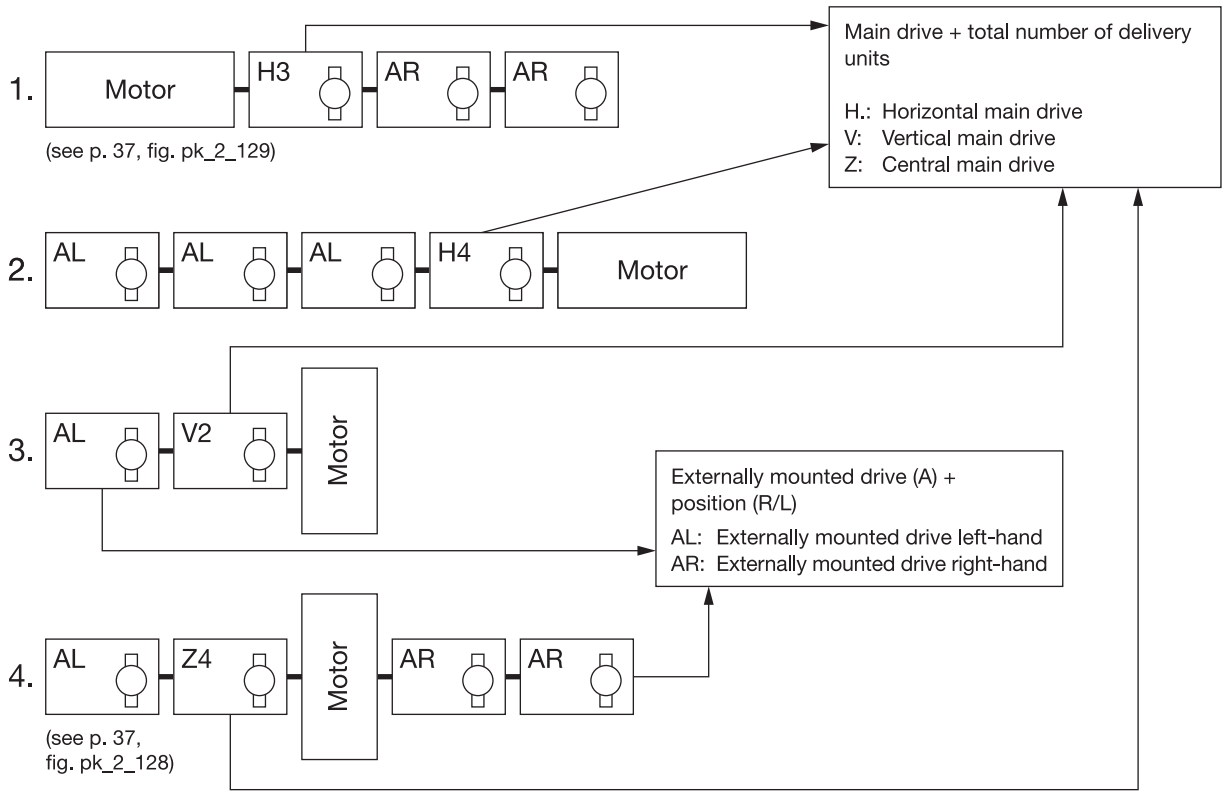
In triplex dosing pumps, the pressure stroke of each dosing head occurs through 120° of crank travel. This results in a dosing flow free of pulsation without the use of elaborate pulsation dampers. This design of process diaphragm pump is preferred equipment in the chemical and petrochemical industries.



pk_2_129
Triplex pump

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Type Of Drive



When ordering a multiplexed pump, the main and/or all externally mounted pumps require a separate Identcode.

For example a triplex pump (1.) : MF_aH3.....
MF_aAR.....
MF_aAR.....

Materials in contact with medium

	Liquid end	Suction/pressure valve housing	Valve seals	Valve	Valve seat	Range
S1 (DIN)	1.4404	none	1.4571	Ruby	1.4571	DN 3
S1 (ANSI)	A 316 L	N/A	A 316 Ti	Ruby	A 316 Ti	
S1 (DIN)	1.4404	1.4404	1.4571	1.4462	1.4462	≥ DN6
S1 (ANSI)	A 316 L	A 316 L	A 316 Ti	Duplex SS	Duplex SS	
S2 (DIN)	1.4462	1.4462	1.4571	1.4462	1.4462	≥ DN6
S2 (ANSI)	Duplex SS	Duplex SS	A 316 Ti	Duplex SS	Duplex SS	
S3 (DIN)	1.4539	1.4539	2.4610	1.4539	1.4539	≥ DN6
S3 (ANSI)	A904L	A904L	Hastelloy C-4	A904L	A904L	

Motor Data

A	50 Hz	3 ph. 230/400	3 ph. 500	3 ph. 380/660
		3 ph. 400/690	3 ph. 415	
B (adjustable 1:5)	50 Hz	3 ph. 230/400	3 ph. 500	3 ph. 380/660
		3 ph. 400/690	3 ph. 415	
H	60 Hz	3 ph. 220/380	3 ph. 400	
K (adjustable 1:5)	60 Hz	3 ph. 220/380	3 ph. 400	



3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.2 ORLITA® MfS 18 (MF1a) Hydraulic Diaphragm Pump

Technical Data MfS 18 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 7]					Max. pressure p bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		70	88	108	140	200		100 % pres- sure	50 % pres- sure			
		[3]	[4]	[5]	[6]	[7]						
7	0.58	2.4	3.0	3.7	4.8	6.9	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
8	0.75	3.2	4.0	4.9	6.3	9.0	348.0	0.55	0.72	DKu* DN 3	G1/4 internal	1/4" FNPT
10	1.18	4.9	6.2	7.6	9.9	14.1	222.0	0.67	0.79	Ke*** DN 6	G3/8 internal	1/4" FNPT
12	1.70	7.1	9.0	11.0	14.3	20.4	154.0	0.84	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
16	3.02	12.7	15.9	19.5	25.3	36.2	87.0	0.86	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
20	4.71	19.8	24.9	30.5	39.6	56.5	55.0	0.88	0.89	Ke*** DN 6	G3/8 internal	1/4" FNPT
22	5.70	23.9	30.1	36.9	47.9	68.4	46.0	0.88	0.89	Ke*** DN 10/ DN 6	G3/8 internal	1/2"x1/4" FNPT
25	7.36	30.9	38.9	47.7	61.9	88.4	35.0	0.89	0.89	Ke*** DN 10	G3/8 internal	1/2" FNPT
27	8.59	36.1	45.3	55.7	72.1	103.1	30.0	0.89	0.89	Ke*** DN 10	G3/8 internal	1/2" FNPT
30	10.60	44.5	56.0	68.7	89.1	127.2	24.0	0.89	0.89	Ke*** DN 10	DN 10 PN 40	1/2" #300RF
36	15.27	64.1	80.6	98.9	128.3	183.2	17.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
40	18.85	79.2	99.5	122.1	158.3	226.2	13.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
44	22.81	95.8	120.4	147.8	191.6	273.7	11.0	0.89	0.90	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
50	29.45	123.7	155.5	190.9	247.4	353.4	8.0	0.89	0.90	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
65	49.77	209.1	262.8	322.5	418.1	597.3	5.0	0.90	0.90	Ke*** DN 16/ DN 25	DN 15/25 PN 40	3/4"x1" #150RF

Technical Data MfS 18 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 6]					Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		67	87	106	130	168		100 % pres- sure	50 % pres- sure			
		[2]	[3]	[4]	[5]	[6]						
7	0.58	2.3	3.0	3.7	4.5	5.8	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
8	0.75	3.0	3.9	4.8	5.9	7.6	348.0	0.55	0.72	DKu* DN 3	G1/4 internal	1/4" FNPT
10	1.18	4.7	6.1	7.5	9.2	11.9	222.0	0.67	0.79	Ke*** DN 6	G3/8 internal	1/4" FNPT
12	1.70	6.8	8.9	10.8	13.2	17.1	154.0	0.84	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
16	3.02	12.1	15.7	19.2	23.5	30.4	87.0	0.86	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
20	4.71	18.9	24.6	30.0	36.8	47.5	55.0	0.88	0.89	Ke*** DN 6	G3/8 internal	1/4" FNPT
22	5.70	22.9	29.8	36.3	44.5	57.5	46.0	0.88	0.89	Ke*** DN 10/ DN 6	G3/8 internal	1/2"x1/4" FNPT
25	7.36	29.6	38.4	46.8	57.4	74.2	35.0	0.89	0.89	Ke*** DN 10	G3/8 internal	1/2" FNPT
27	8.59	34.5	44.8	54.6	67.0	86.6	30.0	0.89	0.89	Ke*** DN 10	G3/8 internal	1/2" FNPT
30	10.60	42.6	55.3	67.4	82.7	106.9	24.0	0.89	0.89	Ke*** DN 10	DN 10 PN 40	1/2" #300RF
36	15.27	61.4	79.7	97.1	119.1	153.9	17.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
40	18.85	75.8	98.4	119.9	147.0	190.0	13.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
44	22.81	91.7	119.1	145.1	177.9	229.9	11.0	0.89	0.90	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
50	29.45	118.4	153.7	187.3	229.7	296.9	8.0	0.89	0.90	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
65	49.77	200.1	259.8	316.6	388.2	501.7	5.0	0.90	0.90	Ke*** DN 16/ DN 25	DN 15/25 PN 40	3/4"x1" #150RF

* Double ball

*** Cone

- Note:**
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS18 (MF1a)

MF1a	Drive type										
V1	Main drive vertical*		AL	Drive module left-hand	M	Modified **					
Z1	Main drive central*		AR	Drive module right-hand							
Plunger diameter											
007	7 mm	012	12 mm	022	22 mm	036	36 mm	050	50 mm		
008	8 mm	016	16 mm	025	25 mm	040	40 mm	065	65 mm		
010	10 mm	020	20 mm	030	30 mm	044	44 mm				
Stroke rate 50 (60) Hz											
3	70 (84) Strokes/min			5	108 (129) Strokes/min			7	200 (-) Strokes/min		
4	88 (105) Strokes/min			6	140 (168) Strokes/min						
Liquid end material (including valve materials)											
S1	Stainless steel (see table, sheet 2)										
Temperature of pumped medium											
0	-10 °C to 80 °C			2	-40 °C to 60 °C			4	10 °C to 150 °C		
1	-25 °C to 60 °C			3	10 °C to 115 °C						
Displacer format											
0	PTFE multi-layer diaphragm										
1	PTFE multi-layer diaphragm with pressure gauge										
Liquid end version											
0	Standard		2	Standard double valve							
1	Standard with spring		3	Standard double valve with spring							
Hydraulic connection suction side											
G	Thread DIN/ISO										
N	Thread NPT/ANSI										
A	Flange ANSI										
D	Flange DIN/ISO										
Hydraulic connection discharge side											
G	Thread DIN/ISO		A	Flange ANSI							
N	Thread NPT/ANSI		D	Flange DIN/ISO							
Version											
0	no features										
1	Dosing head heating										
2	Dosing head polished										
3	Special paint finish										
Power connector											
A	Standard voltages 50Hz										
B	Standard voltages 50Hz adjustable										
H	Standard voltages 60Hz										
K	Standard voltages 60Hz adjustable										
0	Externally mounted pump										
1	without motor with IEC flange										
2	without motor with NEMA flange										
Electrical protection system / explosion protection											
0	IP 55	C	IP 55 EExde								
1	IP 56	D	IP 56 EExn								
A	IP 55 EExn	E	IP 56 EExe								
B	IP 55 EExe	F	IP 56 EExde								
Electrical options											
0	no options										
1	Stroke sensor										
Stroke length adjustment											
0	manual										
1	0/4-20 mA without Ex										
2	0/4-20 mA Ex Zone 2										
3	0/4-20 mA Ex Zone 1										
4	0/4-20 mA without EX offshore										
5	0/4-20 mA Ex Zone 2 offshore										
6	0/4-20 mA Ex Zone 1 offshore										
Environmental conditions											
0	-20 °C to 40 °C										
1	-40 °C to 40 °C										
2	0 °C to 55 °C										
Approvals											
0	CE										
1	API 675										
2	VDMA										
3	ATEX										
4	ATEX / API 675										
5	VDMA / ATEX										

*For other pump configurations see Type Of Drive page → 3-41

** Modified version (M) is possible for each ID character of the Identcode.



3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.3 ORLITA® MfS 35 (MF2a) Hydraulic Diaphragm Pump

Technical Data MfS 35 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 7]					Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		70	88	108	140	200		100 % pressure	50 % pressure			
		[3]	[4]	[5]	[6]	[7]						
7	0.77	3.2	4.1	5.0	6.5	9.2	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
8	1.01	4.2	5.3	6.5	8.4	12.1	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
10	1.57	6.6	8.3	10.2	13.2	18.8	400.0	0.50	0.70	Ke*** DN 6	G3/8 internal	1/4" FNPT
12	2.26	9.5	11.9	14.7	19.0	27.1	309.0	0.79	0.85	Ke*** DN 6	G3/8 internal	1/4" FNPT
16	4.02	16.9	21.2	26.1	33.8	48.3	174.0	0.83	0.86	Ke*** DN 6	G3/8 internal	1/4" FNPT
20	6.28	26.4	33.2	40.7	52.8	75.4	111.0	0.86	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
22	7.60	31.9	40.1	49.3	63.9	91.2	92.0	0.86	0.88	Ke*** DN 10/ DN 6	G3/8 internal	1/2"x1/4" FNPT
25	9.82	41.2	51.8	63.6	82.5	117.8	71.0	0.87	0.88	Ke*** DN 10	G3/8 internal	1/2" FNPT
27	11.45	48.1	60.5	74.2	96.2	137.4	61.0	0.87	0.88	Ke*** DN 10	G3/8 internal	1/2" FNPT
30	14.14	59.4	74.6	91.6	118.8	169.6	49.0	0.88	0.89	Ke*** DN 10	DN 10 PN 100	1/2" #300RF
36	20.36	85.5	107.5	131.9	171.0	244.3	34.0	0.88	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
40	25.13	105.6	132.7	162.9	211.1	301.6	27.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
44	30.41	127.7	160.6	197.1	255.4	364.9	23.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
50	39.27	164.9	207.3	254.5	329.9	471.2	17.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
65	66.37	278.7	350.4	430.1	557.5	796.4	10.0	0.89	0.90	Ke*** DN 16/ DN 25	DN 15/25 PN 40	3/4"x1" #150RF

Technical Data MfS 35 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 6]					Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		67	87	106	130	168		100 % pressure	50 % pressure			
		[2]	[3]	[4]	[5]	[6]						
7	0.77	3.1	4.0	4.9	6.0	7.8	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
8	1.01	4.0	5.2	6.4	7.8	10.1	400.0	0.50	0.70	DKu* DN 3	G1/4 internal	1/4" FNPT
10	1.57	6.3	8.2	10.0	12.3	15.8	400.0	0.50	0.70	Ke*** DN 6	G3/8 internal	1/4" FNPT
12	2.26	9.1	11.8	14.4	17.6	22.8	309.0	0.79	0.85	Ke*** DN 6	G3/8 internal	1/4" FNPT
16	4.02	16.2	21.0	25.6	31.4	40.5	174.0	0.83	0.86	Ke*** DN 6	G3/8 internal	1/4" FNPT
20	6.28	25.3	32.8	40.0	49.0	63.3	111.0	0.86	0.88	Ke*** DN 6	G3/8 internal	1/4" FNPT
22	7.60	30.6	39.7	48.4	59.3	76.6	92.0	0.86	0.88	Ke*** DN 10/ DN 6	G3/8 internal	1/2"x1/4" FNPT
25	9.82	39.5	51.2	62.4	76.6	99.0	71.0	0.87	0.88	Ke*** DN 10	G3/8 internal	1/2" FNPT
27	11.45	46.0	59.8	72.8	89.3	115.4	61.0	0.87	0.88	Ke*** DN 10	G3/8 internal	1/2" FNPT
30	14.14	56.8	73.8	89.9	110.3	142.5	49.0	0.88	0.89	Ke*** DN 10	DN 10 PN 100	1/2" #300RF
36	20.36	81.8	106.3	129.5	158.8	205.2	34.0	0.88	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
40	25.13	101.0	131.2	159.8	196.0	253.3	27.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
44	30.41	122.3	158.7	193.4	237.2	306.5	23.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #300RF
50	39.27	157.9	205.0	249.8	306.3	395.8	17.0	0.89	0.89	Ke*** DN 16	DN 15 PN 40	3/4" #150RF
65	66.37	266.8	346.4	422.1	517.7	669.0	10.0	0.89	0.90	Ke*** DN 16/ DN25	DN 15/25 PN 40	3/4"x1" #150RF

* Double ball

*** Cone

- Note:**
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS35 (MF2a)

MF2a	Drive type							
V1	Main drive vertical *	AL	Drive module left-hand		M	Modified **		
Z1	Main drive central *	AR	Drive module right-hand					
Plunger diameter								
007	7 mm	012	12 mm	022	22 mm	036	36 mm	050 50 mm
008	8 mm	016	16 mm	025	25 mm	040	40 mm	065 65 mm
010	10 mm	020	20 mm	030	30 mm	044	44 mm	
Stroke rate 50 (60) Hz								
2	(-) 67 Strokes/min		4	88 (105) Strokes/min		6	140 (168) Strokes/min	
3	70 (84) Strokes/min		5	108 (129) Strokes/min		7	200 (-) Strokes/min	
Liquid end material (including valve materials)								
S1	Stainless steel (see table, sheet 2)							
Temperature of pumped medium								
0	-10 °C to 80 °C		2	-40 °C to 60 °C		4	10 °C to 150 °C	
1	-25 °C to 60 °C		3	10 °C to 115 °C				
Displacer format								
0	PTFE multi-layer diaphragm							
1	PTFE multi-layer diaphragm with pressure gauge							
Liquid end version								
0	Standard		2	Standard + double valve				
1	Standard with spring		3	Standard + double valve with spring				
Hydraulic connection suction side								
G	Thread DIN/ISO		A	Flange ANSI				
N	Thread NPT/ANSI		D	Flange DIN/ISO				
Hydraulic connection discharge side								
G	Thread DIN/ISO		A	Flange ANSI				
N	Thread NPT/ANSI		D	Flange DIN/ISO				
Version								
0	no features							
1	Dosing head heating							
2	Dosing head polished							
3	Special paint finish							
Power connector								
A	Standard voltages 50Hz							
B	Standard voltages 50Hz adjustable							
H	Standard voltages 60Hz							
K	Standard voltages 60Hz adjustable							
0	Externally mounted pump							
1	without motor with IEC flange							
2	without motor with NEMA flange							
Electrical protection system / explosion protection								
0	IP 55	D	IP 56 EExn					
1	IP 56	E	IP 56 EExe					
A	IP 55 EExn	F	IP 56 EExde					
B	IP 55 EExe	K	IP 65 EExde					
C	IP 55 EExde							
Electrical options								
0	no options							
1	Stroke sensor							
Stroke length adjustment								
0	manual							
1	0/4-20 mA without Ex							
2	0/4-20 mA Ex Zone 2							
3	0/4-20 mA Ex Zone 1							
4	0/4-20 mA without EX offshore							
5	0/4-20 mA Ex Zone 2 offshore							
6	0/4-20 mA Ex Zone 1 offshore							
Environmental conditions								
0	-20 °C to 40 °C							
1	-40 °C to 40 °C							
2	0 °C to 55 °C							
Approvals								
0	CE							
1	API 675							
2	VDMA							
3	ATEX							
4	ATEX / API 675							
5	VDMA / ATEX							

*For further pump configurations see Type Of Drive page → 3-41

** Modified design (M) is available with every Identcode feature

MaharFan

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.4 ORLITA® MfS 80 (MF3a) Hydraulic Diaphragm Pump

Technical Data MfS 80 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 8]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		70 [3]	90 [4]	115 [5]	134 [6]	152 [7]	194 [8]		100 % pressure	50 % pressure			
16	4.02	16.9	21.7	27.7	32.3	36.7	46.8	400.0	0.75	0.83	Ke*** DN 6	G 3/8	1/4" FNPT
20	6.28	26.4	33.9	43.4	50.5	57.3	73.1	400.0	0.75	0.83	Ke*** DN 6	G 3/8	1/4" FNPT
22	7.60	31.9	41.1	52.5	61.1	69.3	88.5	360.0	0.79	0.80	Ke*** DN 10/ DN 6	G 3/8	1/2" x 1/4" FNPT
25	9.82	41.2	53.0	67.7	78.9	89.5	114.3	285.0	0.79	0.85	Ke*** DN 10	G 3/8	1/2" FNPT
27	11.45	48.1	61.8	79.0	92.1	104.4	133.3	244.0	0.81	0.85	Ke*** DN 10	G 3/8	1/2" FNPT
30	14.14	59.4	76.3	97.5	113.7	128.9	164.6	198.0	0.83	0.86	Ke*** DN 10	DN 10 PN 250	1/2" 1500RF
36	20.36	85.5	109.9	140.5	163.7	185.7	237.0	137.0	0.85	0.87	Ke*** DN 16	DN 15 PN 160	3/4" 1500RF
40	25.13	105.6	135.7	173.4	202.1	229.2	292.5	111.0	0.86	0.88	Ke*** DN 16	DN 15 PN 160	3/4" 1500RF
44	30.41	127.7	164.2	209.8	244.5	277.3	354.0	98.0	0.86	0.88	Ke*** DN 16	DN 15 PN 100	3/4" 600RF
50	39.27	164.9	212.1	271.0	315.7	358.1	457.1	71.0	0.87	0.88	Ke*** DN 16	DN 15 PN 100	3/4" 600RF
65	66.37	278.7	358.4	457.9	533.6	605.3	772.5	40.0	0.88	0.89	Ke*** DN 16/ DN 25	DN 25 PN 40	1" 300RF
80	100.53	422.2	542.9	693.7	808.3	916.8	1,170.2	25.0	0.89	0.89	Ke*** DN 25	DN 25 PN 40	1" 300RF
100	157.08	659.7	848.2	1,083.8	1,262.9	1,432.6	1,828.4	17.0	0.89	0.89	Ke*** DN 32	DN 32 PN 40	1 1/2" 150RF
120	226.19	950.0	1,221.5	1,560.7	1,818.6	2,062.9		12.0	0.89	0.89	Ke*** DN 32	DN 32 PN 40	1 1/2" 150RF
140	307.88	1,293.1	1,662.5	2,124.3	2,475.3	2,807.8		9.0	0.89	0.90	Ke*** DN 40	DN 40 PN 16	1 1/2" 150RF
150	353.43	1,484.4	1,908.5	2,438.7	2,841.6	3,223.3		7.0	0.89	0.90	Ke*** DN 40	DN 40 PN 16	1 1/2" 150RF

Technical Data MfS 80 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 7]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		73 [2]	84 [3]	120 [4]	138 [5]	155 [6]	182 [7]		100 % pressure	50 % pressure			
16	4.02	17.6	20.3	29.0	33.3	37.4	43.9	400.0			Ke*** DN 6	G 3/8	1/4" FNPT
20	6.28	27.5	31.7	45.2	52.0	58.4	68.6	400.0	0.75	0.83	Ke*** DN 6	G 3/8	1/4" FNPT
22	7.60	33.3	38.3	54.7	62.9	70.7	83.0	360.0	0.79	0.80	Ke*** DN 10/ DN 6	G 3/8	1/2" x 1/4" FNPT
25	9.82	43.0	49.5	70.7	81.3	91.3	107.2	285.0	0.79	0.85	Ke*** DN 10	G 3/8	1/2" FNPT
27	11.45	50.2	57.7	82.4	94.8	106.5	125.0	244.0	0.81	0.85	Ke*** DN 10	G 3/8	1/2" FNPT
30	14.14	61.9	71.3	101.8	117.1	131.5	154.4	198.0	0.83	0.86	Ke*** DN 10	DN 10 PN 250	1/2" 1500RF
36	20.36	89.2	102.6	146.6	168.6	189.3	222.3	137.0	0.85	0.87	Ke*** DN 16	DN 15 PN 160	3/4" 1500RF
40	25.13	110.1	126.7	181.0	208.1	233.7	274.4	111.0	0.86	0.88	Ke*** DN 16	DN 15 PN 160	3/4" 1500RF
44	30.41	133.2	153.3	219.0	251.8	282.8	332.1	98.0	0.86	0.88	Ke*** DN 16	DN 15 PN 100	3/4" 600RF
50	39.27	172.0	197.9	282.7	325.2	365.2	428.8	71.0	0.87	0.88	Ke*** DN 16	DN 15 PN 100	3/4" 600RF
65	66.37	290.7	334.5	477.8	549.5	617.2	724.7	40.0	0.88	0.89	Ke*** DN 16/ DN 25	DN 25 PN 40	1" 300RF
80	100.53	440.3	506.7	723.8	832.4	934.9	1,097.8	25.0	0.89	0.89	Ke*** DN 25	DN 25 PN 40	1" 300RF
100	157.08	688.0	791.7	1,131.0	1,300.6	1,460.8	1,715.3	17.0	0.89	0.89	Ke*** DN 32	DN 32 PN 40	1 1/2" 150RF
120	226.19	990.7	1,140.0	1,628.6	1,872.9	2,103.6		12.0	0.89	0.89	Ke*** DN 32	DN 32 PN 40	1 1/2" 150RF
140	307.88	1,348.5	1,551.7	2,216.7	2,549.2	2,863.2		9.0	0.89	0.90	Ke*** DN 40	DN 40 PN 16	1 1/2" 150RF
150	353.43	1,548.0	1,781.3	2,544.7	2,926.4	3,286.9		7.0	0.89	0.90	Ke*** DN 40	DN 40 PN 16	1 1/2" 150RF

*** Cone

- Note:
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS80 (MF3a)

MF3a	Drive type										
H1	Main drive horizontal*		Z1	Main drive central*		AR	Drive module right-hand				
V1	Main drive vertical*		AL	Drive module left-hand		M	Modified **				
Plunger diameter											
016	16 mm	027	27 mm	044	44 mm	100	100 mm	160	160 mm		
020	20 mm	030	30 mm	050	50 mm	120	120 mm				
022	22 mm	036	36 mm	065	65 mm	140	140 mm				
025	25 mm	040	40 mm	080	80 mm	150	150 mm				
Stroke rate 50 (60) Hz											
2	(-) 73 Strokes/min		4	85 (102) Strokes/min		6	145 (174) Strokes/min		8	194 (-) Strokes/min	
3	68 (81) Strokes/min		5	113 (135) Strokes/min		7	174 Strokes/min				
Liquid end material (including valve materials)											
S1	Stainless steel (see table, sheet 2)										
Temperature of pumped medium											
0	-10 °C to 80 °C				2	-40 °C to 60 °C				4	10 °C to 150 °C
1	-25 °C to 60 °C				3	10 °C to 115 °C					
Displacer format											
0	PTFE multi-layer diaphragm										
1	PTFE multi-layer diaphragm with pressure gauge										
Liquid end version											
0	Standard				2	Standard + double valve					
1	Standard with spring				3	Standard + double valve with spring					
Hydraulic connection suction side											
G	Thread DIN/ISO		A	Flange ANSI							
N	Thread NPT/ANSI		D	Flange DIN/ISO							
Hydraulic connection discharge side											
G	Thread DIN/ISO		A	Flange ANSI							
N	Thread NPT/ANSI		D	Flange DIN/ISO							
Version											
0	no features										
1	Dosing head heating										
2	Dosing head polished										
3	Special paint finish										
Power connector											
A	Standard voltage 50Hz										
B	Standard voltage 50Hz adjustable										
H	Standard voltage 60Hz										
K	Standard voltage 60Hz adjustable										
0	Externally mounted pump										
1	without motor with IEC flange										
2	without motor with NEMA flange										
Electrical protection system / explosion protection											
0	IP 55	D	IP 56 EExn								
1	IP 56	E	IP 56 EExe								
A	IP 55 EExn	F	IP 56 EExde								
B	IP 55 EExe	K	IP 65 EExde								
C	IP 55 EExde	D	IP 56 EExn								
Electrical options											
0	no options										
1	Stroke sensor										
Stroke length adjustment											
0	manual										
1	0/4-20 mA without Ex										
2	0/4-20 mA Ex Zone 2										
3	0/4-20 mA Ex Zone 1										
4	0/4-20 mA Ex without EX offshore										
5	0/4-20 mA Ex Zone 2 offshore										
6	0/4-20 mA Ex Zone 1 offshore										
Environmental conditions											
0	-20 °C to 40 °C										
1	-40 °C to 40 °C										
2	0 °C to 55 °C										
Approvals											
0	CE										
1	API 675										
2	VDMA										
3	ATEX										
4	ATEX / API 675										
5	VDMA / ATEX										

*For further pump configurations see Type Of Drive page → 3-41

** Modified design (M) is available with every Identcode feature



3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.5 ORLITA® MfS 180 (MF4a) Hydraulic Diaphragm Pump

Technical Data MfS 180 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 8]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO
		67	88	103	137	154	173		100 % pressure	50 % pressure		
		[3]	[4]	[5]	[6]	[7]	[8]					
25	19.63	78.9	103.7	121.3	161.4	181.4	203.8	366.0	0.77	0.83	Ke*** DN 16	DN 15 PN 400 3/4" 2500RTJ
30	28.27	113.7	149.3	174.7	232.4	261.3	293.5	254.0	0.81	0.85	Ke*** DN 16	DN 15 PN 320 3/4" 1500RF
36	40.72	163.7	215.0	251.6	334.7	376.2	422.6	176.0	0.83	0.86	Ke*** DN 16	DN 15 PN 250 1" 1500RF
38	45.36	182.4	239.5	280.4	372.9	419.2	470.9	158.0	0.84	0.87	Ke*** DN 16	DN 15 PN 160 1" 1500RF
40	50.27	202.1	265.4	310.6	413.2	464.5	521.8	143.0	0.85	0.87	Ke*** DN 16	DN 15 PN 160 1" 1500RF
44	60.82	244.5	321.1	375.9	500.0	562.0	631.3	118.0	0.85	0.87	Ke*** DN 25	DN 25 PN 160 1" 1500RF
46	66.48	267.2	351.0	410.8	546.4	614.2	690.0	108.0	0.86	0.88	Ke*** DN 25	DN 25 PN 160 1" 1500RF
48	72.38	291.0	382.2	447.3	595.0	668.8	751.3	108.0	0.86	0.88	Ke*** DN 25	DN 25 PN 160 1" 1500RF
50	78.54	315.7	414.7	485.4	645.6	725.7	815.2	91.0	0.86	0.88	Ke*** DN 25	DN 25 PN 100 1" 600RF
55	95.03	382.0	501.8	587.3	781.2	878.1	986.4	75.0	0.87	0.88	Ke*** DN 25	DN 25 PN 100 1" 600RF
60	113.10	454.7	597.2	698.9	929.7	1,045.0	1,174.0	63.0	0.87	0.89	Ke*** DN 25	DN 25 PN 64 1" 600RF
65	132.73	533.6	700.8	820.3	1,091.1	1,226.4	1,377.8	54.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 600RF
70	153.94	618.8	812.8	951.3	1,265.4	1,422.4	1,597.9	46.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 600RF
75	176.71	710.4	933.1	1,092.1	1,452.6	1,632.8	1,834.3	40.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 300RF
80	201.06	808.3	1,061.6	1,242.6	1,652.7	1,857.8	2,087.0	35.0	0.88	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
85	226.98	912.5	1,198.5	1,402.7	1,865.8	2,097.3	2,356.1	31.0	0.88	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
90	254.47	1,023.0	1,343.6	1,572.6	2,091.7	2,351.3	2,641.4	28.0	0.89	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
100	314.16	1,262.9	1,658.8	1,941.5	2,582.4	2,902.8	3,261.0	22.0	0.89	0.89	Ke*** DN 50	DN 50 PN 40 2" 150RF
115	415.48	1,670.2	2,193.7	2,567.6	3,415.2	3,839.0		17.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40 2 1/2" 150RF
135	572.56	2,301.7	3,023.1	3,538.4	4,706.4	5,290.4		12.0	0.89	0.90	Ke*** DN 65	DN 65 PN 16 2 1/2" 150RF

Technical Data MfS 180 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 7]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO
		71	91	106	139	164	184		100 % pressure	50 % pressure		
		[2]	[3]	[4]	[5]	[6]	[7]					
25	19.63	83.6	107.2	124.9	163.8	193.2	216.8	352.0	0.77	0.83	Ke*** DN 16	DN 15 PN 400 3/4" 2500RTJ
30	28.27	120.4	154.4	179.8	235.8	278.2	312.1	254.0	0.81	0.85	Ke*** DN 16	DN 15 PN 320 3/4" 1500RF
36	40.72	173.4	222.3	258.9	339.6	400.6	449.5	176.0	0.83	0.86	Ke*** DN 16	DN 15 PN 250 1" 1500RF
38	45.36	193.3	247.7	288.5	378.3	446.4	500.8	158.0	0.84	0.87	Ke*** DN 16	DN 15 PN 160 1" 1500RF
40	50.27	214.1	274.4	319.7	419.2	494.6	554.9	143.0	0.85	0.87	Ke*** DN 16	DN 15 PN 160 1" 1500RF
44	60.82	259.1	332.1	386.8	507.2	598.5	671.5	118.0	0.85	0.87	Ke*** DN 25	DN 25 PN 160 1" 1500RF
46	66.48	283.2	363.0	422.8	554.4	654.1	733.9	108.0	0.86	0.88	Ke*** DN 25	DN 25 PN 160 1" 1500RF
48	72.38	308.3	395.2	460.4	603.7	712.2	799.1	108.0	0.86	0.88	Ke*** DN 25	DN 25 PN 160 1" 1500RF
50	78.54	334.6	428.8	499.5	655.0	772.8	867.1	91.0	0.86	0.88	Ke*** DN 25	DN 25 PN 100 1" 600RF
55	95.03	404.8	518.9	604.4	792.6	935.1	1,049.2	75.0	0.87	0.88	Ke*** DN 25	DN 25 PN 100 1" 600RF
60	113.10	481.8	617.5	719.3	943.2	1,112.9	1,248.6	63.0	0.87	0.89	Ke*** DN 25	DN 25 PN 64 1" 600RF
65	132.73	565.4	724.7	844.2	1,107.0	1,306.1	1,465.4	54.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 600RF
70	153.94	655.8	840.5	979.0	1,283.8	1,514.8	1,699.5	46.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 600RF
75	176.71	752.8	964.9	1,123.9	1,473.8	1,738.9	1,950.9	40.0	0.88	0.89	Ke*** DN 32	DN 40 PN 64 1 1/2" 300RF
80	201.06	856.5	1,097.8	1,278.8	1,676.9	1,978.4	2,219.7	35.0	0.88	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
85	226.98	966.9	1,239.3	1,443.6	1,893.0	2,233.5	2,505.9	31.0	0.88	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
90	254.47	1,084.0	1,389.4	1,618.4	2,122.3	2,504.0	2,809.3	28.0	0.89	0.89	Ke*** DN 40	DN 40 PN 40 1 1/2" 300RF
100	314.16	1,338.3	1,715.3	1,998.1	2,620.1	3,091.3	3,468.3	22.0	0.89	0.89	Ke*** DN 50	DN 50 PN 40 2" 150RF
115	415.48	1,769.9	2,268.5	2,642.4	3,465.1			17.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40 2 1/2" 150RF
135	572.56	2,439.1	3,126.2	3,641.5	4,775.1			11.0	0.89	0.90	Ke*** DN 65	DN 65 PN 16 2 1/2" 150RF

*** Cone

- Note:**
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS180 (MF4a)

MF4a	Drive type									
H1	Main drive horizontal*		Z1	Main drive central *		AR	Drive module right-hand			
V1	Main drive vertical*		AL	Drive module left-hand		M	Modified **			
Plunger diameter										
025	25 mm	040	40 mm	055	55 mm	075	75 mm	100	100 mm	
030	30 mm	044	44 mm	060	60 mm	080	80 mm	115	115 mm	
036	36 mm	046	46 mm	065	65 mm	085	85 mm	135	135 mm	
038	38 mm	050	50 mm	070	70 mm	090	90 mm			
Stroke rate 50 (60) Hz										
2	(-) 71 Strokes/min		4	88 (105) Strokes/min		6	140 (168) Strokes/min		8	173 (-) Strokes/min
3	72 (86) Strokes/min		5	123 (147) Strokes/min		7	172 Strokes/min			
Liquid end material (including valve materials)										
S1	Stainless steel (see table, sheet 2)									
Temperature of pumped medium										
0	-10 °C to 80 °C		2	-40 °C to 60 °C		4	10 °C to 150 °C			
1	-25 °C to 60 °C		3	10 °C to 115 °C						
Displacer format										
0	PTFE multi-layer diaphragm									
1	PTFE multi-layer diaphragm with pressure gauge									
Liquid end version										
0	Standard		2	Standard + double valve						
1	Standard with spring		3	Standard + double valve with spring						
Hydraulic connection suction side										
G	Thread DIN/ISO		A	Flange ANSI						
N	Thread NPT/ANSI		D	Flange DIN/ISO						
Hydraulic connection discharge side										
G	Thread DIN/ISO		A	Flange ANSI						
N	Thread NPT/ANSI		D	Flange DIN/ISO						
Version										
0	no features									
1	Dosing head heating									
2	Dosing head polished									
3	Special paint finish									
Power connector										
A	Standard voltage 50Hz									
B	Standard voltage 50Hz adjustable									
H	Standard voltage 60Hz									
K	Standard voltage 60Hz adjustable									
0	Externally mounted pump									
1	without motor with IEC flange									
2	without motor with NEMA flange									
Electrical protection system / explosion protection										
0	IP 55	D	IP 56 EExn							
1	IP 56	E	IP 56 EExe							
A	IP 55 EExn	F	IP 56 EExde							
B	IP 55 EExe	K	IP 65 EExde							
C	IP 55 EExde									
Electrical options										
0	no options									
1	Stroke sensor									
Stroke length adjustment										
0	manual									
1	0/4-20 mA without Ex									
2	0/4-20 mA Ex Zone 2									
3	0/4-20 mA Ex Zone 1									
4	0/4-20 mA Ex without EX offshore									
5	0/4-20 mA Ex Zone 2 offshore									
6	0/4-20 mA Ex Zone 1 offshore									
Environmental conditions										
0	-20 °C to 40 °C									
1	-40 °C to 40 °C									
2	0 °C to 55 °C									
Approvals										
0	CE									
1	API 675									
2	VDMA									
3	ATEX									
4	ATEX / API 675									
5	VDMA / ATEX									

*For further pump configurations see Type Of Drive page → 3-41

** Modified design (M) is available with every Identcode feature



3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.6 ORLITA® MfS 600 (MF5a) Hydraulic Diaphragm Pump

Technical Data MfS 600 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm³/stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 8]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		69	91	113	134	155	182		100 % pressure	50 % pressure			
		[3]	[4]	[5]	[6]	[7]	[8]						
26	20.43	84.2	111.0	138.3	163.9	189.6	223.4	783.0	0.62	0.76	DKu* DN 15	by arangement	to be agreed
30	28.27	116.6	153.6	191.4	226.8	262.4	309.3	565.0	0.69	0.79	Ke*** DN 16	by arangement	to be agreed
36	40.72	167.9	221.2	275.6	326.7	377.9	445.3	392.0	0.76	0.83	Ke*** DN 16	DN 15 PN 400	1" 2500RTJ
40	50.27	207.3	273.1	340.2	403.3	466.6	549.8	318.0	0.78	0.84	Ke*** DN 16	DN 15 PN 320	1" 2500RTJ
44	60.82	250.8	330.5	411.7	488.0	564.5	665.2	263.0	0.80	0.85	Ke*** DN 25	DN 25 PN 320	1" 2500RTJ
46	66.48	274.1	361.2	450.0	533.3	617.0	727.1	240.0	0.81	0.85	Ke*** DN 25	DN 25 PN 250	1" 1500RF
50	78.54	323.9	426.7	531.6	630.1	729.0	859.0	221.0	0.83	0.86	Ke*** DN 25	DN 25 PN 250	1" 1500RF
55	95.03	391.9	516.4	643.3	762.4	882.1	1,039.4	168.0	0.84	0.87	Ke*** DN 25	DN 25 PN 250	1" 1500RF
60	113.10	466.4	614.5	765.5	907.4	1,049.7	1,237.0	141.0	0.85	0.87	Ke*** DN 25	DN 25 PN 160	1" 1500RF
65	132.73	547.3	721.2	898.4	1,064.9	1,232.0	1,451.8	120.0	0.85	0.87	Ke*** DN 32	DN 40 PN 160	1 1/2" 1500RF
70	153.94	634.8	836.4	1,042.0	1,235.0	1,428.8	1,683.7	100.0	0.90	0.88	Ke*** DN 32	DN 40 PN 100	1 1/2" 600RF
75	176.71	728.7	960.2	1,196.1	1,417.8	1,640.2	1,932.8	90.0	0.86	0.88	Ke*** DN 32	DN 40 PN 100	1 1/2" 600RF
80	201.06	829.1	1,092.4	1,360.9	1,613.1	1,866.2	2,199.1	79.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
85	226.98	936.0	1,233.3	1,536.4	1,821.0	2,106.8	2,482.6	70.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
90	254.47	1,049.4	1,382.6	1,722.4	2,041.6	2,361.9	2,783.3	62.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
90	314.16	1,295.5	1,706.9	2,126.5	2,520.5	2,916.0	3,436.1	50.0	0.88	0.89	Ke*** DN 50	DN 50 PN 64	2" 600RF
115	415.48	1,713.3	2,257.4	2,812.2	3,333.3	3,856.3		38.0	0.88	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
125	490.87	2,024.2	2,667.1	3,322.6	3,938.2	4,556.2		32.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
140	615.75	2,539.2	3,345.6	4,167.9	4,940.1	5,715.3		25.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
160	804.25	3,316.5	4,369.8	5,443.7	6,452.4			19.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
200	1,256.64	5,182.0	6,827.8	8,505.8	10,081.9			12.0	0.89	0.89	Ke*** DN 65	DN 65 PN 16	2 1/2" 300RF
240	1,809.56	7,462.1	9,832.0	12,248.4				8.0	0.89	0.90	Ke*** DN 65	DN 65 PN 16	2 1/2" 300RF

Technical Data MfS 600 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm³/stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 7]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		74	82	109	135	160	186		100 % pressure	50 % pressure			
		[2]	[3]	[4]	[5]	[6]	[7]						
26	20.43	91.0	101.1	133.2	165.9	196.7	227.5	783.0	0.62	0.76	DKu* DN 15	by arangement	to be agreed
30	28.27	126.0	139.9	184.4	229.7	272.2	314.9	565.0	0.69	0.79	Ke*** DN 16	by arangement	to be agreed
36	40.72	181.4	201.5	265.5	330.7	392.0	453.5	392.0	0.76	0.83	Ke*** DN 16	DN 15 PN 400	1" 2500RTJ
40	50.27	224.0	248.7	327.7	408.3	483.9	559.9	318.0	0.78	0.84	Ke*** DN 16	DN 15 PN 320	1" 2500RTJ
44	60.82	271.0	301.0	396.6	494.0	585.6	677.4	263.0	0.80	0.85	Ke*** DN 25	DN 25 PN 320	1" 2500RTJ
46	66.48	296.2	329.0	433.4	540.0	640.0	740.4	240.0	0.81	0.85	Ke*** DN 25	DN 25 PN 250	1" 1500RF
50	78.54	350.0	388.7	512.1	637.9	756.1	874.8	200.0	0.83	0.86	Ke*** DN 25	DN 25 PN 250	1" 1500RF
55	95.03	423.5	470.3	619.6	771.9	914.9	1,058.5	168.0	0.84	0.87	Ke*** DN 25	DN 25 PN 250	1" 1500RF
60	113.10	504.0	559.7	737.4	918.6	1,088.8	1,259.7	141.0	0.85	0.87	Ke*** DN 25	DN 25 PN 160	1" 1500RF
65	132.73	591.5	656.8	865.4	1,078.1	1,277.9	1,478.4	120.0	0.85	0.87	Ke*** DN 40	DN 40 PN 160	1 1/2" 1500RF
70	153.94	686.0	761.8	1,003.7	1,250.4	1,482.0	1,714.6	100.0	0.90	0.88	Ke*** DN 32	DN 40 PN 100	1 1/2" 600RF
75	176.71	787.5	874.5	1,152.2	1,435.4	1,701.3	1,968.3	90.0	0.86	0.88	Ke*** DN 32	DN 40 PN 100	1 1/2" 600RF
80	201.06	896.0	994.9	1,310.9	1,633.1	1,935.7	2,239.5	79.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
85	226.98	1,011.5	1,123.2	1,479.9	1,843.6	2,185.3	2,528.1	70.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
90	254.47	1,134.0	1,259.2	1,659.2	2,066.9	2,449.9	2,834.3	62.0	0.87	0.88	Ke*** DN 40	DN 40 PN 100	1 1/2" 600RF
90	314.16	1,400.0	1,554.6	2,048.3	2,551.8	3,024.6	3,499.1	50.0	0.88	0.89	Ke*** DN 50	DN 50 PN 64	2" 600RF
115	415.48	1,851.5	2,056.0	2,708.9	3,374.7	4,000.0		38.0	0.88	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
125	490.87	2,187.4	2,429.1	3,200.5	3,987.1	4,725.9		32.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
140	615.75	2,743.9	3,047.0	4,014.7	5,001.4	5,928.2		25.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
160	804.25	3,583.9	3,979.8	5,243.7	6,532.5			19.0	0.89	0.89	Ke*** DN 65	DN 65 PN 40	2 1/2" 300RF
200	1,256.64	5,599.9	6,218.4	8,193.3	10,207.0			12.0	0.89	0.89	Ke*** DN 65	DN 65 PN 16	2 1/2" 300RF
240	1,809.56	8,063.8	8,954.5	11,798.4	14,698.1			8.0	0.89	0.90	Ke*** DN 65	DN 65 PN 16	2 1/2" 300RF

* Double ball

*** Cone

- Note:**
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C



3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS600 (MF5a)

MF5a	Drive type	
H1	Main drive horizontal *	Z1 Main drive central * AR Drive module right-hand
V1	Main drive vertical *	AL Drive module left-hand M Modified **
Plunger diameter		
026	26 mm	046 46 mm 070 70 mm 100 100 mm 200 200 mm
030	30 mm	050 50 mm 075 75 mm 115 115 mm 240 240 mm
036	36 mm	055 55 mm 080 80 mm 125 125 mm
040	40 mm	060 60 mm 085 85 mm 140 140 mm
044	44 mm	065 65 mm 090 90 mm 160 160 mm
Stroke rate 50 (60) Hz		
2	(-) 74 Strokes/min	4 93 (111) Strokes/min 6 140 (168) Strokes/min 8 182 (-) Strokes/min
3	71 (85) Strokes/min	5 126 (147) Strokes/min 7 179 Strokes/min
Liquid end material (including valve materials)		
S1	Stainless steel (see table, sheet 2)	
Temperature of pumped medium		
0	-10 °C to 80 °C	2 -40 °C to 60 °C 4 10 °C to 150 °C
1	-25 °C to 60 °C	3 10 °C to 115 °C
Displacer format		
0	PTFE multi-layer diaphragm	
1	PTFE multi-layer diaphragm with pressure gauge	
Liquid end version		
0	Standard 2 Standard + double valve	
1	Standard with spring 3 Standard + double valve with spring	
Hydraulic connection suction side		
G	Thread DIN/ISO A Flange ANSI	
N	Thread NPT/ANSI D Flange DIN/ISO	
Hydraulic connection discharge side		
G	Thread DIN/ISO A Flange ANSI	
N	Thread NPT/ANSI D Flange DIN/ISO	
Version		
0	no features 2 Dosing head polished	
1	Dosing head heating 3 Special paint finish	
Power connector		
A	Standard voltage 50Hz	
B	Standard voltage 50Hz adjustable	
H	Standard voltage 60Hz	
K	Standard voltage 60Hz adjustable	
0	Externally mounted pump	
1	without motor with IEC flange	
2	without motor with NEMA flange	
Electrical protection system / explosion protection		
0	IP 55	D IP 56 EExn
1	IP 56	E IP 56 EExe
A	IP 55 EExn	F IP 56 EExde
B	IP 55 EExe	K IP 65 EExde
C	IP 55 EExde	
Electrical options		
0	no options	
1	Stroke sensor	
Stroke length adjustment		
0	manual	
1	0/4-20 mA without Ex	
2	0/4-20 mA Ex Zone 2	
3	0/4-20 mA Ex Zone 1	
4	0/4-20 mA Ex without EX offshore	
5	0/4-20 mA Ex Zone 2 offshore	
6	0/4-20 mA Ex Zone 1 offshore	
Environmental conditions		
0	-20 °C to 40 °C	
1	-40 °C to 40 °C	
2	0 °C to 55 °C	
Approvals		
0	CE	
1	API 675	
2	VDMA	
3	ATEX	
4	ATEX / API 675	
5	VDMA / ATEX	

*For further pump configurations see Type Of Drive page → 3-41

** Modified design (M) is available with every Identcode feature

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

3.7.7 ORLITA® MfS 1400 (MF6a) Hydraulic Diaphragm Pump

Technical Data MfS 1400 Single Pump 50 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [3 to 8]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		83 [3]	98 [4]	112 [5]	129 [6]	148 [7]	171 [8]		100 % pres- sure	50 % pres- sure			
30	42.41	211.3	248.6	284.6	328.7	376.6	435.0	0.67	0.78	Ke*** DN 16	by arrange- ment	to be agreed	
40	75.40	375.6	442.0	505.9	584.3	669.5	773.3	435.0	0.75	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
42	83.13	414.2	487.3	557.7	644.2	738.1	852.6	435.0	0.76	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
44	91.23	454.5	534.8	612.1	707.0	810.1	935.7	394.0	0.76	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
46	99.71	496.8	584.5	669.0	772.7	885.4	1,022.7	361.0	0.77	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
50	117.81	587.0	690.6	790.4	912.9	1,046.1	1,208.3	305.0	0.79	0.84	Ke*** DN 25	DN 25 PN 320 1" 2500RTJ	
55	142.55	710.2	835.6	956.4	1,104.6	1,265.8	1,462.0	250.0	0.81	0.85	Ke*** DN 25	DN 25 PN 250 1" 1500RTJ	
60	169.65	845.2	994.4	1,138.2	1,314.6	1,506.4	1,740.0	212.0	0.82	0.86	Ke*** DN 25	DN 25 PN 250 1" 1500RTJ	
65	199.10	991.9	1,167.1	1,335.8	1,542.8	1,767.9	2,042.0	180.0	0.83	0.87	Ke*** DN 32	DN 40 PN 250 1 1/2" 1500RF	
70	230.91	1,150.4	1,353.5	1,549.2	1,789.3	2,050.3	2,368.3	155.0	0.84	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
75	265.07	1,320.6	1,553.8	1,778.4	2,054.1	2,353.7	2,718.7	135.0	0.85	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
80	301.59	1,502.6	1,767.9	2,023.5	2,337.1	2,678.0	3,093.3	119.0	0.85	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
90	381.70	1,901.7	2,237.5	2,561.0	2,957.9	3,389.3	3,914.9	94.0	0.90	0.90	Ke*** DN 50	DN 50 PN 100 2" 600RF	
100	471.24	2,347.8	2,762.3	3,161.7	3,651.7	4,184.4	4,833.2	76.0	0.87	0.88	Ke*** DN 65	DN 65 PN 100 2 1/2" 600RF	
115	623.21	3,105.0	3,653.2	4,181.3	4,829.3	5,533.8	6,391.9	57.0	0.88	0.89	Ke*** DN 65	DN 65 PN 64 2 1/2" 600RF	
140	923.63	4,601.7	5,414.2	6,196.9	7,157.3	8,201.4	9,473.1	38.0	0.88	0.89	Ke*** DN 65	DN 65 PN 40 2 1/2" 300RF	
160	1,206.37	6,010.4	7,071.5	8,093.9	9,348.3	10,712.0	12,373.0	29.0	0.89	0.89	Ke*** DN 80	DN 80 PN 40 3" 300RF	
200	1,884.96	9,391.2	11,049.3	12,646.7	14,606.7	16,737.4		19.0	0.89	0.89	Ke*** DN 100	DN 100 PN 25 4" 150RF	
280	3,694.51	18,406.8	21,656.6	24,787.5	28,629.1			9.0	0.89	0.90	Ke*** DN 100	DN 100 PN 16 4" 150RF	

Technical Data MfS 1400 Single Pump 60 Hz

Plunger Ø mm	Stroke Volume cm ³ /stroke	Pump capacity Q _{th} in l/h per head at stroke rate n in 1/min Identcode specification: [2 to 7]						Max. pressure bar	Efficiency WG at		Standard type of valve	Standard connection, Suction/Discharge side DIN/ISO	
		78 [2]	100 [3]	117 [4]	134 [5]	155 [6]	178 [7]		100 % pres- sure	50 % pres- sure			
30	42.41	197.6	253.6	298.3	341.5	394.4	451.9	630.0	0.67	0.78	Ke*** DN 16	by arrange- ment	to be agreed
40	75.40	351.2	450.8	530.4	607.0	701.1	803.4	435.0	0.75	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
42	83.13	387.2	497.0	584.7	669.3	773.0	885.7	435.0	0.76	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
44	91.23	425.0	545.4	641.7	734.5	848.4	972.1	394.0	0.76	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
46	99.71	464.5	596.2	701.4	802.8	927.2	1,062.5	361.0	0.77	0.83	Ke*** DN 25	DN 25 PN 400 1" 2500RTJ	
50	117.81	548.8	704.3	828.7	948.5	1,095.5	1,255.3	305.0	0.79	0.84	Ke*** DN 25	DN 25 PN 320 1" 2500RTJ	
55	142.55	664.0	852.3	1,002.7	1,147.7	1,325.6	1,518.9	250.0	0.81	0.85	Ke*** DN 25	DN 25 PN 250 1" 1500RTJ	
60	169.65	790.2	1,014.3	1,193.3	1,365.8	1,577.5	1,807.6	212.0	0.82	0.86	Ke*** DN 25	DN 25 PN 250 1" 1500RTJ	
65	199.10	927.4	1,190.3	1,400.5	1,603.0	1,851.4	2,121.5	180.0	0.83	0.87	Ke*** DN 32	DN 40 PN 250 1 1/2" 1500RF	
70	230.91	1,075.6	1,380.5	1,624.2	1,859.1	2,147.2	2,460.4	155.0	0.84	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
75	265.07	1,234.7	1,584.8	1,864.6	2,134.1	2,464.9	2,824.4	135.0	0.85	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
80	301.59	1,404.8	1,803.1	2,121.5	2,428.2	2,804.5	3,213.6	119.0	0.85	0.87	Ke*** DN 40	DN 40 PN 160 1 1/2" 1500RF	
90	381.70	1,778.0	2,282.1	2,685.0	3,073.1	3,549.4	4,067.2	94.0	0.90	0.90	Ke*** DN 50	DN 50 PN 100 2" 600RF	
100	471.24	2,195.0	2,817.4	3,314.8	3,794.0	4,382.0	5,021.2	76.0	0.87	0.88	Ke*** DN 65	DN 65 PN 100 2 1/2" 600RF	
115	623.21	2,903.0	3,726.0	4,383.8	5,017.6	5,795.2	6,640.6	57.0	0.88	0.89	Ke*** DN 65	DN 65 PN 64 2 1/2" 600RF	
140	923.21	4,302.3	5,522.0	6,497.0	7,436.2	8,588.7	9,841.6	38.0	0.88	0.89	Ke*** DN 65	DN 65 PN 40 2 1/2" 300RF	
160	1,206.37	5,619.3	7,212.5	8,485.9	9,712.6	11,217.9	12,854.4	29.0	0.89	0.89	Ke*** DN 80	DN 80 PN 40 3" 300RF	
200	1,884.96	8,780.2	11,269.5	13,259.1	15,176.0	17,528.0		19.0	0.89	0.89	Ke*** DN 100	DN 100 PN 25 4" 150RF	
280	3,694.51	17,209.2	22,088.2	25,987.9	29,745.0			9.0	0.89	0.90	Ke*** DN 100	DN 100 PN 16 4" 150RF	

*** Cone

- Note:**
- Further variants on request
 - In layouts conforming to API a power reserve of at least 10% must be allowed for
 - All hydraulic performance data are based on water at 20 °C

3.7 ORLITA® MF Hydraulic Diaphragm Metering Pumps

Identcode Ordering System

Motor-Driven Metering Pump ORLITA® MfS1400 (MF6a)

MF6a	Drive type									
H1	Main drive bare horizontal *		Z1	Main drive bare central *	AR	Drive module right-hand				
V1	Main drive bare vertical *		AL	Drive module left-hand	M	Modified **				
Plunger diameter										
030	30 mm	046	46 mm	065	65 mm	090	90 mm	160	160 mm	
040	40 mm	050	50 mm	070	70 mm	100	100 mm	200	200 mm	
042	42 mm	055	55 mm	075	75 mm	115	115 mm	280	280 mm	
044	44 mm	060	60 mm	080	80 mm	140	140 mm			
Stroke rate 50 (60) Hz										
2	(-) 78 Strokes/min		4	99 (118) Strokes/min	6	142 (170) Strokes/min		8	171 (-) Strokes/min	
3	71 (85) Strokes/min		5	123 (147) Strokes/min	7	177 Strokes/min				
Liquid end material (including valve materials)										
S1	Stainless steel (see table, sheet 2)									
Temperature of pumped medium										
0	-10 °C to 80 °C		2	-40 °C to 60 °C		4	10 °C to 150 °C			
1	-25 °C to 60 °C		3	10 °C to 115 °C						
Displacer format										
0	PTFE multi-layer diaphragm									
1	PTFE multi-layer diaphragm with pressure gauge									
Liquid end version										
0	Standard					2	Standard + double valve			
1	Standard with spring					3	Standard + double valve with spring			
Hydraulic connection suction side										
G	Thread DIN/ISO				A	Flange ANSI				
N	Thread NPT/ANSI				D	Flange DIN/ISO				
Hydraulic connection discharge side										
G	Thread DIN/ISO				A	Flange ANSI				
N	Thread NPT/ANSI				D	Flange DIN/ISO				
Version										
0	no features									
1	Dosing head heating									
2	Dosing head polished									
3	Special paint finish									
Power connector										
A	Standard voltage 50Hz									
B	Standard voltage 50Hz adjustable									
H	Standard voltage 60Hz									
K	Standard voltage 60Hz adjustable									
0	Externally mounted pump									
1	without motor with IEC flange									
2	without motor with NEMA flange									
Electrical protection system / explosion protection										
0	IP 55	D		IP 56 EExn						
1	IP 56	E		IP 56 EExe						
A	IP 55 EExn	F		IP 56 EExde						
B	IP 55 EExe	K		IP 65 EExde						
C	IP 55 EExde									
Electrical options										
0	no options									
1	Stroke sensor									
Stroke length adjustment										
0	manual									
1	0/4-20 mA without Ex									
2	0/4-20 mA Ex Zone 2									
3	0/4-20 mA Ex Zone 1									
4	0/4-20 mA Ex without EX offshore									
5	0/4-20 mA Ex Zone 2 offshore									
6	0/4-20 mA Ex Zone 1 offshore									
Environmental conditions										
0	-20 °C to 40 °C									
1	-40 °C to 40 °C									
2	0 °C to 55 °C									
Approvals										
0	CE									
1	API 675									
2	VDMA									
3	ATEX									
4	ATEX / API 675									
5	VDMA / ATEX									

*For further pump configurations see Type Of Drive page → 3-41

** Modified design (M) is available with every Identcode feature



3.8 ORLITA® MH Hydraulic Diaphragm Metering Pumps

3.8.1 ORLITA® MH Hydraulic Diaphragm Pump With Metal Diaphragm

Hydraulically operated diaphragm head. A metal diaphragm forms a hermetic seal between the liquid and hydraulic ends.

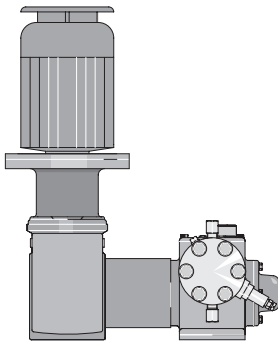
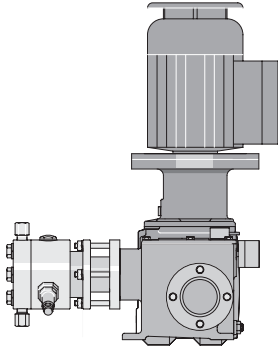
During both discharge and suction strokes the diaphragm is balanced by the hydraulic liquid which is displaced by the plunger.

A pressure relief valve and an automatic vent valve for the hydraulic chamber are integrated in the pump head. The valve-free forced reflow of the internal oil leakage operates wear free and guarantees optimum metering accuracy.

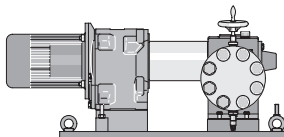
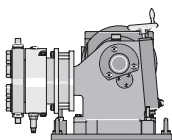
The suction and discharge valves are either cone, ball or prismatic depending on the design width and operating pressure.

All parts in contact with the feed chemical are made of stainless steel.

High pressure diaphragm pumps on request



pk_2_122
MhS 35-5



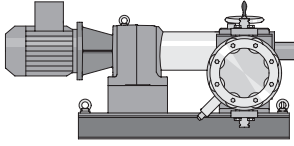
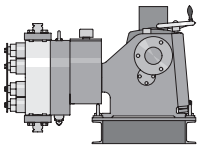
pk_2_120
MhS 80/22

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz					Max. pressure bar
			70	88	108	140	200	
MhS 18/	5	0.29	1.2	1.6	1.9	2.5	3.5	500.0
	6	0.42	1.8	2.2	2.7	3.6	5.1	500.0
	7	0.58	2.4	3.0	3.7	4.8	6.9	400.0
	8	0.75	3.2	4.0	4.9	6.3	9.0	320.0
	10	1.18	4.9	6.2	7.6	9.9	14.1	222.0
	12	1.70	7.1	9.0	11.0	14.3	20.4	154.0
	16	3.02	12.7	15.9	19.5	25.3	36.2	87.0
20	4.71	19.8	24.9	30.5	39.6	56.5	55.0	

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz					Max. pressure bar
			70	88	108	140	200	
MhS 35/	7	0.77	3.2	4.1	5.0	6.5	9.2	900.0
	8	1.01	4.2	5.3	6.5	8.4	12.1	630.0
	10	1.57	6.6	8.3	10.2	13.2	18.8	445.0
	12	2.26	9.5	11.9	14.7	19.0	27.1	309.0
	14	3.08	12.9	16.3	20.0	25.9	36.9	227.0
	16	4.02	16.9	21.2	26.1	33.8	48.3	174.0
	18	5.09	21.4	26.9	33.0	42.8	61.1	137.0
	20	6.28	26.4	33.2	40.7	52.8	75.4	111.0
	22	7.60	31.9	40.1	49.3	63.9	91.2	71.0
	32	16.08	67.6	84.9	104.0	135.0	193.0	40.0
	45	31.81	134.0	168.0	206.0	267.0	382.0	22.0

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz						Max. pressure bar
			70	90	115	134	152	194	
MhS 80/	14	3.08	12.9	16.6	21.3	24.8	28.1	35.9	900.0
	16	4.02	16.9	21.7	27.7	32.3	36.7	46.8	696.0
	18	5.09	21.4	27.5	35.1	40.9	46.4	59.2	550.0
	20	6.28	26.4	33.9	43.3	50.5	57.3	73.1	445.0
	22	7.60	31.9	41.0	52.4	61.1	69.3	88.5	368.0
	25	9.82	41.2	53.0	67.8	79.0	89.6	114.0	285.0

3.8 ORLITA® MH Hydraulic Diaphragm Metering Pumps

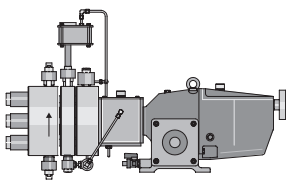


pk_2_088_1
MhS 600/26

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz						Max. pressure bar
			69	91	113	134	155	182	
MhS 600/	26	20.43	84.2	111.0	138.0	163.0	189.0	223.0	760.0
	28	24.63	101.0	133.0	166.0	197.0	228.0	269.0	630.0
	30	28.37	116.0	153.0	191.0	226.0	262.0	309.0	565.0
	32	32.17	132.0	174.0	217.0	258.0	298.0	351.0	497.0

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz						Max. pressure bar
			83	98	112	129	148	171	
MhS 1400/	30	42.41	211.0	248.0	284.0	328.0	376.0	435.0	800.0
	32	48.25	240.0	282.0	323.0	373.0	428.0	494.0	700.0
	36	91.07	304.0	358.0	409.0	473.0	542.0	626.0	589.0
	40	75.40	375.0	442.0	505.0	584.0	669.0	773.0	477.0

Technical Data MH High Pressure Diaphragm Metering Pump With Single Metal Diaphragm



pk_2_141
MhR 150/6

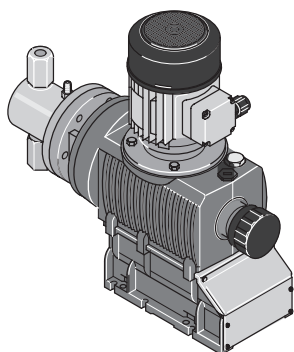
Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz					Max. pressure bar
			70	88	108	140	200	
MhS 35/	5	0.39	1.6	2.1	2.5	3.3	4.7	1,782.0

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz				Max. pressure bar
			56	75	112	140	
MhR 150/	6	0.90	3.0	4.1	6.1	7.6	3,000.0
	7	1.23	4.1	5.5	8.3	10.3	3,000.0

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity max. (theo.) in l/h at strokes/min 50 Hz						Max. pressure bar
			69	91	113	134	155	182	
MhS 600/	11	3.80	15.7	20.6	25.7	30.5	35.3	41.6	3,000.0

3.9 Sigma/ 2 Plunger Metering Pumps

3.9.1 Sigma Plunger Metering Pumps



pk_2_006

The Sigma/ 2 motor plunger metering pump has a high-strength inner metal housing for those component parts subjected to load as well as an additional plastic housing to protect against corrosion. The capacity ranges between 2-76 l/h at a max. backpressure of 12-320 bar. The output can be adjusted by a self-locking rotary knob in 0.2 % steps via the stroke length (15 mm).

The reproducibility of the metering is better than $\pm 1\%$ in the stroke length range of 30% - 100% given defined conditions and correct installation. (The notes in the operating instructions must be observed.)

The rugged, corrosion-resistant metal-plastic housing is combined with three gearbox ratios and four liquid end sizes in stainless steel (W. No. 1.4571). The Sigma control type (SCKa) facilitates control via contact or analogue signals (e.g. 0/4-20 mA) which ensures a good adaptation, also to different metering tasks.

For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps without integrated overload protections.

Sigma Basic Type SBKa

The Sigma Basic is a motor metering pump without its own internal electronic control system. The SBKa offers numerous different drive options, be it the three-phase standard motor (standard IP 55) or the single-phase AC motor. Metering pumps for use in Exe and EXde zones with ATEX approval are also available.

Different flanges are available any time so that the customers can use their own motors to drive the pump.

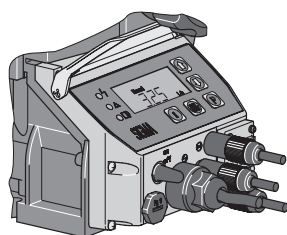
Sigma Control Type SCKa

The Sigma/ 2 microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

The control unit has the same control surface as the gamma/ L metering pump.

The microprocessor controller of the Sigma pumps, featuring the optimum combination of variable AC frequency combined with digital stroking frequency, ensures exact metering even in the lower minimum range due to individual stroke control.

With five programming keys the individual pump functions are easy to set. A backlit LCD gives information about the prevailing operating status. LEDs along with a fault-indicating or pacing relay act as operating and warning indicators to ensure monitoring of the pump function.

pk_2_104
Sigma Controller

Sigma Basic Type Control Functions

Stroke length actuator/controller

Actuator for automatic stroke length adjustment, actuating period approx. 1 sec for 1 % stroke length, 1 k Ω response signal potentiometer, enclosure rating IP 54.

Controller consists of actuator with servomotor and integrated servo control for stroke length adjustment via a standard signal. Standard signal input 0/4-20 mA, corresponds to stroke length 0 - 100 %. Automatic/manual operation selection key for manual stroke adjustment. Mechanical status display of actual stroke length value output 0/4-20 mA for remote display.

Variable speed motors with integrated speed controller (identcode characteristic V)

Power supply 1 ph 230 V, 50/60 Hz, 0.37 kW.

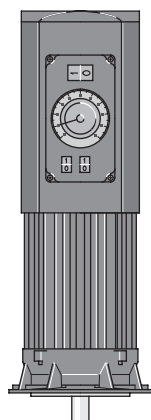
External control with 0/4-20 mA (see pk_2_103)

(Speed Controllers see p. → 2-51)

Speed controllers in metal housing (identcode characteristic Z)

The speed controller assembly consists of a speed controller and a 0.37 kW variable speed motor.

(Speed Controllers see p. → 2-51)



pk_2_103

3.9 Sigma/ 2 Plunger Metering Pumps

Technical data

Type Sigma/ 2	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz				Suction head mWC	Perm. admiss. pressure suction side bar	Connector Suction/ Discharge Side Rp-DN	Shipping weight kg
	Delivery rate at max. backpressure			Max. stroke rate Strokes/min	Delivery rate at max. backpressure			Max. stroke rate Strokes/min				
	bar	l/h	ml/stroke		psi	l/h	gph					
32002	320	1.9	0.46	71	4,627	2.3	0.61	84	5.0	160	1/4	24
23004	230	4.0	0.52	129	3,335	4.8	1.27	154	5.0	115	1/4	24
10006	100	6.4	0.55	195	1,450	7.6	2.01	233	5.0	50	1/4	24
14006	140	6.1	1.42	71	2,030	7.1	1.88	84	4.0	70	1/4	24
10011	100	11.0	1.43	129	1,450	13.1	3.46	153	4.0	50	1/4	24
05016	50	16.7	1.43	195	725	20.0	5.28	233	4.0	25	1/4	24
07012	70	12.4	2.90	71	1,015	14.8	3.91	85	4.0	35	1/4	24
04522	45	22.5	2.91	129	652	26.7	7.05	153	4.0	22.5	1/4	24
02534	25	34.1	2.92	195	363	40.8	10.78	233	4.0	12.5	1/4	24
04022	40	22.4	5.26	71	580	26.5	7.00	84	4.0	20	3/8	25
02541	25	41.5	5.37	129	363	49.2	13.00	153	4.0	12.5	3/8	25
01264	12	64.0	5.45	195	174	76.0	20.08	233	4.0	6	3/8	25

Note: For the SCKa pump types the 60 capacity data (since internal 60 Hz operation) applies, however max. 200 strokes/min.

Materials in contact with medium

Material	Liquid End	Suction/ Discharge connector	Seals	Valve Balls	Ball Seat
SST	Stainless steel no. 1.4571/1.4404	Stainless steel no. 1.4571/1.4404	PTFE / PTFE with graphite	Ceramic	Stainless steel no. 1.4571/1.4404

Motor Data

Identcode characteristic	Power supply				Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.25 kW	
		250-280 V/440-480 V	60 Hz	0.25 kW	
M	1 ph AC, IP 55	230 V ± 5%	50/60 Hz	0.18 kW	
N	1 ph AC, IP 55	115 V ± 5%	60 Hz	0.18 kW	
L1	3 ph, II2GEEexII T3	220-240 V/380-420 V	50 Hz	0.18 kW	
L2	3 ph, II2GEEexdII CT4	220-240 V/380-420 V	50 Hz	0.18 kW	with PTC thermistor, speed adjustment range 1:5
P1	3 ph, II2GEEexII T3	250-280 V/440-480 V	60 Hz	0.18 kW	
		250-280 V/440-480 V	60 Hz	0.21 kW	
P2	3 ph, II2GEEexdII CT4	250-280 V/440-480 V	60 Hz	0.21 kW	with PTC thermistor, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	0.37 kW	with PTC thermistor, speed adjustment range 1:20 with external fan 1 ph 230 V; 50/60 Hz
V0	1 ph, IP 55	230 V ± 5%	50/60 Hz	0.37 kW	variable-speed motor with integrated frequency converter

For further information you can request motor data sheets.
Custom motors and/or custom motor flanges may be supplied on request.

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.9 Sigma/ 2 Plunger Metering Pumps

3.9.2 Sigma/ 2 HK Spare Parts Kits

Consisting of: 1 ceramic metering plunger, 4 valve balls, 4 ball seat discs, 2 ball PTFE/graphite ball seals, 2 plunger guides, 14 flat seals, 2 O-rings.

	Type	Order no.
Liquid end FK 08	applies to identcode: 32002, 23004, 10006	1001572
Liquid end FK 12,5	applies to identcode: 14006, 10011, 05016	910470
Liquid end FK 25	applies to identcode: 07012, 04522, 02534	910471
Liquid end FK 50	applies to identcode: 04022, 02541, 01264	910472

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.9 Sigma/ 2 Plunger Metering Pumps

3.9.3 Identcode Ordering System

Sigma Basic Type SBKa

SBKa	Drive type	
	HK	Main drive, plunger
	Type*	
		32002
		23004
		10006
		14006
		10011
		05016
		07012
		04522
		02534
		04022
		02541
		01264
	Material Liquid end	
	SS	Stainless steel
	Sealing material*	
	T	PTFE
	Displacement body*	
	4	Plunger (oxide ceramic)
	Liquid end version	
	0	No spring (standard)
1	With 2 valve springs, Hastelloy C, 0.1 bar	
Hydraulic connection		
0	Standard threaded connector (according to technical data)	
Version		
0	With ProMinent® logo (standard)	
1	Without ProMinent® logo	
M	Modified	
Electrical power supply		
S	3 ph, 230 V/400 V 50/60 Hz, 0.18 kW	
M	1 ph, AC, 230 V/ 50/60 Hz, 0.18 kW	
N	1 ph, AC 115 V 60 Hz, 0.18 kW	
L	3 ph, 230 V/400 V, 50 Hz, (EExe, EExd), 0.18 kW	
P	3 ph, 230 V/400 V, 60 Hz, (EExe, EExd), 0.18 kW	
R	3 ph, variable speed motor, 230/400 V, 0.37 kW	
V (0)	Variable speed motor with integrated SC 1 pH, 230 V, 50/60 Hz	
Z	1 ph, variable speed set 230 V, 50/60 Hz	
1	No motor, with B 14 flange (size 71 (DIN))	
2	No motor, C 56 flange (NEMA)	
3	No motor, B 5 size 63 (DIN)	
Enclosure rating		
0	IP 55 (standard)	
1	Exe motor version ATEX-T3	
2	Exd motor version ATEX-T4	
A	ATEX power end	
Stroke sensor		
0	No stroke sensor (standard)	
2	Pacing relay (reed relay)	
3	Stroke sensor (Namura) for hazardous locations	
Stroke length adjustment		
0	Manual (standard)	
1	With stroke positioning motor, 230 V/50/60 Hz	
2	With stroke positioning motor, 115 V/50/60 Hz	
3	With stroke control motor 0...20 mA 230 V/50/60 Hz	
4	With stroke control motor 4...20 mA 230 V/50/60 Hz	
5	With stroke control motor 0...20 mA 115 V/50/60 Hz	
6	With stroke control motor 4...20 mA 115 V/50/60 Hz	

* Digits 1 - 3=back pressure [bar]; digits 4 + 5=feed rate [l/h]

3.9 Sigma/ 2 Plunger Metering Pumps

3.9.4 Identcode Ordering System

Sigma Control Type SCKa

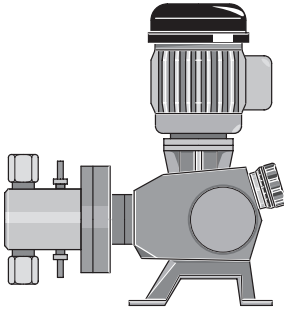
SCKa	Drive type		
HK	Main drive, plunger		
	Type*		
	32002		
	23004		
	10006		
	14006		
	10011		
	05016		
	07012		
	04522		
	02534		
	04022		
	02541		
	01264		
	Material Liquid end		
	SS	Stainless steel	
	Sealing material*		
	T	PTFE	
	Displacement body*		
	4	Plunger (oxide ceramic)	
	Liquid end version		
	0	No spring (standard)	
	1	With 2 valve springs, Hastelloy C 4, 0.1 bar	
	Hydraulic connection		
	0	Standard threaded connector (according to technical data)	
	Version		
	0	With ProMinent® logo	
	1	Without ProMinent® logo	
	Electrical power supply		
	U	1 ph 100-230 V ±10 %, 50/60 Hz	
	Cable and plug		
	A	2 m European	
	B	2 m Swiss	
	C	2 m Australian	
	D	2 m USA	
	Relay		
	0	No relay	
	1	With fault indicating relay 1x changeover 230 V – 2A	
	3	With fault indicating relay 1x changeover 230 V – 2A	
	4	as 1 + pacing relay 2x normally open 24 V - 100 mA	
	5	As 3 with pacing relay 2x normally open 24 V – 100 mA	
	A	shut-off and warning relays normally closed 2x normally open 24 V - 100 mA	
	F	Power relay normally closed 1x changeover 230 V - 8 A	
	Control variant		
	0	Manual + external with pulse control	
	1	Manual + external + pulse control + analogue	
	Access code		
	0	No access code	
	1	With access code	
	Metering monitor		
	0	Input with pulse evaluation	
	1	input with cont. evaluation	
	Stroke length adjustment		
	0	Manual	

* Digits 1 - 3=back pressure [bar]; digits 4 + 5=feed rate [l/h]

3.10 Meta Plunger Metering Pumps

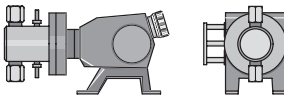
3.10.1

Meta Plunger Metering Pumps



pk_2_010

The Meta plunger pump is a standard sized metering pump driven by an 0.18 kW/37 kW dual wound three phase motor. 230/400 V, 50/60 Hz power supply, enclosure rating IP 55, insulation class F. Stroke length is adjustable between 0...15.5 mm in 0.2 % steps. Worm gears in a choice of four reduction ratios, and cam / spring follower mechanisms are built into a salt water-resistant and acrylic resin coated housing. Liquid end parts in contact with chemicals are listed below. The suction lift varies depending upon the density and viscosity of the feed chemical, and connecting pipework dimensions. Under defined conditions and providing installation is correct, reproducible metering accuracy is better than ± 0.5 % at a stroke length range of between 10 % and 100 %. (Guidelines given in the instruction manual must be followed precisely.) For technical safety reasons, appropriate equipment must be installed to prevent current overload to motorised metering pumps.



pk_2_011

Meta Add-On Pumps

Meta add-on pumps can be connected up with Meta main pumps to form duplex or triplex pumps. (In certain cases more add-on pumps can be operated with a main pump with reduced back pressures). The multiplexed pumps can also be ordered and supplied as complete systems, consisting of a main pump and the required number of add-on pumps. Multiplexed pumps can also be retrofitted by the operator. All necessary fittings and connectors are supplied with the add-on pump. They are connected to the main pump at the power output side, i.e. the stroke rate of the add-on pump is identical to that of the main pump.

Actuation of Meta metering pumps

(Speed Controllers see p. → 2-51)

Speed controllers in metal housing (Identcode characteristic Z)

Frequency changer built into IP 54 protective housing and main switch designed for max. 0.37 kW motor output.

Externally controlled with 0/4-20 mA / 0-10 V to correspond to 0-50 (60) Hz output frequency.

Integrated controller with versatile functions e.g. switching between external/internal control. In the case of internal control, frequency input via arrow keys. Multi-lingual fault message display etc. and motor temperature monitoring (thermistor-protection).

The speed controller assembly consists of a speed controller and a variable speed motor (see also ident-code characteristic R).

3.10 Meta Plunger Metering Pumps

Technical data

Type MTKa	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suction head mWC	Perm. ad- miss. pressure suction side bar	Connector Suction/ Discharge Side Rp-DN	Motor rating W	Shipping weight kg
	Delivery rate at max. backpressure		Max. stroke rate Strokes/ min	Delivery rate at max. backpres- sure		Max. stroke rate Strokes/ min						
	l/h bar	ml/ stroke		psi l/h / gph								
21606	216	6.1	1.42	72	3,130	7.3/1.9	86	4.0	108	1/4	180	18
24006	240	6.1	1.42	72	3,477	7.3/1.9	86	4.0	120	1/4	370	20
16208	162	8.1	1.42	96	2,347	9.8/2.6	115	4.0	81	1/4	180	18
22508	225	8.1	1.42	96	3,260	9.8/2.6	115	4.0	112.5	1/4	370	20
12910	129	10.2	1.42	120	1,878	12.2/3.2	144	4.0	64.5	1/4	180	18
21610	216	10.2	1.42	120	3,130	12.2/3.2	144	4.0	108	1/4	370	20
10812	108	12.2	1.42	144	1,565	14.7/3.9	173	4.0	54	1/4	180	18
21012	210	12.2	1.42	144	3,043	14.7/3.9	173	4.0	105	1/4	370	20
10213	102	13.0	3.01	72	1,479	15.6/4.1	86	4.0	51	1/4	180	18
11313	113	13.0	3.01	72	1,644	15.6/4.1	86	4.0	56.5	1/4	370	20
07617	76	17.3	3.01	96	1,109	20.8/5.5	115	4.0	38	1/4	180	18
10617	106	17.3	3.01	96	1,541	20.8/5.5	115	4.0	53	1/4	370	20
06122	61	21.7	3.01	120	888	26.0/6.9	144	4.0	30.5	1/4	180	18
10222	102	21.7	3.01	120	1,479	26.0/6.9	144	4.0	51	1/4	370	20
05126	51	26.0	3.01	144	740	31.2/8.2	173	4.0	25.5	1/4	180	18
09926	99	26.0	3.01	144	1,438	31.2/8.2	173	4.0	49.5	1/4	370	20
05425	54	24.6	5.71	72	782	29.5/7.8	86	4.0	27	3/8	180	18
06025	60	24.6	5.71	72	869	29.5/7.8	86	4.0	30	3/8	370	20
04033	40	32.8	5.71	96	587	39.4/10.4	115	4.0	20	3/8	180	18
05633	56	32.8	5.71	96	815	39.4/10.4	115	4.0	28	3/8	370	20
03241	32	41.1	5.71	120	469	49.3/13.0	144	4.0	16	3/8	180	18
05441	54	41.1	5.71	120	782	49.3/13.0	144	4.0	27	3/8	370	20
02749	27	49.3	5.71	144	391	59.2/15.6	173	4.0	13.5	3/8	180	18
05249	52	49.3	5.71	144	761	59.2/15.6	173	4.0	26	3/8	370	20

Materials in contact with medium

Material	Liquid end	Suction/pressure port	Gaskets	Valve balls	Valve seat	Plunger
SST	Stainless steel W. No. 1.4571/1.4404	Stainless steel W. No. 1.4571/1.4404	PTFE PTFE with graphite	Ceramic	Stainless steel W. No. 1.4571/1.4404	Ceramic

Motor Data

Identcode characteristic		Voltage supply		Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.18/0.37 kW
		250-280 V/440-480 V	60 Hz	0.18/0.37 kW
M	1 ph AC, IP 55	230 V ±5%	50/60 Hz	0.37 kW
N	1 ph AC, IP 55	115 V ±5 %	60 Hz	0.37 kW
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	0.18/0.37 kW
L2	3 ph, II2GEEexIICT4	220-240 V/380-420 V	50 Hz	0.18/0.37 kW with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	0.18/0.37 kW
P2	3 ph, II2GEEexIICT4	250-280 V/440-480 V	60 Hz	0.18/0.37 kW with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	0.37 kW with PTC, speed adjustment range 1:20
V0	1 ph, IP 55	230 V ±5 %	50/60 Hz	0.37 kW Variable speed motor with integrated frequency converter

The motor output depends on the pump type (see techn. data).

For further information, please request motor data sheets.

Customised motors or customised motor flanges are available on request.

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3.10 Meta Plunger Metering Pumps

3.10.2 Identcode Ordering System

Meta Plunger Metering Pump Version a

MTKa	Drive type			
	H	Main drive		
	A	Add-on drive		
		Type*		
		02749	05441	10213
				16208
		03241	05633	10222
				21012
		04033	06025	10617
				21606
		05126	06122	10812
				21610
		05249	07617	11313
				22508
		05425	09926	12910
				24006
		Material Liquid end		
		SS	Stainless steel	
		Sealing material*		
		T	PTFE	
		Displacement body*		
		S	Standard plunger, oxide ceramic	
		Liquid end version		
		0	No valve springs	
		1	With 2 valve springs, Hastelloy C, 0.1 bar	
		Hydraulic connection		
		0	Standard threaded connector (according to technical data)	
		Version		
		0	With ProMinent® logo (standard)	
		1	Without ProMinent® logo	
		M	Modified	
		Electrical power supply		
		S	3 ph, 230 V/400 V, 50/60 Hz (WBS)	
		M	1 ph, AC, 230 V, 50/60 Hz	
		N	1 ph, AC, 115 V, 60 Hz	
		L	3 ph, 230 V/400 V, 50 Hz, (Exe, Exd)	
		P	3 ph, 230 V/400 V, 60 Hz, (Exe, Exd)	
		R	3 ph, variable speed motor, 230 V/400 V	
		V (0)	Motor with integrated frequency converter	
		Z	1 ph, variable speed set 230 V, 50/60 Hz	
		0	Add-on pump (no motor)	
		1	No motor, with flange 90/63	
		2	No motor, with flange 140/71	
		3	No motor, with flange 160/71	
		4	No motor, with flange 56 C	
		Enclosure rating		
		0	IP 55 (standard)	
		1	Exe motor version ATEX-T3	
		2	Exd motor version ATEX-T4	
		A	ATEX power end	
		Stroke sensor		
		0	No stroke sensor (standard)	
		1	With stroke sensor, Namur signal (Ex)	
		Stroke length adjustment		
		0	Manual (standard)	
		1	With stroke positioning, 230 V/50/60 Hz	
		2	With stroke positioning, 115 V/50/60 Hz	
		A	With stroke control motor 0...20 mA 230 V/50/60 Hz	
		B	With stroke control motor 4...20 mA 230 V/50/60 Hz	
		C	With stroke control motor 0...20 mA 115 V/50/60 Hz	
		D	With stroke control motor 4...20 mA 115 V/50/60 Hz	

* Digits 1 - 3=back pressure [bar]; digits 4 + 5=feed rate [l/h]

3.10 Meta Plunger Metering Pumps

3.10.3 Spare Parts Kits

Spare parts kits for Meta (MTKa) Plunger Metering Pumps

consisting of:

- 1 ceramic plunger
- 4 valve balls
- 4 ball seat discs
- 2 PTFE /graphite plunger packing rings
- 2 plunger guides bands
- 14 flat seals
- 2 O-rings

	Order no.
Liquid end FK 12,5 Applies to identcode: 21606, 24006, 16208, 22508, 12910, 21610, 10812, 21012	910470
Liquid end FK 25 Applies to identcode: 10213, 11313, 07617, 10617, 06122, 10222, 05126, 09926	910471
Liquid end FK 50 Applies to identcode: 05425, 06025, 04033, 05633, 03241, 05441, 02749, 05249	910472

Base Frames for Meta MTMa and MTKa

A base frame is available for main and add-on pump combinations.

	Order no.
Base frame for main and one add-on pump	803897
Base frame for main and two add-on pumps	803898
Base frame for main and three add-on pumps	803899

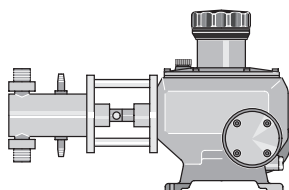
Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.11 Makro TZ Plunger Metering Pumps

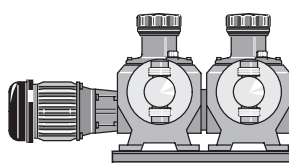
3.11.1

Makro TZ Plunger Metering Pumps



pk_2_019

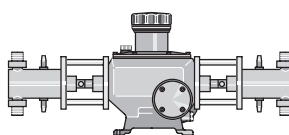
The Makro TZ plunger pump is a standard sized metering pump which can be driven by either a 0.75 kW or 1.5 kW dual wound three phase motor. 230/400 V, 50/60 Hz power supply, enclosure rating IP 55, insulation class F. Stroke length is 0...20 mm and is adjustable to within 0.5 % accuracy. The shift ring mechanism, in a choice of four reduction ratios, is built into a salt water-resistant and acrylic resin coated cast housing. Liquid ends are made of stainless steel 1.4571, and plungers are in oxide ceramic or stainless steel with a ceramic anti-wear coating. The suction lift varies depending upon the density and viscosity of the feed chemical, and connecting pipework dimensions. Under defined conditions and providing installation is correct, reproducible metering accuracy is better than ± 0.5 % at a stroke length range of between 10 % and 100 %. (Guidelines given in the instruction manual must be followed precisely.) For technical safety reasons, appropriate equipment must be installed to prevent current overload to motorised metering pumps.



pk_2_018

Makro TZ TZKaA Add-On Pumps

Makro TZ add-on pumps (TZ-AK) can be connected up with Makro TZ main pumps (TZ-HK) to form duplex or triplex pumps. (In certain cases more add-on pumps can be operated with a main pump with reduced back pressures). The multiplexed pumps can also be ordered and supplied as complete systems, consisting of a TZ-HK and the required number of TZ-AKs. Multiplexed pumps can also be retrofitted by the operator. All necessary fittings and connectors are supplied with the TZ-AK. The TZ-AK stroke rate is set independently of the TZ-HK, as each TZ-AK governs its own reducing gear. The main power end can be fitted with a 2.2 kW/3 kW motor for this purpose. A base frame is required when using add-on pumps.

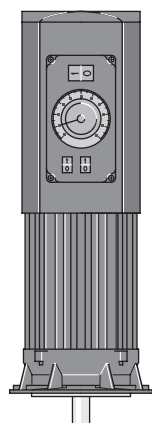


pk_2_020

Makro TZ Double Head Version TZKaD (Main Pump) /TZKaB (Add-On Pump)

The Makro TZ HKD and AKD are similar to simplex pumps, but with an additional liquid end.

The gearbox coupler causes the pumps to operate counter to one another, i.e. the discharge stroke in the first is matched by a suction stroke in the second.



pk_2_103

Makro TZ Metering Pump Actuators

Stroke length actuator/stroke controller Makro TZ

Actuator Makro TZ

Servomotor for automatic stroke length adjustment, actuating time approx. 1 sec. for 1 % stroke length, equipped with 2 limit switches for min./max. position, feedback potentiometer 1 k Ω ; IP rating: IP 52. Electrical connection 230 V (± 10 %), 50/60 Hz, approx. 40 W, mech. stroke position indicator present at drive Makro TZ.

Special voltage/higher IP ratings/Ex protection on request.

Stroke controller Makro TZ

Variable speed drive consisting of actuator with motor actuator and integrated microprocessor controller for stroke length adjustment via a standard signal. For technical data see actuator.

Design:

Standard current input 0/4-20 mA, corresponds to stroke length 0-100%, internal switch for manual/automatic operation, key switch for stroke adjustment in manual operation mode. Actual value output 0/4-20 mA for remote display.

Variable speed motors with integrated frequency converter (Identcode characteristic V)

Power supply 3 ph 230 V, 50/60 Hz, 2.2 kW.

Optional 0/4-20 mA external control. (see Fig. pk_2_103)

(Speed Controllers see p. \rightarrow 2-51)

Speed controllers in metal housing (Identcode characteristic Z)

The speed controller set comprises frequency converter and 2.2 kW variable speed motor.

(Speed Controllers see p. \rightarrow 2-51)

3.11 Makro TZ Plunger Metering Pumps

Technical data

Typ TZKa	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz			Suction head mWC	Connection, intake/ pressure side G-DN	Shipping weight kg	Plunger Ø mm
	Delivery rate at max. backpressure		Max. stroke rate Strokes/min	Delivery rate at max. backpressure		Max. stroke rate Strokes/min					
	bar	l/h ml/ stroke		psi	l/h / gph						
320009	320	8.7	2.0	72	4,627	10/2.6	86	4.0	Rp 1/4**–8	50	12
320012	320	11.6	2.0	96	4,627	14/3.7	115	4.0	Rp 1/4**–8	50	12
320014	320	14.5	2.0	120	4,627	17/4.5	144	4.0	Rp 1/4**–8	50	12
320017	320	17.4	2.0	144	4,627	21/5.5	173	4.0	Rp 1/4**–8	50	12
320018	320	17.7	4.1	72	4,627	21/5.5	86	4.0	Rp 1/4**–8	50	17
320024	320	23.6	4.1	96	4,627	28/7.4	115	4.0	Rp 1/4**–8	54	17
320030	320	29.5	4.1	120	4,627	35/9.2	144	4.0	Rp 1/4**–8	54	17
313035	313	35.4	4.1	144	4,526	42/11.1	173	4.0	Rp 1/4**–8	54	17
192033	192	32.9	7.6	72	2,776	39/10.3	86	4.0	Rp 3/8**–10	55	23
192044	192	43.9	7.6	96	2,776	59/15.6	115	4.0	Rp 3/8**–10	55	23
192055	192	54.8	7.6	120	2,776	66/17.4	144	4.0	Rp 3/8**–10	55	23
168066	168	65.8	7.6	144	2,437	79/20.9	173	4.0	Rp 3/8**–10	55	23
113057	113	57.5	13.3	72	1,634	69/18.2	86	4.0	Rp 3/8**–10	56	30
113077	113	76.6	13.3	96	1,634	92/24.3	115	4.0	Rp 3/8**–10	56	30
113096	113	95.8	13.3	120	1,634	115/30.4	144	4.0	Rp 3/8**–10	56	30
096115	96	114.9	13.3	144	1,392	138/36.5	173	4.0	Rp 3/8**–10	56	30
063104	63	104.3	24.2	72	911	125/33.0	86	4.0	G 1 1/4–20	58	40
063139	63	139.0	24.2	96	911	167/44.1	115	4.0	G 1 1/4–20	58	40
063174	63	173.8	24.2	120	914	209/55.2	144	4.0	G 1 1/4–20	58	40
052208	52	208.5	24.2	144	754	250/66.0	173	4.0	G 1 1/4–20	58	40
040163	40	162.9	37.7	72	578	195/51.5	86	4.0	G 1 1/4–20	58	50
040217	40	217.2	37.7	96	578	261/68.9	115	4.0	G 1 1/4–20	58	50
040271	40	271.5	37.7	120	580	326/86.1	144	4.0	G 1 1/4–20	58	50
033326	33	325.8	37.7	144	479	391/103.3	173	4.0	G 1 1/4–20	58	50
028237	28	237.0	54.9	72	405	284/75.0	86	4.0	G 1 1/2–25	62	60
028316	28	315.9	54.9	96	405	379/100.1	115	4.0	G 1 1/2–25	62	60
027395	27	394.9	54.9	120	392	474/125.2	144	4.0	G 1 1/2–25	62	60
022474	22	473.9	54.9	144	319	569/150.3	173	4.0	G 1 1/2–25	62	60
020322	20	322.5	74.7	72	289	387/102.2	86	4.0	G 1 1/2–25	62	70
020430	20	430.0	74.7	96	289	516/136.3	115	4.0	G 1 1/2–25	62	70
020538	20	537.6	74.7	120	290	645/170.4	144	4.0	G 1 1/2–25	62	70
016645	16	645.1	74.7	144	232	774/204.5	173	4.0	G 1 1/2–25	62	70
014475	14	475.1	110.0	72	202	571/150.8	86	4.0	G 2 1/4–40	68	85
014634	14	634.1	110.0	96	202	761/201.0	115	4.0	G 2 1/4–40	68	85
013793	13	792.6	110.0	120	189	951/251.2	144	4.0	G 2 1/4–40	68	85
011951	11	951.1	110.0	144	160	1,141/301.4	173	4.0	G 2 1/4–40	68	85

The permissible admission pressure on the suction side is approx. 50 % of max. permissible back pressure.

** The suction and discharge connectors Rp 1/4 and Rp 3/8 are inner threaded and fitted with double ball valves.

Materials in contact with medium

Pump type	Hydraulic Ø mm	Liquid end connection	Suction/pressure gaskets	Ball seat	Valve balls	Plunger
...12 S to 30 S		Stainless steel 1.4571/ 1.4404	1.4571/1.4404	SS/PTFE	Oxide ceramics	Stainless steel/ ceramic
...40 S to 70 S		Stainless steel 1.4571/ 1.4404	1.4581	PTFE/PTFE	Stainless steel 1.4401	Stainless steel/ ceramic
...85 S		Stainless steel 1.4571/ 1.4404	1.4581	PTFE/PTFE	1.4404 (plate) Hast. C (spring)	Stainless steel/ ceramic

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3.11 Makro TZ Plunger Metering Pumps

3.11.2 Identcode Ordering System

Motor metering pump TZKa 20 (plunger metering pump)

TZKa		Drive type				
H	Main drive					
A	Add-on					
D	Double main drive					
B	Double add-on					
Type*						
320009	320030	113057	063174	028237	020538	
320012	313035	113077	052208	028316	016645	
320014	192033	113096	040163	027395	014475	
320017	192044	096115	040217	022474	014634	
320018	192055	063104	040271	020322	013793	
320024	168066	063139	033326	020430	011951	
Material Liquid end						
SS	Stainless steel					
Sealing material*						
T	PTFE					
Displacement body						
S	Stainless steel plunger, chromoxide coated					
Liquid end version						
0	No valve springs					
1	With valve springs					
Hydraulic connection						
0	Standard connection					
4	SS union nut and insert					
Version						
0	With ProMinent® logo, no frame					
2	Without ProMinent® logo, no frame					
A	With ProMinent® logo, with frame, simplex					
B	With ProMinent® logo, with frame, duplex					
C	With ProMinent® logo, with frame, triplex					
M	Modified					
Electrical power supply						
S	3 ph. 230/400 V 50/60 Hz (WBS)					
P	3 ph. 230/400 V 60 Hz (Exe, Exd)					
L	3 ph. 230/400 V 50 Hz (Exe, Exd)					
R	Variable speed motor 4 pole 230/400 V					
V (0)	Variable speed motor with integr. frequency converter					
V (2)	With integrated frequency converter (Exd)					
Z	1 ph, variable speed control set 1 ph, 230 V, 50/60 Hz					
4	No motor, with 56 C flange					
7	No motor, with 120/80 flange					
8	No motor, with 160/90 flange					
0	Without motor, externally mounted drive					
Enclosure rating						
0	IP 55 (Standard) ISO class F					
1	Exe version ATEX-T3					
2	Exd version ATEX-T4					
A	ATEX power end					
Stroke sensor						
0	No stroke sensor					
1	With stroke sensor (Namur)					
Stroke length adjustment						
0	Stroke length adjustment, man.					
1	230 V stroke adjustment motor					
2	115 V stroke adjustment motor					
3	230 V 0-20 mA stroke controller					
4	230 V 4-20 mA stroke controller					
5	115 V 0-20 mA stroke controller					
6	115 V 4-20 mA stroke controller					
Application						
0	Standard					

* Digits 1 - 3=back pressure [bar]; digits 4 - 6=feed rate [l/h]

3.11 Makro TZ Plunger Metering Pumps

Motor Data

Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	1.5 kW	
		250-280 V/440-480 V	60 Hz	1.5 kW	
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	1.5 kW	
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	1.5 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	1.5 kW	
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	1.5 kW	with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	2.2 kW	with PTC, speed adjustment range 1:20 with separate fan 1ph 230 V ; 50/60Hz
V0	3 ph, IP 55	400 V ±10 %	50/60 Hz	2.2 kW	Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	2.2 kW	Ex-variable speed motor with integrated frequency converter

3.11.3

Spare Parts Kits

Spare parts kit, plunger metering pump

comprising:

valve balls
 valve plate with spring
 ball seat discs
 PTFE/graphite plunger packing rings
 plunger guides
 flat seals/O rings

Spare parts kit Makro TZ

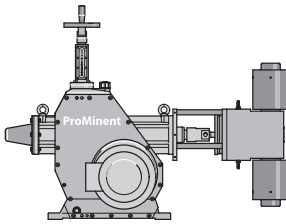
	Order no.
Spare parts kit Makro TZ FK 12/20 S DN 8	1019106
Spare parts kit Makro TZ FK 17/20 S DN 8	1019107
Spare parts kit Makro TZ FK 23/20 S DN 10	1019108
Spare parts kit Makro TZ FK 30/20 S DN 10	1019109
Spare parts kit Makro TZ FK 40/20 S DN 20	1019110
Spare parts kit Makro TZ FK 50/20 S DN 20	1019111
Spare parts kit Makro TZ FK 60/20 S DN 25	1019112
Spare parts kit Makro TZ FK 70/20 S DN 25	1019113
Spare parts kit Makro TZ FK 85/20 S DN 40	1019124

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

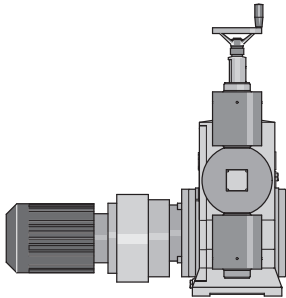
3.12 Makro/ 5 Plunger Metering Pumps

3.12.1 Makro/ 5 Plunger Metering Pumps



pk_2_075

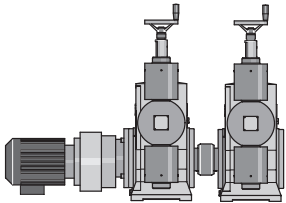
The Makro/ 5 plunger metering pump is optionally driven by a 3 kW motor, 230/400 V, 50/60 Hz, enclosure rating IP 55, insulation class F. The stroke length is adjustable between 0...50 mm. The gearbox is housed in a sea water-resistant acrylic resin lacquered cast housing. The plunger liquid end is made of stainless steel 1.4571 and plungers are made of oxide ceramic or stainless steel with a ceramic wear-resistant coating. Metering reproducibility under defined conditions and when installed correctly, is better than $\pm 0.5\%$ in a stroke length range of between 10 and 100 % (instructions in the operating instructions manual must be followed). The priming lift varies with the density and viscosity of the chemical, the connection pipework and the stroking rate of the pump. For all motor-driven metering pumps, for safety reasons, suitable overload protection must be provided during installation. A tensioning key is supplied as standard for re-tensioning packing rings.



pk_2_076

Makro/ 5 M5KaA Add-On Pumps

The Makro/ 5 AK add-on plunger metering pump can be used with the Makro/ 5 HK plunger main power end to expand to a duplex or triplex system. (At reduced backpressures up to four add-on power ends can be combined with a single main power end). The customer can retrofit the add-on power ends on site. If required, the main power end can be fitted with a 3 kW or a 5.5 kW motor. You will require a base frame when connecting add on power ends.

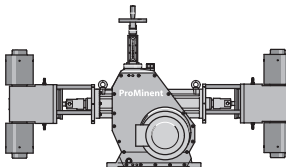


pk_2_077

Makro/ 5 Double Head Version M5KaD (Main Pump) /M5HaB (Add-On Pump)

For the Makro/ 5 HKD and AKD the same basic instructions as for the simplex pumps apply. It is also fitted, however, with a second liquid end.

The liquid ends operate in push-pull mode.



pk_2_078

Makro/ 5 Pump Control

Stroke length variable speed drive Makro/ 5

Variable speed drive consisting of actuator with motor actuator and integrated microprocessor controller for stroke length adjustment via a standard signal. Actuating time approx. 100 sec. for 100% stroke length, equipped with 2 limit switches for min./max. position, IP rating: IP 52. Electrical connection 230 V ($\pm 10\%$), 50/60 Hz, approx. 40 W, mech. stroke position indicator present at drive Makro/ 5.

Special voltage/higher IP ratings/Ex protection on request.

Includes:

Standard current input 0/4-20 mA (corresponds to stroke length 0-100%); internal switch for manual/automatic operation, key switch for stroke adjustment in manual operation mode. Actual value output 0/4-20 mA for remote display.

Frequency converter for speed control in metal housing, IP rating 54

Frequency converter installed in protective housing IP 54 with integrated control unit and main switch suitable for the motor output stated in the following.

Externally controllable with 0/4-20 mA or 0-10V corresponding to 0-50 (60) Hz output frequency.

Integrated control unit with numerous functions such as toggling external/internal control. For internal control, frequency setting via arrow keys, error message on multi-lingual display etc.

Including evaluator for temperature monitoring of the motor (thermistor protection).

Stroke sensor with namur signal

Mounted at the crank drive of the Makro/5 gearbox. For a precise detection of each metering stroke, consisting of actuating cams and inductive proximity switch, switching signal according to Namur. In connection with electronic preselection counters suitable for batch metering or proportional metering in connection with the proportional control.

Retrofitting is only possible on factory premises.

Approved for ex-proof operation with IP rating EEx ia II C T6.

3.12 Makro/ 5 Plunger Metering Pumps

Technical data

Typ M5kaH	With motor 1500 rpm at 50 Hz				With motor 1800 rpm at 60 Hz				Suction head mWC	Connection, intake/pressure side G-DN	Shipping weight kg	Plunger Ø mm
	Delivery rate at max. backpressure			Max. stroke rate Strokes/min	Delivery rate at max. backpressure			Max. stroke rate Strokes/min				
	bar	l/h	ml/stroke		psi	l/h	gph					
3200038	320	38	11	60	4,640	44	12	71	3.0	Rp 1/4-8	300	17
3200048	320	48	11	75	4,640	56	15	89	3.0	Rp 1/4-8	300	17
3200066	320	66	11	103	4,640	78	21	123	3.0	Rp 1/4-8	300	17
3200085	320	85	11	133	4,640	101	27	159	3.0	Rp 3/4-10	300	17
3200100	320	100	11	156					3.0	Rp 3/4-10	300	17
2400070	240	70	21	60	3,480	82	22	71	3.0	Rp 3/4-10	300	23
2400088	240	88	21	75	3,480	104	27	89	3.0	Rp 3/4-10	300	23
2400121	240	121	21	103	3,480	144	38	123	3.0	G 1-15	300	23
2160157	216	157	21	133	3,132	187	49	159	3.0	G 1-15	300	23
1700184	170	184	21	156					3.0	G 1-15	300	23
1400120	140	120	35	60	2,030	142	38	71	3.0	G 1-15	302	30
1400151	140	151	35	75	2,030	179	47	89	3.0	G 1-15	302	30
1400207	140	207	35	103	2,030	247	65	123	3.0	G 1-15	302	30
1270267	127	267	35	133	1,842	319	84	159	3.0	G 1 1/4-20	302	30
1000314	100	314	35	156					3.0	G 1 1/4-20	302	30
0800214	80	214	63	60	1,160	253	67	71	3.0	G 1 1/4-20	303	40
0800268	80	268	63	75	1,160	318	84	89	3.0	G 1 1/4-20	303	40
0800368	80	368	63	103	1,160	439	116	123	3.0	G 1 1/4-20	303	40
0700476	70	476	63	133	1,015	569	150	159	3.0	G 1 1/2-25	303	40
0560558	56	558	63	156					3.0	G 1 1/2-25	303	40
0500335	50	335	98	60	725	396	105	71	3.0	G 1 1/2-25	303	50
0500419	50	419	98	75	725	497	131	89	3.0	G 1 1/2-25	303	50
0500576	50	576	98	103	725	687	181	123	3.0	G 1 1/2-25	303	50
0450744	45	744	98	133	653	889	235	159	3.0	G 2-32	303	50
0350872	35	872	98	156					3.0	G 2-32	303	50
0350483	35	483	141	60	507	571	151	71	3.0	G 1 1/2-25	311	60
0350604	35	604	141	75	507	716	189	89	3.0	G 1 1/2-25	311	60
0350829	35	829	141	103	507	989	261	123	3.0	G 2-32	311	60
0301071	30	1,071	141	133	435	1,280	338	159	3.0	G 2-32	311	60
0251257	25	1,257	141	156					3.0	G 2-32	311	60
0250658	25	658	192	60	363	778	206	71	3.0	G 2-32	311	70
0250822	25	822	192	75	363	975	258	89	3.0	G 2-32	311	70
0251129	25	1,129	192	103	363	1,348	356	123	3.0	G 2-32	311	70
0231458	23	1,458	192	133	334	1,743	460	159	3.0	G 2 1/4-40	311	70
0181710	18	1,710	192	156					3.0	G 2 1/4-40	311	70
0160970	16	970	284	60	232	1,147	303	71	3.0	G 2 1/4-40	317	85
0161212	16	1,212	284	75	232	1,438	380	89	3.0	G 2 1/4-40	317	85
0161665	16	1,665	284	103	232	1,988	525	123	3.0	G 2 1/4-40	317	85
0162150	16	2,150	284	133	232	2,570	679	159	3.0	G 2 3/4-50	317	85
0162522	16	2,522	284	156					3.0	G 2 3/4-50	317	85
0121343	12	1,343	393	60	174	1,589	420	71	3.0	G 2 3/4-50	331	100
0121678	12	1,678	393	75	174	1,991	526	89	3.0	G 2 3/4-50	331	100
0122305	12	2,305	393	103	174	2,752	727	123	3.0	G 2 3/4-50	331	100
0122977	12	2,977	393	133	174	3,558	940	159	3.0	G 2 3/4-50	331	100
0103491	10	3,491	393	156					3.0	G 2 3/4-50	331	100
0062269	6	2,269	664	60	87	2,684	709	71	3.0	G 2 1/2-65	350	130
0062837	6	2,837	664	75	87	3,366	889	89	3.0	G 2 1/2-65	350	130
0063896	6	3,896	664	103	87	4,652	1,229	123	3.0	G 2 1/2-65	350	130
0065031	6	5,031	664	133	87	6,014	1,589	159	3.0	G 2 1/2-65	350	130
0066000	6	6,000	664	156					3.0	G 2 1/2-65	350	130

3.12 Makro/ 5 Plunger Metering Pumps

3.12.2 Identcode Ordering System

Makro/ 5 motor-driven metering pump

M5Ka	Drive type				
H	Main drive				
A	Add-on power end				
D	Double main drive				
B	Double add-on power end				
Type*					
3200038	1400120	0500335	0250658	0121343	
3200048	1400151	0500419	0250822	0121678	
3200066	1400207	0500576	0251129	0122305	
3200085	1270267	0450744	0231458	0122977	
3200100	1000314	0350872	0181710	0103491	
2400070	0800214	0350483	0160970	0062269	
2400088	0800268	0350604	0161212	0062837	
2400121	0800368	0350829	0161665	0063896	
2160157	0700476	0301071	0162150	0065031	
1700184	0560558	0251257	0162522	0066000	
Material Liquid end					
SS	Stainless steel				
Sealing material*					
T	PTFE				
Displacement body					
S	Stainless steel plunger, chromoxide coated				
Liquid end version					
0	No valve springs				
1	With valve springs				
Hydraulic connection					
0	Standard connection				
4	SS union nut and insert				
Version					
0	With ProMinent® logo, no frame				
2	No ProMinent® logo, no frame				
A	With ProMinent® logo, with frame, simplex				
B	With ProMinent® logo, with frame, duplex				
C	With ProMinent® logo, with frame, triplex				
D	With ProMinent® logo, with frame, quadruplex				
M	Modified				
Electrical power supply					
S	3 ph. 230/400 V 50/60 Hz (WBS)				
P	3 ph. 230/400 V 60 Hz (Exe, Exd)				
L	3 ph. 230/400 V 50 Hz (Exe, Exd)				
R	Variable speed motor 4 pole 230/400 V				
V (0)	Motor with integrated frequency converter				
V (2)	Motor with integrated frequency converter (Exd)				
5	No motor, with IEC 100 gearbox				
6	No motor, with IEC 112 gearbox				
0	No motor, no gearbox				
Enclosure rating					
0	IP 55 (Standard) ISO class F				
1	Exe version ATEX-T3				
2	Exd version ATEX-T4				
A	ATEX power end				
Stroke sensor					
0	No stroke sensor				
1	With stroke sensor (Namur)				
Stroke length adjustment					
0	Stroke length adjustment, man.				
3	230 V 0-20 mA stroke controller				
4	230 V 4-20 mA stroke controller				
5	115 V 0-20 mA stroke controller				
6	115 V 4-20 mA stroke controller				
Application					
0	Standard				

* Digits 1 - 3=back pressure [bar]; digits 4 - 7=feed rate [l/h]

3.12 Makro/ 5 Plunger Metering Pumps

Materials in contact with medium

	Liquid end	Suction/ pressure port	Valve seat/ gaskets	Valve balls	Plunger
Makro 5/50 HK ...DN 8-DN 10	Stainless steel 1.4571/ 1.4404	1.4571/1.4404	SS/PTFE	Oxide ceramics	Stainless steel/ ceramic
Makro 5/50 HK ...DN 15-DN 25	Stainless steel 1.4571/ 1.4404	1.4581	PTFE/PTFE	Stainless steel 1.4401	Stainless steel/ ceramic
Makro 5/50 HK ...DN 32-DN 65	Stainless steel 1.4571/ 1.4404	1.4581/1.4404	PTFE/PTFE	Stainless steel 1.4404 (plate/ spring)	Stainless steel/ ceramic

The permissible pre-pressure on the suction side is approx. 50% of the max. permissible backpressure.

Motor Data

Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	3 kW	
		250-280 V/440-480 V	60 Hz	3 kW	
L1	3 ph, II2GEEexIIIT3	220-240 V/380-420 V	50 Hz	3.6 kW	
L2	3 ph, II2GEEexIIICT4	220-240 V/380-420 V	50 Hz	4 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEexIIIT3	250-280 V/440-480 V	60 Hz	3.6 kW	
P2	3 ph, II2GEEexIIICT4	250-280 V/440-480 V	60 Hz	4 kW	with PTC, speed adjustment range 1:5
R	3 ph, IP 55	230 V/400 V	50/60 Hz	3 kW	with PTC, speed adjustment range 1:5
V0	3 ph, IP 55	400 V ±10 %	50/60 Hz	3 kW	Variable speed motor with integrated frequency converter
V2	3 ph, II2GEEexIIICT4	400 V ±10 %	50/60 Hz	4 kW	Ex-variable speed motor with integrated frequency converter

Note concerning installation in Ex-zones:

With effect from 01.07.2003, only pumps with a suitable identification and rating plate in accordance with ATEX Directive 94/9/EC may be used in areas with potentially explosive atmospheres. The explosion group, category and degree of protection stated on the rating plate must correspond to, or be higher than, the conditions specified in the intended application.

3.12 Makro/ 5 Plunger Metering Pumps

3.12.3

Spare Parts Kits

Spare parts kits plunger metering pumps

Comprising:

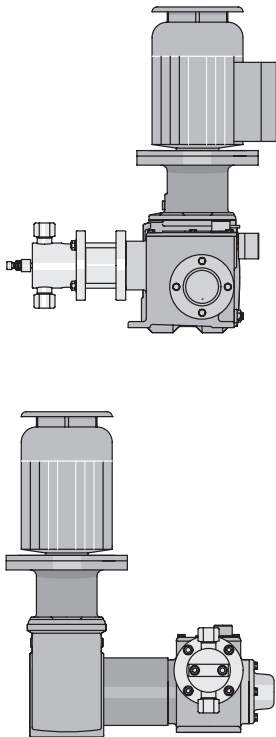
Valve balls
 Valve plate with spring
 Ball seat discs
 PTFE/graphite plunger packing rings
 Plunger rings
 Flat seals/O-rings

Spare parts kits Makro/ 5

	Order no.
Spare parts kit Makro/ 5 FK 17/50 S DN 8	1005899
Spare parts kit Makro/ 5 FK 17/50 S DN 10	1005536
Spare parts kit Makro/ 5 FK 23/50 S DN 10	1005004
Spare parts kit Makro/ 5 FK 23/50 S DN 15	1005900
Spare parts kit Makro/ 5 FK 30/50 S DN 15	1005901
Spare parts kit Makro/ 5 FK 30/50 S DN 20	1005537
Spare parts kit Makro/ 5 FK 40/50 S DN 20	1005902
Spare parts kit Makro/ 5 FK 40/50 S DN 25	1005538
Spare parts kit Makro/ 5 FK 50/50 S DN 25	1005539
Spare parts kit Makro/ 5 FK 60/50 S DN 25	1005903
Spare parts kit Makro/ 5 FK 60/50 S DN 32	1005540
Spare parts kit Makro/ 5 FK 70/50 S DN 32	1005541
Spare parts kit Makro/ 5 FK 70/50 S DN 40	1005904
Spare parts kit Makro/ 5 FK 85/50 S DN 40	1005542
Spare parts kit Makro/ 5 FK 85/50 S DN 50	1005905
Spare parts kit Makro/ 5 FK 100/50 S DN 50	1005543
Spare parts kit Makro/ 5 FK 130/50 S DN 65	1005544

3.13 ProMinent® ORLITA® PS Plunger Metering Pumps

3.13.1 ORLITA® PS Plunger Metering Pumps



pk_2_123

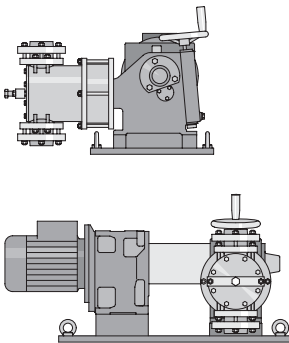
Plunger head with stuffing box packing. The plunger oscillates in the cylinder and displaces the medium to be metered.

The plunger packing can also be adjusted in operation using the front clamp screw. The lantern mounted at the rear head end can be used as annulus collector for leakages. From there, the leakage can be drained or a medium to seal, flush or lubricate the pump can be fed. As suction or pressure valves, ball valves are used which are low-wearing, self-cleaning and show a low pressure loss (NPSH_P).

All parts coming into contact with the product are made of stainless steel with PTFE gaskets.

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz			Max. pressure bar		
			70	88	108			
PS 18/	5	0.29	1.2	1.6	1.9	2.5	3.5	250.0
	6	0.42	1.8	2.2	2.7	3.6	5.1	250.0
	7	0.58	2.4	3.0	3.7	4.8	6.9	250.0
	8	0.75	3.2	4.0	4.9	6.3	9.0	250.0
	10	1.18	4.9	6.2	7.6	9.9	14.1	200.0
	12	1.70	7.1	9.0	11.0	14.3	20.4	139.0
	16	3.02	12.7	15.9	19.5	25.3	36.2	78.0
	20	4.71	19.8	24.9	30.5	39.6	56.5	50.0
	25	7.36	30.9	38.9	47.7	61.9	88.4	32.0
	30	10.60	44.5	56.0	68.7	89.1	127.2	22.0
	36	15.27	64.1	80.6	98.9	128.3	183.2	15.0
	40	18.85	79.2	99.5	122.1	158.3	226.2	12.0
	50	29.45	123.7	155.5	190.9	247.4	353.4	8.0
	65	49.77	209.1	262.8	322.5	418.1	597.3	5.0

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz			Max. pressure bar		
			70	88	108			
PS 35/	8	1.01	4.2	5.3	6.5	8.4	12.1	250.0
	10	1.57	6.6	8.3	10.2	13.2	18.8	250.0
	12	2.26	9.5	11.9	14.7	19.0	27.1	250.0
	16	4.02	16.9	21.2	26.1	33.8	48.3	157.0
	20	6.28	26.4	33.2	40.7	52.8	75.4	100.0
	25	9.82	41.2	51.8	63.6	82.5	117.8	64.0
	30	14.14	59.4	74.6	91.6	118.8	169.6	44.0
	36	20.36	85.5	107.5	131.9	171.0	244.3	31.0
	40	25.13	105.6	132.7	162.9	211.1	301.6	25.0
	50	39.27	164.9	207.3	254.5	329.9	471.2	16.0
	65	66.37	278.7	350.4	430.1	557.5	796.4	9.0
	80	100.53	422.2	530.8	651.4	844.5	1,206.4	6.0
100	157.08	659.7	829.4	1,017.9	1,319.5	1,885.0	4.0	

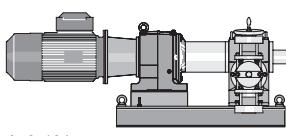
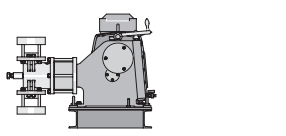


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Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz				Max. pressure bar		
			70	90	115	134			
PS 80/	20	6.28	26.4	33.9	43.4	50.5	57.3	73.1	250.0
	25	9.82	41.2	53.0	67.7	78.9	89.5	114.3	250.0
	30	14.14	59.4	76.3	97.5	113.7	128.9	164.6	178.0
	36	20.36	85.5	109.9	140.5	163.7	185.7	237.0	123.0
	40	25.13	105.6	135.7	173.4	202.1	229.2	292.5	100.0
	50	39.27	164.9	212.1	271.0	315.7	358.1	457.1	64.0
	60	56.55	237.5	305.4	390.2	454.7	515.7	658.2	40.0
	65	66.37	278.7	358.4	457.9	533.6	605.3	772.5	38.0
	80	100.53	422.2	542.9	693.7	808.3	916.8	1,170.2	25.0
	100	157.08	659.7	848.2	1,083.8	1,262.9	1,432.6	1,828.4	16.0
	125	245.44	1,030.8	1,325.4	1,693.5	1,973.3	2,238.4	2,856.9	10.0
	140	307.88	1,293.1	1,662.5	2,124.3	2,475.3	2,807.8	3,583.7	8.0
160	402.12	1,688.9	2,171.5	2,774.7	3,233.1	3,667.4	4,680.7	6.0	

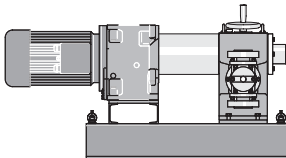
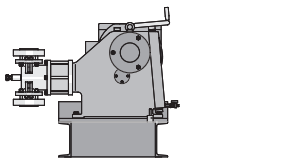
3.13 ProMinent® ORLITA® PS Plunger Metering Pumps

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz						Max. pressure bar
			67	88	103	137	154	173	
PS 180/	30	28.27	113.7	149.3	174.7	232.4	261.3	293.5	229.0
	36	40.72	163.7	215.0	251.6	334.7	376.2	422.6	159.0
	40	50.27	202.1	265.4	310.6	413.2	464.5	521.8	129.0
	50	78.54	315.7	414.7	485.4	645.6	725.7	815.2	82.0
	54	91.61	368.3	483.7	566.1	753.0	846.5	950.9	70.0
	65	132.73	533.6	700.8	820.3	1,091.1	1,226.4	1,377.8	48.0
	70	153.94	618.8	812.8	951.3	1,265.4	1,422.4	1,597.9	42.0
	80	201.06	808.3	1,061.6	1,242.6	1,652.7	1,857.8	2,087.0	32.0
	94	277.59	1,115.9	1,465.7	1,715.5	2,281.8	2,564.9	2,881.4	23.0
	125	490.87	1,973.3	2,591.8	3,033.6	4,035.0	4,535.7	5,095.3	13.0
	140	615.75	2,475.3	3,251.2	3,805.3	5,061.5	5,689.5	6,391.5	10.0
	160	804.25	3,233.1	4,246.4	4,970.3	6,610.9	7,431.2	8,348.1	8.0
200	1,256.64	5,051.7	6,635.0	7,766.0	10,329.6	11,611.3	13,043.9	5.0	



pk_2_124

Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz						Max. pressure bar
			69	91	113	134	155	182	
PS 600/	30	28.27	116.6	153.6	191.4	226.8	262.4	309.3	400.0
	36	40.27	167.9	221.2	275.6	326.7	377.9	445.3	353.0
	40	50.27	207.3	273.1	340.2	403.3	466.6	549.8	286.0
	50	78.54	323.9	426.7	531.6	630.1	729.0	859.0	183.0
	54	91.61	377.8	497.7	620.1	735.0	850.3	1,002.0	157.0
	65	132.73	547.3	721.2	898.4	1,064.9	1,232.0	1,451.8	108.0
	70	153.94	634.8	836.4	1,042.0	1,235.0	1,428.8	1,683.7	93.0
	80	201.06	829.1	1,092.4	1,360.9	1,613.1	1,866.2	2,199.1	71.0
	94	277.59	1,144.7	1,508.3	1,878.9	2,227.1	2,576.5	3,036.2	51.0
	125	490.87	2,024.2	2,667.1	3,322.6	3,938.2	4,556.2	5,368.9	29.0
	140	615.75	2,539.2	3,345.6	4,167.9	4,940.1	5,715.3	6,734.8	23.0
	160	804.25	3,316.5	4,369.8	5,443.7	6,452.4	7,464.8	8,796.5	18.0
200	1,256.64	5,182.0	6,827.8	8,505.8	10,081.9	11,663.8	13,744.5	11.0	



pk_2_125

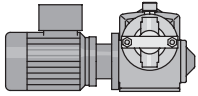
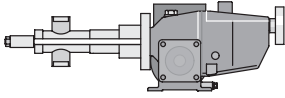
Pump type	Plunger Ø mm	Stroke Volume cm ³ /stroke	Capacity (theo.)in l/h at strokes/min 50 Hz						Max. pressure bar
			83	98	112	129	148	171	
PS 1400/	40	75.40	375.6	442.0	505.9	584.3	669.5	773.3	400.0
	50	117.81	587.0	690.6	790.4	912.9	1,046.1	1,208.3	275.0
	60	169.65	845.2	994.4	1,138.2	1,314.6	1,506.4	1,740.0	191.0
	70	230.91	1,150.4	1,353.5	1,549.2	1,789.3	2,050.3	2,368.3	140.0
	80	301.59	1,502.6	1,967.9	2,023.5	2,337.1	2,678.0	3,093.3	107.0
	94	416.39	2,074.5	2,440.8	2,793.6	3,226.6	3,697.3	4,270.6	77.0
	125	736.31	3,668.5	4,316.1	4,940.1	5,705.7	6,538.1	7,551.9	44.0
	140	923.63	4,601.7	5,414.2	6,196.9	7,157.3	8,201.4	9,473.1	35.0
	160	1,206.37	6,010.4	7,071.5	8,093.9	9,348.3	10,712.0	12,373.0	25.0
	200	1,884.96	9,391.2	11,049.3	12,646.7	14,606.7	16,737.4	19,332.9	17.0
	280	3,694.51	18,406.8	21,656.6	24,787.5	28,629.1	32,805.4	37,892.4	8.0

Note: All specified performance data is at motor frequency 50 Hz.

Other variants on request

3.14 ProMinent® ORLITA® DR Plunger Metering Pumps

3.14.1 ORLITA® DR Valve-Free Plunger Metering Pump



pk_2_081_1

Valve-free metering plunger head. The valve-free plunger liquid end functions by means of the oscillating and rotating plunger action. The suction and discharge sides are opened and closed by the plunger itself. The pump therefore needs no valves and can be operated over a wide stroke rate range.

This principle enables precise metering of highly viscous liquids which may contain even large solids.

The pump head is made of stainless steel. Plungers and cylinders are given a wear-resistant surface finish.

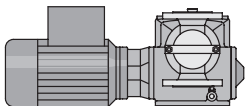
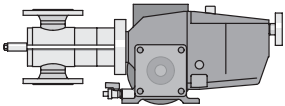
Depending on the application the pump head is also available in other high performance materials.

The clearance between the plunger and the cylinder, which is responsible for the seal, depends on the viscosity of the liquid.

The lantern on the rear head end can be used as a collector for leaked fluid or can be used to add flushing, lubrication or sealing agent. The lantern is sealed with elastomer sealing lips. The feed direction depends on the installation position of the plunger.

The backlash effect can be adjusted by turning the head around its longitudinal axis.

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity (theo.)in l/h at strokes/min 50 Hz			Max. pressure bar
			56	75	112	
DR 15/	5	0.29	1.0	1.3	2.0	100.0
	7	0.58	1.9	2.6	3.9	400.0
	12	1.70	5.7	7.6	11.4	159.0
	18	3.82	12.8	17.2	25.7	70.0
	25	7.36	24.7	33.1	49.5	36.0
	36	15.27	51.3	68.7	103.0	17.0
	50	29.45	99.0	133.0	198.0	9.0
	70	57.73	194.0	260.0	388.0	4.0



pk_2_119

Pump type	Plunger Ø mm	Stroke Volume cm ³ / stroke	Capacity (theo.)in l/h at strokes/min 50 Hz				Max. pressure bar
			56	75	112	140	
DR 150/	12	3.62	12.2	16.3	24.3	30.4	400.0
	18	8.14	27.4	36.6	54.7	68.4	400.0
	25	15.71	52.8	71.0	105.6	131.9	250.0
	36	32.57	109.4	146.6	218.9	273.6	147.0
	50	62.83	211.1	282.7	422.2	527.8	76.0
	70	123.15	413.8	554.2	827.6	1,034.5	38.0
	90	203.58	684.0	916.1	1,368.0	1,710.0	23.0
	120	361.91	1,216.0	1,628.6	2,432.1	3,040.1	13.0
	140	492.60	1,655.1	2,216.7	3,310.3	4,137.9	9.0

Note: All performance specifications referred to 50 Hz motor frequency.

Other versions available on request.

3.15 Process Diaphragm Pump TriPower 674

3.15.1 Process Diaphragm Pump TriPower 674

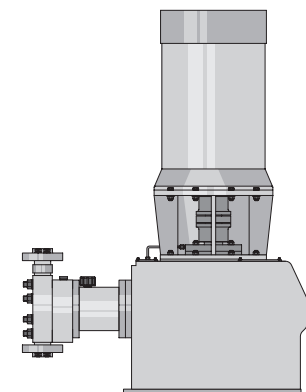
The process diaphragm pump TriPower 674 by ProMinent offers high performance with smallest footprint. The pump delivers up to 38 m³/h at pressures of up to 415 bar. Thanks to the compact TriPower design, the pump has a considerably smaller footprint than conventionally designed pumps.

The proven Orlita MF liquid head offers optimal safety with PTFE dual diaphragm system and integrated overflow valve.

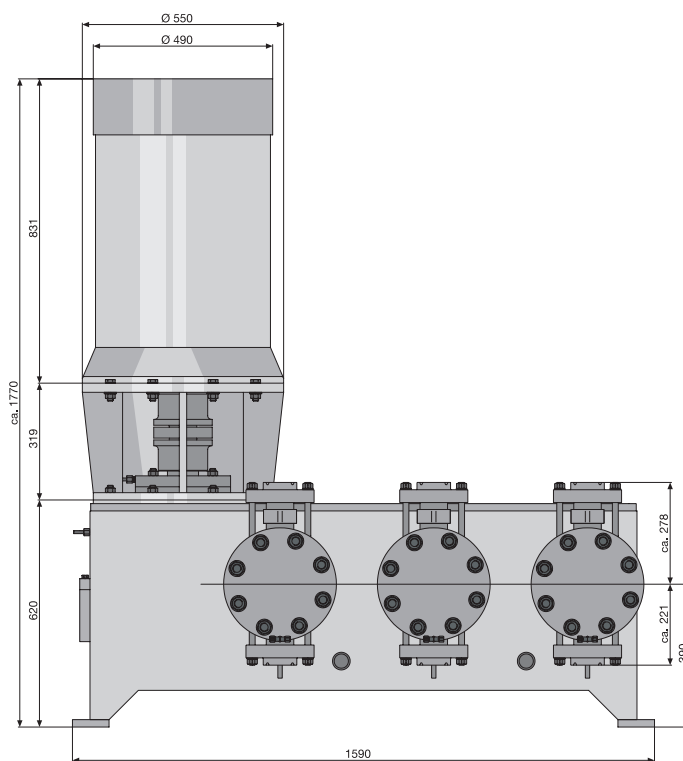
Standard output range: 4-38 m³/h; 415-50 bar.

Triplex process diaphragm pumps

In Triplex metering pumps, the pressure stroke of the individual liquid ends is displaced by 120° crank angle. This ensures a low-pulsation rate of delivery even without the use of complex pulsation dampers. This process diaphragm pump design is the preferred design in the chemical and petrochemical industry.



P_TR_0003_SW



P_TR_0001_SW3

Technical data TriPower size B/ 60 mm stroke / MF liquid ends

Plunger Ø mm	Stroke volume cm ³ /stroke	Output Q _{th} in l/h Triplex total at stroke rate n in 1/min					Max. pressure bar	Efficiency at		Standard type of valve
		100	130	170	200	230		100% pressure	50% pressure	
46	3 x 99.71	1,795	2,333	3,051	3,590	4,128	415	0.77	0.83	DN 25
55	3 x 142.55	2,566	3,336	4,362	5,132	5,902	320	0.81	0.85	DN 25
70	3 x 230.91	4,156	5,403	7,066	8,313	9,560	200	0.84	0.87	DN 40
90	3 x 381.70	6,871	8,932	11,680	13,741	15,802	125	0.90	0.90	DN 50
140	3 x 923.63	16,625	21,613	28,263	33,251	38,238	50	0.88	0.89	DN 80

4 Dosing Systems

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4.0 Overview Dosing Systems DULCODOS® And Ultramat®

4.0.1 Product Overview DULCODOS®

Dosing now made even easier. The pre-assembled, complete solutions from ProMinent are available immediately, ready for use for the most important applications. The sensor system, controller and dosing pump, together with the necessary tanks, make up a unit that can take on your task with no installation expenditure.

Compared to separate components, dosing systems offer three big advantages:

- Only one supplier and contact
- No interface problems between the separate components
- Customers do not need their own installation service. On request, the entire system is supplied pre-assembled and ready for use, or installed and commissioned on your site by our technicians.

As a customer, you get a ready-made solution which only needs electrical and hydraulic connections. We manufacture all our dosing systems in-house, which means that we make the main components used, such as dosing pump, controller and sensor system, and also assemble the systems here in our works. This guarantees ProMinent® quality.

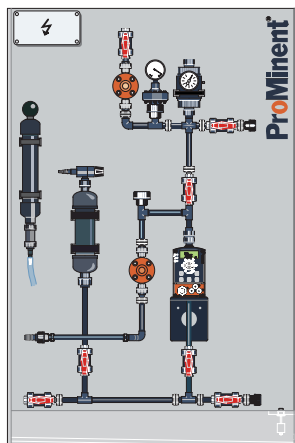


pk_7_076

DULCODOS® eco

Net volume between 35 and 1000 litres.

Dosing systems with tank, drip pan, agitator, and metering pump for storing and metering of liquid chemicals. A selection system (Identcode) helps to easily, quickly and flexibly adapt the metering station to the metering task



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DULCODOS® panel

Dosing output between 0.74 - 1000 l/h

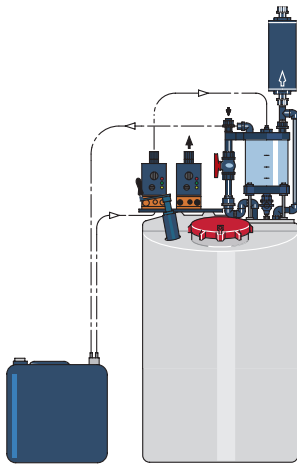
Dosing systems for liquid products consist of one or 2 metering pumps including wall-mounting panel and drip pan. A selection system (Identcode) helps to easily, quickly and flexibly adapt the dosing system to the metering task

4.0 Overview Dosing Systems DULCODOS® And Ultromat®

DULCODOS® Hydrazin

Dosing output up to 11 l/h

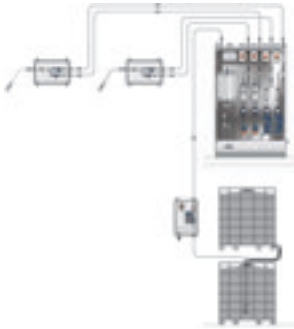
DULCODOS® Hydrazin is a dosing system for the preparation and dosing of hydrazine solution. Hydrazine is used as corrosion inhibitor in water and vapour systems. Because of the carcinogenic effect of hydrazine, special preparation and dosing units are required.



pk_7_078_c

DULCODOS® PPLA

With DULCODOS® PPLA units (Post Pelletizing Liquid Application), liquid additives are sprayed on after pelletizing of the animal food. The units have a modular design and offer a complete solution for storing, refilling, metering, and spraying on of all types of additives as e.g. vitamins and enzymes.



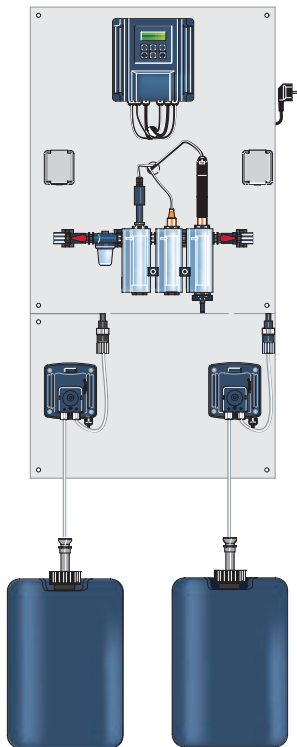
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DULCODOS® Pool

Applications: private and public swimming pools

The dosing systems DULCODOS® Pool were designed especially for the conditioning of swimming pool water. Pre-mounted and ready for connection, the DULCODOS® Pool metering systems take care of the pH value adjustment and the disinfection – be it with chlorine or active oxygen.

A selection system (Identcode) helps to easily, quickly and flexibly adapt the dosing system to your dosing task.



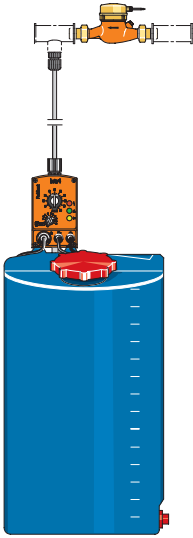
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4.0 Overview Dosing Systems DULCODOS® And Ultromat®

DULCODOS® domestic

Dosing output between 0.165 – 165 ml/m³

Dosing systems for a volume-proportional dosing of liquid chemicals in domestic water installations. (DULCODOS® domestic Water Meter Controlled Dosing Plant see page → 9-4)



pk_7_081_c

DULCODOS® Custom

The customer-specific dosing systems DULCODOS® custom are individually designed, constructed and supplied according to customer preferences. Also according to ATEX (explosion-proof). You as our customer do not have to perform any installation work. If requested, we will also commission the systems at your site.



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4.0 Overview Dosing Systems DULCODOS® And Ultromat®

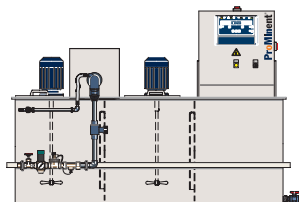
4.0.2 Product Overview Ultromat®

Ultromat® systems are special preparation and metering stations for synthetic flocculants (polyelectrolytes).

Ultromat® AF/AT/ATF Continuous flow systems

Capacity range 400 – 8000 l/h, 0.5 % polymer solution

Ultromat® continuous flow systems made of polypropylene for the processing of liquid and powdery polymers. A selection system (Identcode) helps to easily, quickly and flexibly adapt the continuous flow system to your application.

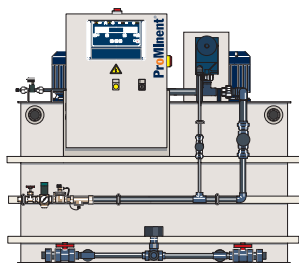


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Ultromat® AFP/ATP/ATFP 2-chamber batch systems

Capacity range 400 – 4000 l/h, 0.5 % polymer solution

Ultromat® 2-chamber batch systems for the processing of liquid and powdery polymers. The Ultromat® consists of two separate tanks which are filled with polymer solution one after the other. Having matured, the polymer solution can be withdrawn.



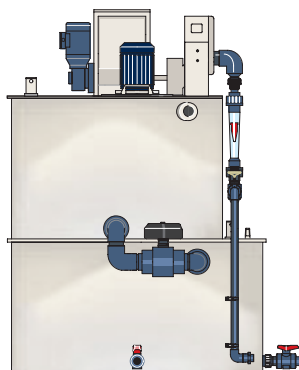
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Ultromat® AFD/ATD/ATFD Double-deck systems

Capacity range 400 – 2000 l/h, 0.5 % polymer solution

Ultromat® double deck systems for the processing of liquid and powdery polymers.

The double-deck Ultromat® consists of two separate PP tanks which are arranged on top of each other. The polymer solution is prepared in the top tank. Having matured, the polymer solution is refilled into the bottom tank.

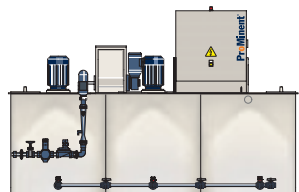


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Ultromat® ATR Continuous flow systems with round tank

Capacity range 400 – 2000 l/h, 0.5 % polymer solution

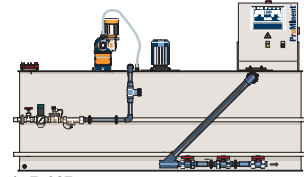
Ultromat® continuous flow system with round tanks made of PP for the processing of powdery polymers. The tanks are hydraulically connected through overflow channels and are extraordinarily stable thanks to their round shape. This also significantly reduced the transport weight of the Ultromat® system.



P_UL_0020_C

4.0 Overview Dosing Systems DULCODOS® And Ultramat®

Ultramat® AFK continuous flow systems



pk_7_087_c

Capacity range 400 – 4000 l/h, 0.5 % polymer solution

Ultramat® 2-chamber continuous flow systems for the processing of liquid polymers. The tank consists of one separate day tank for the storage of the liquid concentrate and a 2-chamber continuous flow system for the preparation of the polymer solution. The liquid concentrate pump is included in the scope of delivery.

Ultramat® MT manual mixing station

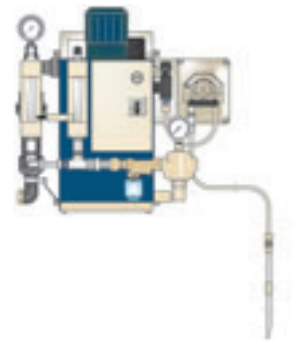


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Capacity range 120 – 4800 l/h, 0.5 % polymer solution

Ultramat® MT for processing polymers in liquid and powder form. During the preparation, the powdery polymer is added to the wetting cone to the diluent water.

POLYMORE

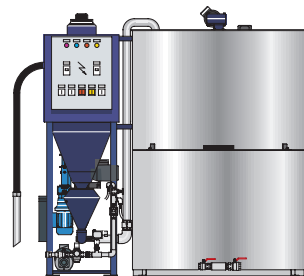


pk_7_089_c

Capacity range 120 – 18000 l/h, 0.5 % polymer solution

Polymer preparation stations for liquid polymers. Water and polymer are mixed in a flameproof multi-zone mixer unit. In most cases, the polymer solution can be directly metered into the application.

PolyRex



pk_7_090_c

Capacity range 240 – 3820 l/h, 0.5 % polymer solution

PolyRex is a double-deck preparation station for the processing of liquid and powdery polymers. The preparation station consists of the delivery and mixer unit and the two stainless steel double-deck tanks. The upper tank is the preparation/maturing tank, the bottom tank is the storage tank for the prepared polymer solution.

4.0 Overview Dosing Systems DULCODOS® And Ultromat®

4.0.3 Selection Guide

Selection Guide DULCODOS®

Type	Function	Applications	Output range
DULCODOS® eco	Storing, metering	General	35 – 1,000 litres
DULCODOS® panel	Metering	General	0.74 – 1,000 l/h
DULCODOS® Hydrazin	Preparing, Metering	Boiler feed water	up to 11 l/h
DULCODOS® PPLA	Mixing, Metering	Animal food	–
DULCODOS® Pool	Measuring, controlling, metering	Private and public swimming pools	–
DULCODOS® domestic	Proportional metering	Drinking water	0.165 – 165 ml/m ³
DULCODOS® custom	Customer-specific	any	–

Selection Guide Ultromat®

Type	Application	Polymers	Output range
Continuous flow system Ultromat® AF/AT/ATF	Waste water	F*/T**/TF***	400 – 8000 l/h
2-chamber batch system Ultromat® AFP/ATP/ATFP	Waste water, Paper	F*/T**/TF***	400 – 4000 l/h
Double-deck system Ultromat® AFD/ATD/ATFD	Waste water, Paper	F*/T**/TF***	400 – 2000 l/h
Continuous flow system Ultromat® ATR with round tanks	Waste water	T**	400 – 2000 l/h
Continuous flow system Ultromat® AFK	Waste water	F*	400 – 4000 l/h
Manual mixing station Ultromat® MT	Waste water	T**	120 – 4800 l/h
POLYMORE	Waste water, Paper	F*	120 – 18,000 l/h
PolyRex	Waste water, Paper	TF***	240 – 3820 l/h

* liquid

** Powder

*** liquid + powder

4.1 Dosing Systems DULCODOS® eco

4.1.1 Dosing Systems DULCODOS® eco

ProMinent® dosing systems with PE tanks can be selected and ordered using the Identcode system. Choose the metering pump first using the correct pump Identcode.

Component options:

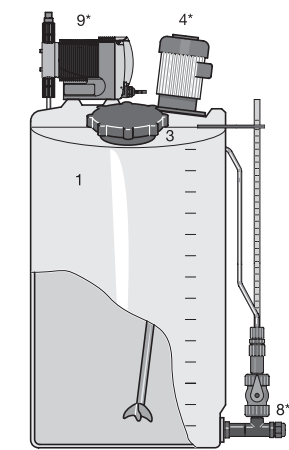
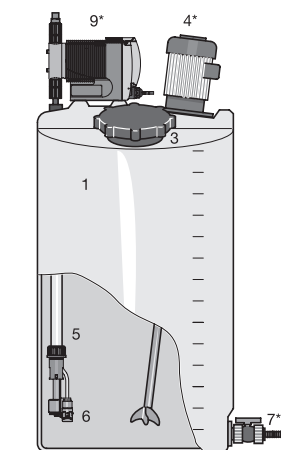
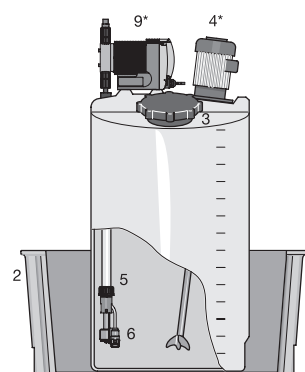
1. PE metering tank (35 – 1000 litre)
2. Stackable bund (35 – 1000 litre)
3. Lock for tank screw cap
4. Hand mixer / stirrer (*)
5. Suction assembly
6. Float switch for suction assembly
7. Discharge tap for tank (*)
8. Calibration assembly (*)
9. Metering pump (*) order separately (pump to be ordered separately based on the large number of possible pumps fitted to the tank. Use the Identcodes in section 1, 2 and 5 for the pumps you require).

* These components are designed for retrofitting, however to avoid damage in transit the goods are packed separately in the delivery. The complete installation on site is to be carried out by the customer.

The metering pump and tank combination options are shown in the table below:

Metering pumps	Tank						
	35 l	60 l	100 l	140 l	250 l	500 l	1000 l
alpha	x+	x+	x	x+	x	x+	x+
Beta®	x+	x	x	x	x	x	x
gamma/ L	x+	x	x	x	x	x	x
D_4a	x+	x	x	x	x	x	x
Sigma/ 1	–	x+	x+	x+	x	x	x
Sigma/ 2	–	–	–	–	x	x+	x
Sigma/ 3	–	–	–	–	x	x+	x
delta®	–	x+	x+	x+	x	x	x

x = pump mounted directly without mounting plate
 x+ = pump mounted with mounting plate



pk_3_033

pk_3_034

pk_3_035

4.1 Dosing Systems DULCODOS® eco

4.1.2 Identcode Ordering System, 35 litre

Dosing stations with tank, 35 litre

DSBa	PE tank
	0035N 35 l PE dosing tank, neutral colour
	0035S 35 l PE dosing tank, black
	0035B 35 l PE dosing tank, blue
	0035G 35 l PE dosing tank, yellow
	0035R 35 l PE dosing tank, red
	Bund
	0 no bund
	1 with bund, neutral colour
	2 with bund, coloured (the same colour as tank)
	Version
	0 with ProMinent® Logo
	Lock for tank screw top
	0 no lock
	Hand mixer, stirrers
	0 none
	A with PP hand mixer
	Metering pump mounting
	0 no pump
	D for alpha
	E for Beta®, gamma/ L, D_4a
	Suction assembly selection
	0 no suction assembly
	1 suction assembly with 6x4 suction hose
	2 suction assembly with 8x5 suction hose
	3 suction assembly with 12x9 suction hose
	Suction assembly material
	1 PVC
	2 PP
	Suction assembly float switch
	0 no float switch
	1 2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L
	3 1-stage, flat plug (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank
	0 no accessories
	1 with ball valve PVC, hose grommet d16 **
	2 with ball valve PP, hose grommet d20 **
	Calibration assembly
	0 no calibration assembly
	1 with metering gauge d6 35/60 l ***
	Info - pump*
	e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.3 Identcode Ordering System, 60 litre

Dosing stations with tank, 60 litre

DSBa	PE tank	
	0060N	60 l PE dosing tank, neutral colour
	0060S	60 l PE dosing tank, black
	0060B	60 l PE dosing tank, blue
	0060G	60 l PE dosing tank, yellow
	0060R	60 l PE dosing tank, red
	Bund	
	0	no bund
	1	with bund, neutral colour
	2	with bund, coloured (the same colour as tank)
	Version	
	0	with ProMinent® Logo
	Lock for tank screw top	
	0	no lock
	1	with lock
	Hand mixer, stirrers	
	0	none
	A	with PP hand mixer
	B	with PP hand stirrer
	H	with stainless steel 0.02 kW electric stirrer
	P	with PVDF 0.02 kW electric stirrer
	Metering pump mounting	
	0	no pump
	A	for Beta®, gamma/ L, D_4a
	D	for alpha
	F	for Sigma/ 1
	P	for delta®
	Suction assembly selection	
	0	no suction assembly
	1	suction assembly with 6x4 suction hose
	2	suction assembly with 8x5 suction hose
	3	suction assembly with 12x9 suction hose
	4	suction assembly DN 10
	5	suction assembly DN 15
	Suction assembly material	
	1	PVC
	2	PP
	Suction assembly float switch	
	0	no float switch
	1	2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
	2	2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
	3	1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank	
	0	no accessories
	1	with ball valve PVC, hose grommet d16 **
	2	with ball valve PP, hose grommet d20 **
	Calibration assembly	
	0	no calibration assembly
	1	with calibration assembly d6 35/60 l
	2	with metering gauge d8 60 l ***
	Info - pump*	
		e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.4 Identcode Ordering System, 100 litre

Dosing stations with tank, 100 litre

DSBa	PE tank
0100N	100 l PE dosing tank, neutral colour
0100S	100 l PE dosing tank, black
0100B	100 l PE dosing tank, blue
0100G	100 l PE dosing tank, yellow
0100R	100 l PE dosing tank, red
	Bund
0	no bund
1	with bund, neutral colour
2	with bund, coloured (the same colour as tank)
	Version
0	with ProMinent® Logo
	Lock for tank screw top
0	no lock
1	with lock
	Hand mixer, stirrers
0	none
A	with PP hand mixer
C	with PP hand stirrer
I	with stainless steel 0.18 kW electric stirrer
R	with PVDF 0.18 kW electric stirrer
	Metering pump mounting
0	no pump
A	for Beta®, gamma/ L, D_4a
L	for Sigma/ 1
N	for alpha
P	for delta®
	Suction assembly selection
0	no suction assembly
1	suction assembly with 6x4 suction hose
2	suction assembly with 8x5 suction hose
3	suction assembly with 12x9 suction hose
4	suction assembly DN 10
5	suction assembly DN 15
	Suction assembly material
1	PVC
2	PP
	Suction assembly float switch
0	no float switch
1	2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
2	2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
3	1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank
0	no accessories
1	with ball valve PVC, hose grommet d16 **
2	with ball valve PP, hose grommet d20 **
	Calibration assembly
0	no calibration assembly
3	with metering gauge d8 100/140 l ***
	Info - pump*
	e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.5 Identcode Ordering System, 140 litre

Dosing stations with tank, 140 litre

DSBa	PE tank
	0140N 140 l PE dosing tank, neutral colour
	0140S 140 l PE dosing tank, black
	0140B 140 l PE dosing tank, blue
	0140G 140 l PE dosing tank, yellow
	0140R 140 l PE dosing tank, red
	Bund
	0 no bund
	1 with bund, neutral colour
	2 with bund, coloured (the same colour as tank)
	Version
	0 with ProMinent® Logo
	Lock for tank screw top
	0 no lock
	1 with lock
	Hand mixer, stirrers
	0 none
	A with PP hand mixer
	D with PP hand stirrer
	K with stainless steel 0.18 kW electric stirrer
	S with PVDF 0.18 kW electric stirrer
	Metering pump mounting
	0 no pump
	A for Beta®, gamma/ L, D_4a
	D for alpha
	H for Sigma/ 1
	P for delta®
	Suction assembly selection
	0 no suction assembly
	1 suction assembly with 6x4 suction hose
	2 suction assembly with 8x5 suction hose
	3 suction assembly with 12x9 suction hose
	4 suction assembly DN 10
	5 suction assembly DN 15
	Suction assembly material
	1 PVC
	2 PP
	Suction assembly float switch
	0 no float switch
	1 2-stage, round plug (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
	2 2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
	3 1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank
	0 no accessories
	1 with ball valve PVC, hose grommet d16 **
	2 with ball valve PP, hose grommet d20 **
	Calibration assembly
	0 no calibration assembly
	3 with metering gauge d8 100/140 l ***
	Info - pump*
	e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.6 Identcode Ordering System, 250 litre

Dosing stations with tank, 250 litre

DSBa	PE tank
	0250N 250 l PE dosing tank, neutral colour
	0250S 250 l PE dosing tank, black
	0250B 250 l PE dosing tank, blue
	0250G 250 l PE dosing tank, yellow
	0250R 250 l PE dosing tank, red
	Bund
	0 no bund
	1 with bund, neutral colour
	2 with bund, coloured (the same colour as tank)
	Version
	0 with ProMinent® Logo
	Lock for tank screw top
	0 no lock
	1 with lock
	Hand mixer, stirrers
	0 none
	A with PP hand mixer
	E with PP hand stirrer
	L with stainless steel 0.18 kW electric stirrer
	T with electric stirrer PVDF 0.18 kW
	Metering pump mounting
	0 no pump
	A for Beta®, gamma/ L, D_4a
	B for Sigma/ 2/ 3
	C for Sigma/ 1
	N for alpha
	P for delta®
	Suction assembly selection
	0 no suction assembly
	1 suction assembly with 6x4 suction hose
	2 suction assembly with 8x5 suction hose
	3 suction assembly with 12x9 suction hose
	4 suction assembly DN 10
	5 suction assembly DN 15
	6 suction assembly DN 20
	7 suction assembly DN 25
	8 suction assembly DN 32
	Suction assembly material
	1 PVC
	2 PP
	Suction assembly float switch
	0 no float switch
	1 2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
	2 2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
	3 1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank
	0 no accessories
	1 with ball valve PVC, hose grommet d16 **
	2 with ball valve PP, hose grommet d20 **
	Calibration assembly
	0 no calibration assembly
	4 with metering gauge d12 250 l ***
	Info - pump*
	e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.7 Identcode Ordering System, 500 litre

Dosing stations with tank, 500 litre

DSBa	PE tank	
	0500N	500 l PE dosing tank, neutral colour
	0500S	500 l PE dosing tank, black
	0500B	500 l PE dosing tank, blue
	0500G	500 l PE dosing tank, yellow
	0500R	500 l PE dosing tank, red
	Bund	
	0	no bund
	1	with bund, neutral colour
	2	with bund, coloured (the same colour as tank)
	Version	
	0	with ProMinent® Logo
	Lock for tank screw top	
	0	no lock
	1	with lock
	Hand mixer, stirrers	
	0	none
	A	with PP hand mixer
	F	with PP hand stirrer
	M	with stainless steel 0.25 kW electric stirrer
	U	with PVDF 0.25 kW electric stirrer
	Metering pump mounting	
	0	no pump
	A	for Beta®, gamma/ L, D_4a
	C	for Sigma/ 1, delta®
	D	for alpha
	J	for Sigma/ 2/ 3
	P	for delta®
	Suction assembly selection	
	0	no suction assembly
	1	suction assembly with 6x4 suction hose
	2	suction assembly with 8x5 suction hose
	3	suction assembly with 12x9 suction hose
	4	suction assembly DN 10
	5	suction assembly DN 15
	6	suction assembly DN 20
	7	suction assembly DN 25
	8	suction assembly DN 32
	Suction assembly material	
	1	PVC
	2	PP
	Suction assembly float switch	
	0	no float switch
	1	2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
	2	2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
	3	1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank	
	0	no accessories
	1	with ball valve PVC, hose grommet d16 **
	2	with ball valve PP, hose grommet d20 **
	Calibration assembly	
	0	no calibration assembly
	5	with metering gauge d12 500/1,000 l ***
	Info - pump*	
		e.g.: BT4a 1005 PPE 300AA000

* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.1 Dosing Systems DULCODOS® eco

4.1.8 Identcode Ordering System, 1000 litre

Dosing stations with tank, 1000 litre

DSBa	PE tank
1000N	1000 l PE dosing tank, neutral colour
1000S	1000 l PE dosing tank, black
1000B	1000 l PE dosing tank, blue
1000G	1000 l PE dosing tank, yellow
1000R	1000 l PE dosing tank, red
	Bund
0	no bund
1	with bund, neutral colour
2	with bund, black
	Version
0	with ProMinent® Logo
	Lock for tank screw top
0	no lock
1	with lock
	Hand mixer, stirrers
0	None
G	with hand mixer PP
N	with stainless steel 0.75 kW electric stirrer
W	with PVDF 0.75 kW electric stirrer
	Metering pump mounting
0	no pump
A	for Beta®, gamma/ L, D_4a
B	for Sigma/ 2/ 3
C	for Sigma/ 1, delta®
D	for alpha
P	for delta®
	Suction assembly selection
0	no suction assembly
1	suction assembly with 6x4 suction hose
2	suction assembly with 8x5 suction hose
3	suction assembly with 12x9 suction hose
4	suction assembly DN 10
5	suction assembly DN 15
6	suction assembly DN 20
7	suction assembly DN 25
8	suction assembly DN 32
	Suction assembly material
1	PVC
2	PP
	Suction assembly float switch
0	no float switch
1	2-stage, round plug, (6x4, 8x5, 12x9) for Beta®, gamma/ L, delta®
2	2-stage, round plug, (DN 10-32) for Sigma/ 1/ 2/ 3, delta®
3	1-stage, flat plug, (6x4, 8x5, 12x9) for D_4a
	Accessories - discharge tap for tank
0	no accessories
1	with ball valve PVC, hose grommet d16 **
2	with ball valve PP, hose grommet d20 **
	Calibration assembly
0	no calibration assembly
5	with metering gauge d12 500/1,000 l ***
	Info - pump*
	e.g.: BT4a 1005 PPE 300AA000

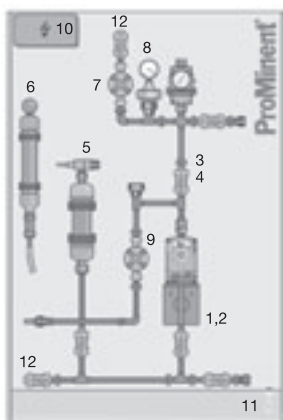
* Please enter the Identcode of the selected pump

** Ball valve can only be selected if the metering station was ordered without drip pan.

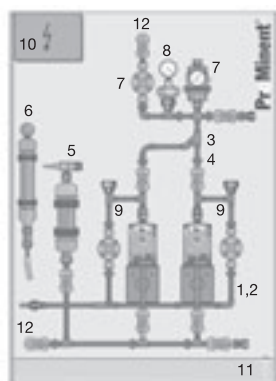
*** Metering gauge can only be selected if the metering station was ordered without drip pan and without suction fitting.

4.2 Dosing Systems DULCODOS® panel

4.2.1 Dosing Systems DULCODOS® panel



pk_7_070
Dosing system with simple pump



pk_7_061
Dosing system with stand-by pump

ProMinent® panel-mounted dosing systems offer a solution for the most common dosing tasks as e.g.:

- Dosing of biocides and inhibitors in cooling water
- Dosing of alkalis and acids for pH value adjustment
- Dosing of precipitants (ferric chloride) for waste water treatment
- Dosing of detergents (CIP systems, bottle washing machines)

The panel-mounted dosing systems can be selected and ordered using an Identcode system.

At first, the dosing and standby pump have to be selected and ordered via the separate pump Identcode.

The followings options can be selected:

1. Mounting frame with piping for installation of one metering pump
2. Extension for installation of a standby pump (same type as metering pump)
3. Pipework material
4. Sealing material
5. Vacuum cylinder
6. Vacuum pump
7. Pulsation dampening
8. Manometer
9. Relief valve assembly
10. Terminal box
11. Leakage probe
12. Connections for suction and pressure side

Technical data

Type		B410	B510	GL10	S110	S115	S215	S220	S325	S332
Nominal width piping		DN 10	DN 10	DN 10	DN 10	DN 15	DN 15	DN 20	DN 25	DN 32
Nominal width flushing port		DN 10	DN 10	DN 10	DN 10	DN 10	DN 10	DN 15	DN 20	DN 25
Connection return line		DN 10	DN 10	DN 10	DN 10	DN 10	DN 10	DN 15	DN 20	DN 25
Dimensions H x W x D	mm	1,200 x 800 x 300	1,200 x 800 x 300	1,200 x 800 x 300	1,400 x 900 x 450	1,400 x 900 x 450	1,400 x 900 x 450	1,400 x 900 x 450	1,600 x 900 x 500	1,600 x 900 x 500
Dimensions H x W x D with 2 pumps	mm	1,400 x 1,000 x 300	1,400 x 1,000 x 300	1,400 x 1,000 x 300	1,600 x 1,200 x 450	1,600 x 1,200 x 450	1,600 x 1,200 x 450	1,600 x 1,200 x 450	1,600 x 1,200 x 500	1,600 x 1,200 x 500
Dosierleistung max.	l/h	19	32	32	65	120	130	350	324	1,000
Operating pressure max. (25 °C)	bar	10	10	10	10	10	10	10	10	8* / 10
Operating pressure max. (40 °C)	bar	6	6	6	6	6	6	6	6	6

* with option pulsation dampening

4.2 Dosing Systems DULCODOS® panel

4.2.2 Identcode Ordering System for Beta® and gamma/ L, DN 10

Panel-mounted dosing systems for Beta, gamma/ L, DN 10

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)	
B410	for Beta®, DN 10 (BT4a 1000 - 0220: 0.74 - 19 l/h)	
B510	for Beta®, DN 10 (BT5a 1605 - 0232: 4.1 - 32 l/h)	
GL10	for gamma/ L, DN 10 (GALa 1000 - 0232: 0.74 - 32 l/h)	
	Extension for installation of a standby pump (order standby pump separately)	
0	without	
1	with extension for standby pump (same type as dosing pump)	
	Pipework material	
PC	PVC	
PP	PP	
	Sealing material	
E	EPDM	
A	FPM	
	Vacuum cylinder	
0	without	
1	with vacuum cylinder	
	Vacuum pump	
0	without	
1	with vacuum pump	
	Pulsation dampener	
0	without	
1	with pulsation dampener (incl. back pressure valve)	
	Pressure gauge	
0	without	
1	with pressure gauge and diaphragm seal unit	
	Relief valve assembly	
0	with multi-function valve (for 1 pump of Type: 1000 - 1605)	
1	with multi-function valve (for 1 pump of Type: 0708 - 0232)	
2	with back pressure valve (for 1 pump)	
3	with multi-function valve (for 2 pumps of Type: 1000 - 1605)	
4	with multi-function valve (for 2 pumps of Type: 0708 - 0232)	
5	with back pressure valves (for 2 pumps)	
	Terminal box	
0	without terminal box	
1	with terminal box for 1 pump	
2	with terminal box for 2 pumps	
3	With terminal box + master switch for 1 pump	
4	With terminal box + 2 master switches for 2 pumps	
	Leakage probe in drip tray	
0	without leakage probe	
1	with leakage probe	
	Suction/delivery side connection parts	
0	with solvent/fusion weld sockets	
1	with 6x4 hose barb	
2	with 8x5 hose barb	
3	with 12x6 hose barb	
4	with 12x9 hose barb	
5	with DN 10 hose barb	
	Info - pump*	
	e.g.: BT4a 1005 PPE 300AA000	

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.3 Identcode Ordering System for Sigma/ 1, DN 10

Panel-mounted dosing systems for Sigma/ 1, DN 10

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)
S110	Sigma/ 1, DN 10 (S1Ca/S1Ba 12017 - 07065: 20 - 65 l/h)
	Extension for installation of a standby pump (order standby pump separately)
0	without
2	with extension for standby pump (same type as dosing pump)
	Pipework material
PC	PVC
PP	PP
	Sealing material
E	EPDM
A	FPM
	Vacuum cylinder
0	without
2	with vacuum cylinder
	Vacuum pump
0	without
1	with vacuum pump
	Pulsation dampener
0	without
2	with pulsation dampener (incl. back pressure valve)
	Pressure gauge
0	without
1	with pressure gauge and diaphragm seal unit
	Relief valve assembly
6	with relief valve assembly
	Terminal box
0	without terminal box
1	with terminal box for 1 pump
2	with terminal box for 2 pumps
3	With terminal box + master switch for 1 pump
4	With terminal box + 2 master switches for 2 pumps
	Leakage probe in drip tray
0	without leakage probe
1	with leakage probe
	Suction/delivery side connection parts
0	with straight solvent/fusion sockets
6	with hose DN 10 connector
	Info - pump*
	e.g.: S1Ba H12017 PVT0110M000

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.4 Identcode Ordering System for Sigma/ 1, DN 15

Panel-mounted dosing systems for Sigma/ 1, DN 15

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)	
S115	Sigma/ 1, DN 15 (S1Ca/S1Ba 07042 - 04120: 50 - 120 l/h)	
	Extension for installation of a standby pump (order standby pump separately)	
0	without	
3	with extension for standby pump (same type as dosing pump)	
	Pipework material	
PC	PVC	
PP	PP	
	Sealing material	
E	EPDM	
A	FPM	
	Vacuum cylinder	
0	without	
3	with vacuum cylinder	
	Vacuum pump	
0	without	
1	with vacuum pump	
	Pulsation dampener	
0	without	
3	with pulsation dampener (incl. back pressure valve)	
	Pressure gauge	
0	without	
1	with pressure gauge and diaphragm seal unit	
	Relief valve assembly	
6	with relief valve assembly	
	Terminal box	
0	without terminal box	
1	with terminal box for 1 pump	
2	with terminal box for 2 pumps	
3	With terminal box + master switch for 1 pump	
4	With terminal box + 2 master switches for 2 pumps	
	Leakage probe in drip tray	
0	without leakage probe	
1	with leakage probe	
	Suction/delivery side connection parts	
0	with straight solvent/fusion sockets	
7	with hose DN 15 connector	
	Info - pump*	
	e.g.: S1Ba H07042 PVT0110M000	

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.5 Identcode Ordering System for Sigma/ 2, DN 15

Panel-mounted dosing systems for Sigma/ 2, DN 15

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)
S215	Sigma/ 2, DN 15 (S2Ca/S2ba 16050 -16130:60 - 130 l/h)
	Extension for installation of a standby pump (order standby pump separately)
0	without
4	with extension for standby pump (same type as dosing pump)
	Pipework material
PC	PVC
PP	PP
	Sealing material
E	EPDM
A	FPM
	Vacuum cylinder
0	without
4	with vacuum cylinder
	Vacuum pump
0	without
1	with vacuum pump
	Pulsation dampener
0	without
4	with pulsation dampener (incl. back pressure valve)
	Pressure gauge
0	without
1	with pressure gauge and diaphragm seal unit
	Relief valve assembly
6	with relief valve assembly
	Terminal box
0	without terminal box
1	with terminal box for 1 pump
2	with terminal box for 2 pumps
3	With terminal box + master switch for 1 pump
4	With terminal box + 2 master switches for 2 pumps
	Leakage probe in drip tray
0	without leakage probe
1	with leakage probe
	Suction/delivery side connection parts
0	with straight solvent/fusion sockets
8	with hose DN 15 connector
	Info - pump*
	e.g.: S2Ba HM16050 PVT0110M000

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.6 Identcode Ordering System for Sigma/ 2, DN 20

Panel-mounted dosing systems for Sigma/ 2, DN 20

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)	
S220	Sigma/ 2, DN 20 (S2Ca/S2ba 07120 - 04350: 120 - 350 l/h)	
	Extension for installation of a standby pump (order standby pump separately)	
0	without	
5	with extension for standby pump (same type as dosing pump)	
	Pipework material	
PC	PVC	
PP	PP	
	Sealing material	
E	EPDM	
A	FPM	
	Vacuum cylinder	
0	without	
5	with vacuum cylinder	
	Vacuum pump	
0	without	
1	with vacuum pump	
	Pulsation dampener	
0	without	
5	with pulsation dampener (incl. back pressure valve)	
	Pressure gauge	
0	without	
1	with pressure gauge and diaphragm seal unit	
	Relief valve assembly	
6	with relief valve assembly	
	Terminal box	
0	without terminal box	
1	with terminal box for 1 pump	
2	with terminal box for 2 pumps	
3	With terminal box + master switch for 1 pump	
4	With terminal box + 2 master switches for 2 pumps	
	Leakage probe in drip tray	
0	without leakage probe	
1	with leakage probe	
	Suction/delivery side connection parts	
0	with straight solvent/fusion sockets	
9	with hose DN 20 connector	
	Info - pump*	
	e.g.: S2Ba HM07120 PVT0110M000	

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.7 Identcode Ordering System for Sigma/ 3, DN 25

Panel-mounted dosing systems for Sigma/ 3, DN 25

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)
S325	Sigma/ 3, DN 25 (S3Ca/S3Cb 120145 - 120330: 174 - 324 l/h)
	Extension for installation of a standby pump (order standby pump separately)
0	without
6	with extension for standby pump (same type as dosing pump)
	Pipework material
PC	PVC
PP	PP
	Sealing material
E	EPDM
A	FPM
	Vacuum cylinder
0	without
6	with vacuum cylinder
	Vacuum pump
0	without
1	with vacuum pump
	Pulsation dampener
0	without
6	with pulsation dampener (incl. back pressure valve)
	Pressure gauge
0	without
1	with pressure gauge and diaphragm seal unit
	Relief valve assembly
6	with relief valve assembly
	Terminal box
0	without terminal box
1	with terminal box for 1 pump
2	with terminal box for 2 pumps
3	With terminal box + master switch for 1 pump
4	With terminal box + 2 master switches for 2 pumps
	Leakage probe in drip tray
0	without leakage probe
1	with leakage probe
	Suction/delivery side connection parts
0	with straight solvent/fusion sockets
A	with hose connector DN 25
	Info - pump*
	e.g.: S3Ba H120145 PVT0110M000

* Please enter the Identcode for your chosen pump

4.2 Dosing Systems DULCODOS® panel

4.2.8 Identcode Ordering System for Sigma/ 3, DN 32

Panel-mounted dosing systems for Sigma/ 3, DN 32

DSWa	Mounting frame with pipework for installation of one dosing pump (order dosing pump separately)	
S332	Sigma/ 3, DN 32 (S3Ca/S3Cb 070410 - 041030: 492 - 1000 l/h)	
	Extension for installation of a standby pump (order standby pump separately)	
0	without	
7	with extension for standby pump (same type as dosing pump)	
	Pipework material	
PC	PVC	
PP	PP	
	Sealing material	
E	EPDM	
A	FPM	
	Vacuum cylinder	
0	without	
7	with vacuum cylinder	
	Vacuum pump	
0	without	
1	with vacuum pump	
	Pulsation dampener	
0	without	
7	with pulsation dampener (incl. back pressure valve)	
	Pressure gauge	
0	without	
1	with pressure gauge and diaphragm seal unit	
	Relief valve assembly	
6	with relief valve assembly	
	Terminal box	
0	without terminal box	
1	with terminal box for 1 pump	
2	with terminal box for 2 pumps	
3	With terminal box + master switch for 1 pump	
4	With terminal box + 2 master switches for 2 pumps	
	Leakage probe in drip tray	
0	without leakage probe	
1	with leakage probe	
	Suction/delivery side connection parts	
0	with straight solvent/fusion sockets	
B	with hose DN 32 connector	
	Info - pump*	
	e.g.: S3Ba H070410 PVT0110M000	

* Please enter the Identcode for your chosen pump

4.3 Hydrazin Dosing Systems DULCODOS® Hydrazin

4.3.1

Hydrazine Dosing Systems DULCODOS® Hydrazin

Hydrazine is an oxygen binding agent used in service water applications, primarily in steam generating systems. It is a carcinogenic substance that requires particular care and attention when handling.

It can be assumed that the triggering threshold of hydrazine is not exceeded in sealed and gas-tight systems used for their intended purpose.

Design:

Turnkey pre-assembled dosing system consisting of:

- Gas tight PE dosing tank with litre scale, locking screw cap and manual stirrer.
- Each with decanting and dosing pump with suction assembly, level switch and all pipework in rigid PVC, complete with two ball valves, dosing tank and activated charcoal filter.

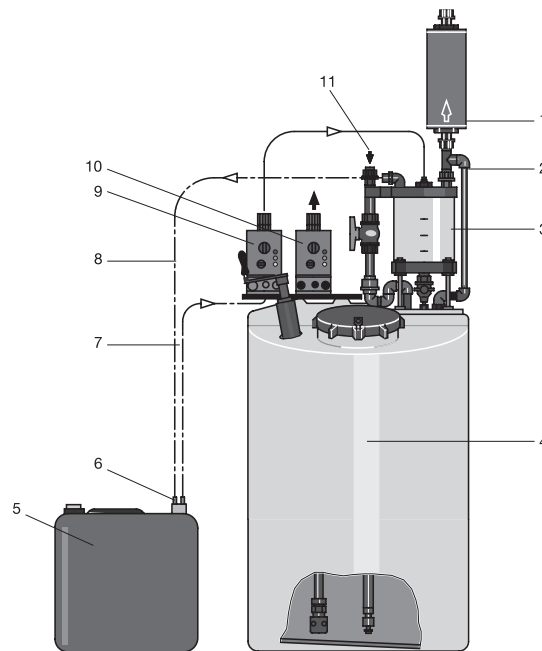
Accessories:

5 m discharge line Ø 8/12 mm and 8 mm Ø/1/20 stainless steel discharge valve

230 V ±10 %, 50...60 Hz electrical connector.

Note:

The system is supplied with hose connectors which fit widely available commercial drainage tap systems. Manufacturers of these systems include e.g. Fa. MicroMatic, Gräfelfing/Munich.



- 1 Activated carbon filter
- 2 Breather line
- 3 Apportioning unit
- 4 Metering tank
- 5 Hydrazin 15 returnable canister
- 6 Quick release coupling
- 7 Intake line
- 8 Gas shuttle line
- 9 Refilling pump
- 10 Metering pump
- 11 Fill water

pk_7_078

4.3 Hydrazin Dosing Systems DULCODOS® Hydrazin

Hydrazine transfer and dosing systems, fully pre-assembled

Dosing Tank Contents	Metering pump	Dosingpump Feed Rate	Transfer Pump Discharge Flow	Order no.
140 l	7.1 l/h	7.0 bar	17 l/h	913018
250 l	11.0 l/h	7.0 bar	32 l/h	913019

Accessories

	Order no.
sampling set stainless steel	1003964
200 l bund*	on request
1000 l bund*	on request

* with qualification approval, with galvanised diagrid

4.4 Liquid Enzyme Dosing Systems DULCODOS® PPLA

4.4.1

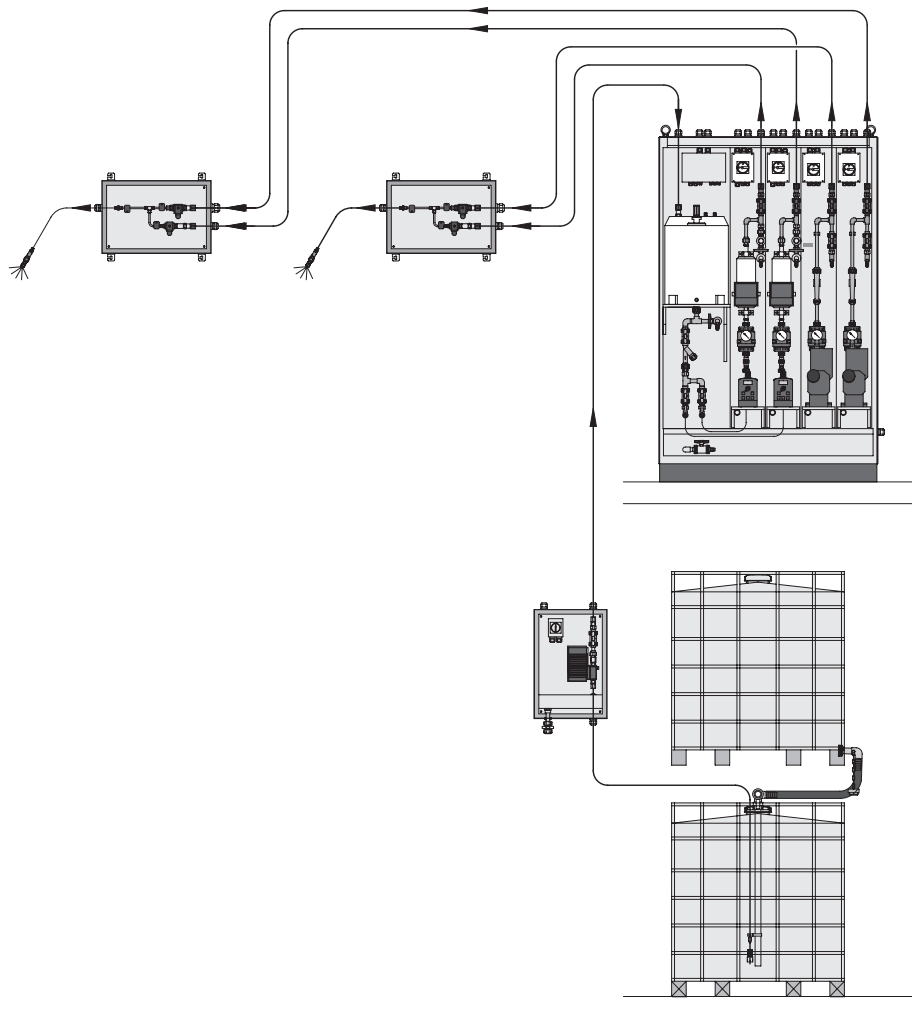
Liquid Enzyme Dosing Systems DULCODOS® PPLA

Dosing of liquid products plays a vital role in the manufacture of animal food. Vitamins and enzymes are the best known examples of liquid additives.

The raw materials for the feed are ground, mixed and then compressed into pellets. ProMinent DULCODOS® PPLA dosing systems (Post Pelleting Liquid Application) are used to apply the liquid additive coating after the feed has been pelletised.

The liquid products are stored in a container and then transferred to the dosing station day tank with the aid of a filling pump. Water is used as a carrier to ensure the required even distribution of the additive in the feed. One pump is used for the additive and a second pump for the dilution water. The additives and the water are brought together in a mixing station and adequately mixed via a static mixer. The diluted additive is sprayed onto the animal feed via a nozzle.

ProMinent DULCODOS® PPLA dosing systems have a modular construction and can be adapted and extended very easily. They offer a complete solution for storage, decanting, dosing and application of all types of additives. Standard solutions in a range from below 50 ppm to above 1000 ppm are possible.



pk_4_PPLA

Prices and delivery time on request

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

4.5.1 Swimming Pool Dosing Systems DULCODOS® Pool

The dosing systems DULCODOS® Pool were designed especially for the conditioning of swimming pool water. Pre-mounted and ready for connection, they take care of the pH value adjustment and the disinfection – be it with chlorine or active oxygen. Various types and a comprehensive upgrade programme offer the suitable solution for any application.

DULCODOS® Pool dosing systems are equipped with all required components, ideally matched and mounted on a panel:

- Sensors
- Controllers
- Metering pumps

Advantages

- Delivery ready for connection
- Simple and quick assembly
- Graded programm
- Numerous upgrading options
- High disinfection effect
- Precise metering
- High level of safety

Application Areas

Automatic disinfection and pH value adjustment for

- Private swimming pools
- Hotel pools
- Therapeutic baths
- Public swimming pools

DULCODOS® Pool metering systems can be selected and ordered using an Identcode system:

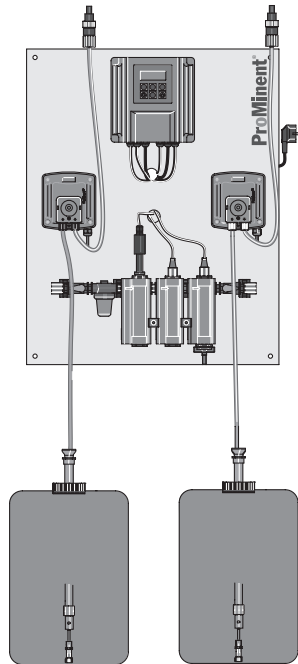
Application	Identcode: Feature measured variable	Measuring and control				Metering			Controllers	see chapter	
		pH	ORP	Free chlo- rine	Total chlo- rine*	H ₂ O ₂	Acid	Chlo- rine			Active oxygen
Private swimming pool	PR0	x	x				x	x		DSR	4.5.2
Upscale private swim- ming pool	PR2	x	x				x	x		D2C	4.5.3
	PC2	x		x			x	x		D2C	4.5.3
	PC4	x			x		x	x		D2C	4.5.3
Upscale private swim- ming pool	PC5	x	x				x	x		DXC	4.5.4
Public swimming pool	PC6	x		x			x	x		DXC	4.5.4
Therapeutic bath	PC7	x	x	x			x	x		DXC	4.5.4
	PC8	x	x	x	x		x	x		DXC	4.5.4
	PC9	x			x		x	x		DXC	4.5.4
	PCA	x	x		x		x	x		DXC	4.5.4
Private swimming pool	P02	x					x		x	D1C	4.5.5
	PH1	x				x	x		x	2 x D1C	4.5.5

* Total chlorine = organically combined chlorine (isocyanuric acid derivatives)

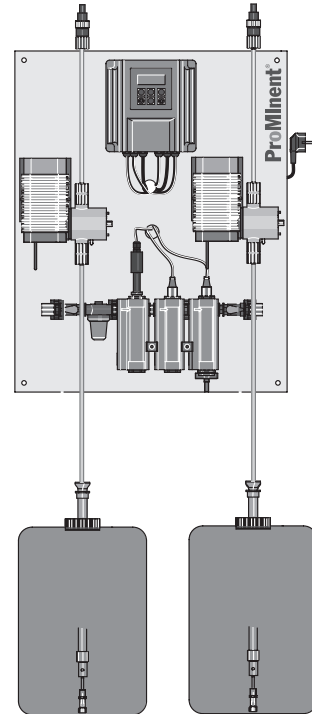
4.5 Swimming Pool Dosing Systems DULCODOS® Pool

4.5.2

DULCODOS® Pool PR0



pk_7_100



pk_7_101

Complete system for pH value adjustment and disinfection with liquid chlorine products, consisting of:

- Sensors for pH value and ORP
- 2-channel swimming pool controller DSR with control function for pH value and ORP and integrated suction function
- In-line probe with sample water filter and flow monitoring

Dimensions

595 x 745 x 150 mm (W x H x D)

Weight

approx. 10 kg and 6 kg, resp. (without pumps)

Connection for metering station

Dosing valves with 1/2" screw-in-thread

Connection for sample water line

8x5 mm PE hose

Electrical connection

230 VAC, 50 Hz alternative with Euro or Swiss connector

Recommended area of application

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

Identcode Ordering System, DULCODOS® Pool PR0

DSPa	Measured variable	
PR0	pH / Redox (DSR)	
	Hardware-additional functions	
0	Standard	
	Software-additional functions	
0	none	
	Communication interfaces	
0	none	
	Electrical connection	
A	230 V, 50/60 Hz, Euro connector	
B	230 V, 50/60 Hz, Swiss connector	
	Sensor equipment	
0	with sensors	
A	Measured variable PR0 without sensors	
	Version	
0	with logo	
1	without 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	1.2 l/h (alpha ALPb 1001 PP1)	
5	2.4 l/h (alpha ALPb 1002 PP1)	
	Multi-function valve for acid/alkali pump	
0	none	
1	with MFV (only for alpha)	
	Metering pumps for disinfection	
0	without metering pumps	
1	0.8 l/h Dulco®flex up to 45/10 m³/h circulation HB/FB*	
2	1.6 l/h Dulco®flex for up to 100/20 m³/h circulation HB/FB*	
3	2.4 l/h Dulco®flex for up to 140/30 m³/h circulation HB/FB*	
4	1.2 l/h alpha for up to 70/14 m³/h circulation HB/FB*	
5	2.4 l/h alpha for up to 140/30 m³/h circulation HB/FB*	
	Multi-function valve for pump Disinfection	
0	none	
1	with MFV (only for alpha)	
	Installation	
0	not assembled, delivery without mounting plate mounted on base plate	
1		
	Approvals	
0	with CE approval	

* Calculated for 12 % sodium hypochlorite

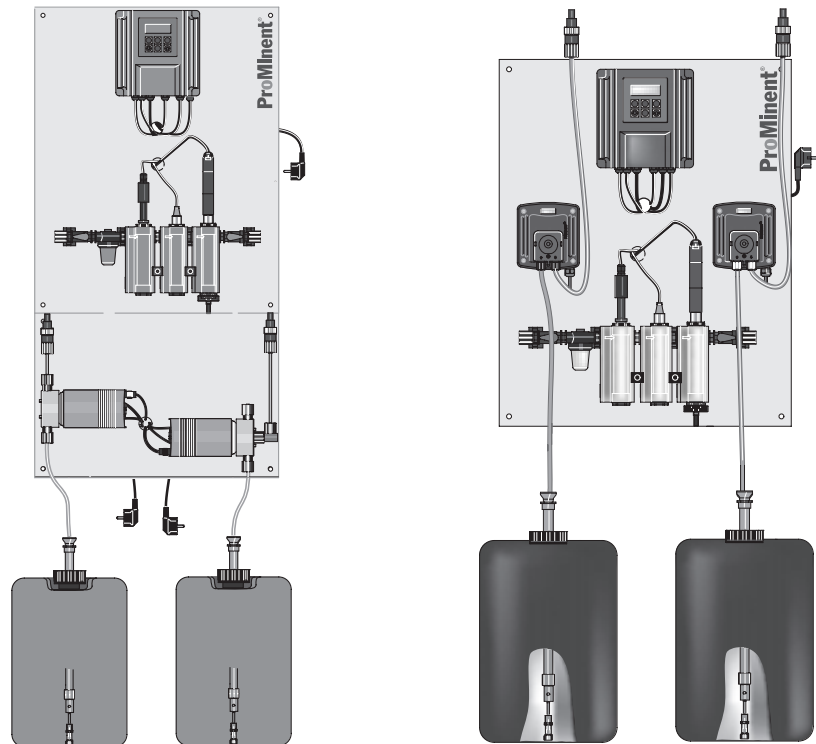
HB = indoor swimming pool

FB = outdoor swimming pool

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

4.5.3

DULCODOS® Pool, PR2, PC2, PC4



pk_7_102

P_DD_0029_SW

Complete system for pH value adjustment and disinfection with liquid chlorine products, consisting of:

- Sensors:
 - Type PR2: pH value and ORP
 - Type PC2: pH value and chlorine sensors (free chlorine)
 - Type PC4: pH value and chlorine sensors (total chlorine)
- 2-channel D2C controller with control function for pH value and ORP or pH value and chlorine concentration
- In-line probe with sample water filter and flow monitoring.

Dimensions

with alpha

595 x 745 x 150 mm (W x H x D) mounting plate for measuring instruments

595 x 400 x 150 mm (W x H x D) mounting plate for pumps

with DULCO® flex

595 x 745 x 150 mm (W x H x D)

Weight

approx. 10 kg and 6 kg, resp. (without pumps)

Connection for metering station Metering valves with 1/2" screw-in thread

Connection for sample water line 8x5 mm PE hose

Electrical connection 230 VAC, 50 Hz alternative with Euro or Swiss connector

Recommended area of application ■ Upscale private swimming pool

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

Identcode Ordering System, DULCODOS® Pool PR2, PC2, PC4

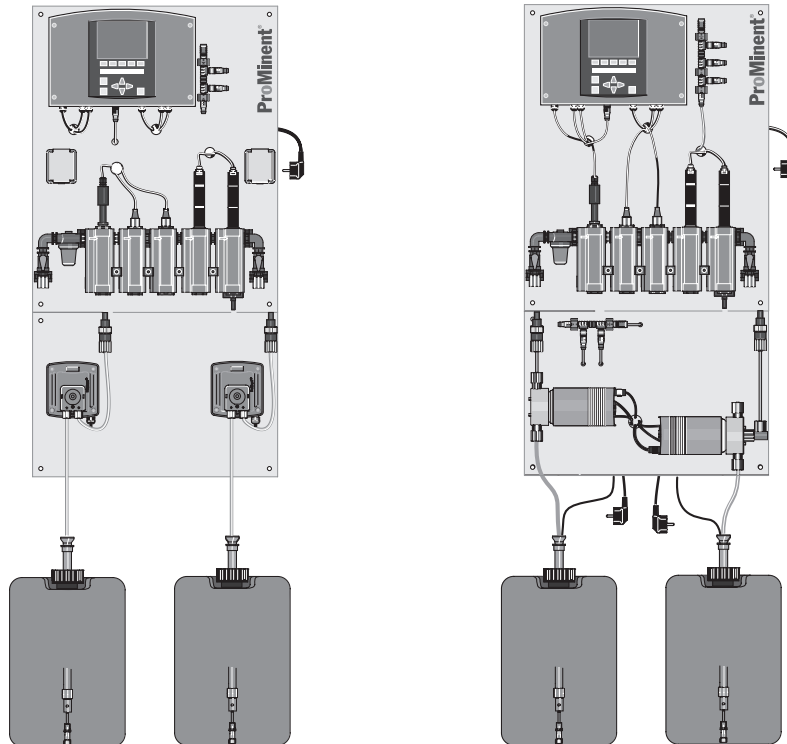
DSPa	Measured variable
PR2	pH / ORP (D2C)
PC2	pH / free chlorine (D2C)
PC4	pH / total chlorine (D2C)
Hardware-additional functions	
0	Standard
Software-additional functions	
0	none
Communication interfaces	
0	none
Electrical connection	
A	230 V, 50/60 Hz, Euro connector
B	230 V, 50/60 Hz, Swiss connector
Sensor equipment	
0	with sensors
A	Measured variable PR2 without sensors
B	Measured variable PC2 without sensors
C	Measured variable PC4 without sensors
Version	
0	with logo
1	without logo
Language	
A	Swedish
D	German
E	English
F	French
I	Italian
N	Dutch
P	Polish
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	1.2 l/h (alpha ALPb 1001 PP1)
5	2.4 l/h (alpha ALPb 1002 PP1)
6	1.5 l/h (Beta® BT4a 0401 PPE)
7	2.8 l/h (Beta® BT4a 0402 PPE)
8	5.3 l/h (Beta® BT4a 0405 PPE)
Multi-function valve for acid/alkali pump	
0	none
1	with MFV (only for Beta®and alpha)
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 100/20 m³/h circulation HB/FB*
3	2.4 l/h Dulco®flex for up to 140/30 m³/h circulation HB/FB*
4	1.2 l/h alpha for up to 70/14 m³/h circulation HB/FB*
5	2.4 l/h alpha for up to 140/30 m³/h circulation HB/FB*
6	0.9 l/h Beta® for up to 50/10 m³/h circulation HB/FB*
7	2.1 l/h Beta® for up to 125/25 m³/h circulation HB/FB*
8	4.2 l/h Beta® for up to 250/50 m³/h circulation HB/FB*
Multi-function valve for pump Disinfection	
0	none
1	with MFV (only for Beta®and alpha)
Installation	
0	not assembled, delivery without mounting plate mounted on base plate
1	
Approvals	
0	with CE approval

* Calculated for 12 % sodium hypochlorite
 HB = indoor swimming pool
 FB = outdoor swimming pool

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

4.5.4

DULCODOS® Pool PC5, PC6, PC7, PC8, PC9, PCA



pk_7_104

pk_7_105

Complete system for pH value adjustment and disinfection with liquid chlorine products, consisting of:

- Sensors:
 - Type PC5: pH value and ORP
 - Type PC6: pH value and chlorine sensor (free chlorine)
 - Type PC7: pH value, ORP, and chlorine sensor (free chlorine)
 - Type PC8: pH value, ORP, chlorine sensor total chlorine, and free chlorine)
 - Type PC9: pH value and chlorine sensor total chlorine
 - Type PCA: pH value, ORP and chlorine sensor total chlorine
- DULCOMARIN®II compact controller with control functions for pH value, ORP, and chlorine concentration
- In-line probe with sample water filter and flow monitoring

Dimensions 595 x 745 x 150 mm (W x H x D) plate for measuring instruments
595 x 400 x 150 mm (W x H x D) pumps

Weight approx. 12 kg and 7 kg, resp. (without pumps)

Connection for metering station Metering valves with 1/2" screw-in thread

Connection for sample water line 8x5 mm PE hose

Electrical connection 230 VAC, 50 Hz alternative with Euro or Swiss connector

- Recommended area of application**
- Upscale private swimming pool
 - Public swimming pool
 - Therapeutic bath

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

Identcode Ordering System, DULCODOS® Pool PC5, PC6, PC7, PC8, PC9, PCA

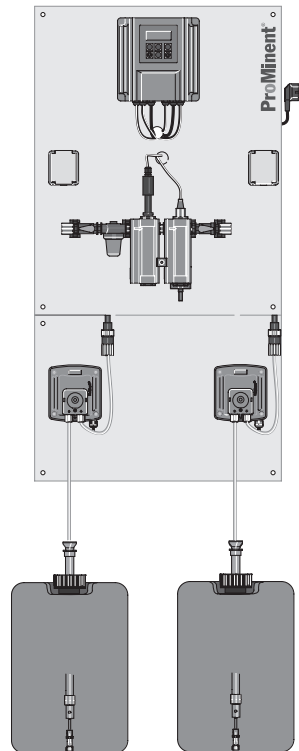
DSPa	Measured variable
PC5	pH / ORP (DXC)
PC6	pH / free chlorine (DXC)
PC7	pH / ORP / free chlorine (DXC)
PC8	pH / ORP / free chlorine / total chlorine (DXC)
PC9	pH / total chlorine (DXC)
PCA	pH / ORP / total chlorine (DXC)
Hardware-additional functions	
0	Standard
A	4 Standard signal outputs 0/4-20mA measured value (A-module)
Software-additional functions	
1	Videographic recorder with measuring data archiving incl. SD-Card
Communication interfaces	
0	none
5	Embedded Web Server, LAN
6	OPC server + embedded web server
Electrical connection	
A	230 V, 50/60 Hz, Euro connector
B	230 V, 50/60 Hz, Swiss connector
Sensor equipment	
0	with sensors
A	Measured variable PC5 without sensors
E	Measured variable PC6 without sensors
F	Measured variable PC7 without sensors
G	Measured variable PC8 without sensors
H	Measured variable PC9 without sensors
I	Measured variable PCA without sensors
Version	
0	with logo
1	without logo
Language	
D	German
E	English
F	French
I	Italian
P	Polish
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	1.2 l/h (alpha ALPb 1001 PP1)
5	2.4 l/h (alpha ALPb 1002 PP1)
A	1.5 l/h (Beta® CANopen BT4a 0401 PPE)
B	2.8 l/h (Beta® CANopen BT4a 0402 PPE)
C	5.3 l/h (Beta® CANopen BT4a 0405 PPE)
Multi-function valve for acid/alkali pump	
0	none
1	with MFV (only for 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 100/20 m³/h circulation HB/FB*
3	2.4 l/h Dulco®flex for up to 140/30 m³/h circulation HB/FB*
4	1.2 l/h alpha for up to 70/14 m³/h circulation HB/FB*
5	2.4 l/h alpha for up to 140/30 m³/h circulation HB/FB*
A	0.9 l/h Beta® for up to 50/10 m³/h circulation HB/FB*
B	2.1 l/h Beta® for up to 125/25 m³/h circulation HB/FB*
C	4.2 l/h Beta® for up to 250/50 m³/h circulation HB/FB*
Multi-function valve for pump Disinfection	
0	none
1	with MFV (only for Beta®)
Installation	
0	not assembled, delivery without mounting plate
1	mounted on base plate
Approvals	
0	with CE approval

* Calculated for 12 % sodium hypochlorite
 HB = indoor swimming pool
 FB = outdoor swimming pool

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

4.5.5

DULCODOS® Pool, P02, PH1



pk_7_103

Complete system for pH value adjustment and chlorine-free disinfection with active oxygen, consisting of:

- Sensors:
 - Type PC02: pH value sensor
 - Type PH1: pH value and H₂O₂ sensor
- Type P02: D1C controller with control functions for pH value and timer function to control the active oxygen pump
- Type PH1: D1C controller with control function for pH value and control function for active oxygen concentration
- In-line probe with sample water filter and flow monitoring

Dimensions

595 x 745 x 150 mm (W x H x D) mounting plate for measuring instruments

595 x 400 x 150 mm (W x H x D) mounting plate for pumps

Weight

approx. 12 kg and 7 kg, resp. (without pumps)

Connection for metering station

Metering valves with 1/2" screw-in thread

Connection for sample water line

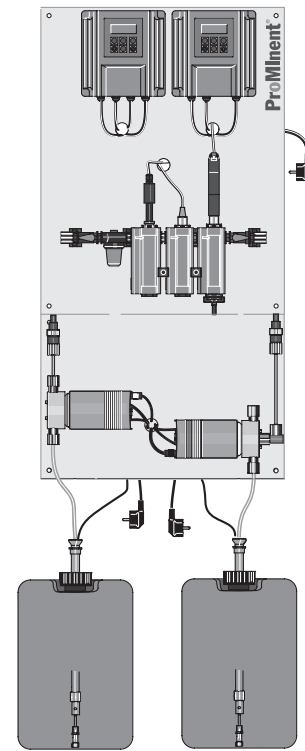
8x5 mm PE hose

Electrical connection

230 VAC, 50 Hz alternative with Euro or Swiss connector

Recommended area of application

Private swimming pool



pk_7_107

4.5 Swimming Pool Dosing Systems DULCODOS® Pool

Identcode Ordering System, DULCODOS® Pool P02, PH1

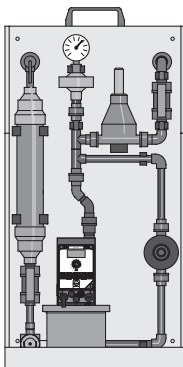
DSPa	Measured variable
P02	pH / timer control H ₂ O ₂ (D1C)
PH1	pH / H ₂ O ₂ (2 x D1C)
Hardware-additional functions	
0	Standard
Software-additional functions	
0	none
Communication interfaces	
0	none
Electrical connection	
A	230 V, 50/60 Hz, Euro connector
B	230 V, 50/60 Hz, Swiss connector
Sensor equipment	
0	with sensors
1	Measured variable P02 without sensors
D	Measured variable PH1 without sensors
Version	
0	with logo
1	without logo
Language	
A	Swedish
D	German
E	English
F	French
G	Czech
H	Swiss
I	Italian
N	Dutch
P	Polish
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	1.2 l/h (alpha ALPb 1001 PP1)
5	2.4 l/h (alpha ALPb 1002 PP1)
6	1.5 l/h (Beta® BT4a 0401 PPE)
7	2.8 l/h (Beta® BT4a 0402 PPE)
8	5.3 l/h (Beta® BT4a 0405 PPE)
Multi-function valve for acid/alkali pump	
0	none
1	with MFV (only for Beta® and alpha)
Metering pumps for disinfection	
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	1.2 l/h (alpha ALPb 1001 PP1)
5	2.4 l/h (alpha ALPb 1002 PP1)
6	0.9 l/h (Beta® BT4a 0401 NPB)
7	2.1 l/h (Beta® BT4a 0402 PPE)
8	4.2 l/h (Beta® BT4a 0405 PPE)
Multi-function valve for pump Disinfection	
0	none
1	with MFV (only for Beta® and alpha)
Installation	
0	not assembled, delivery without mounting plate mounted on base plate
1	
Approvals	
0	with CE approval

4.6 Customized Dosing Systems DULCODOS® custom

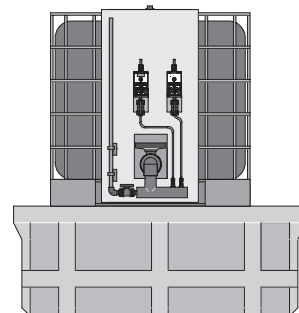
4.6.1 Customized Dosing Systems DULCODOS® custom

ProMinent® supplies pre-assembled, turnkey systems custom designed to customer specifications:

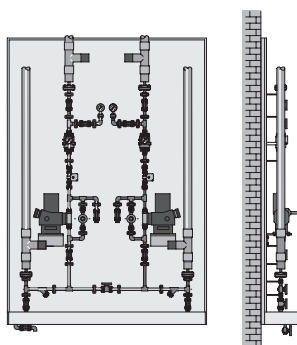
- Dosing systems including pumps and accessories. Portable, (fig. A) or directly attachable to skeleton containers (fig. B).
- Panel mounted metering systems (fig. C) or frame-mounted (fig. D).
- Dosing systems mounted on metering tank (fig. E) and with drip pan and metering tank (fig. F).
- Dosing systems in metering cabinet for indoor or outdoor locations (fig. G).



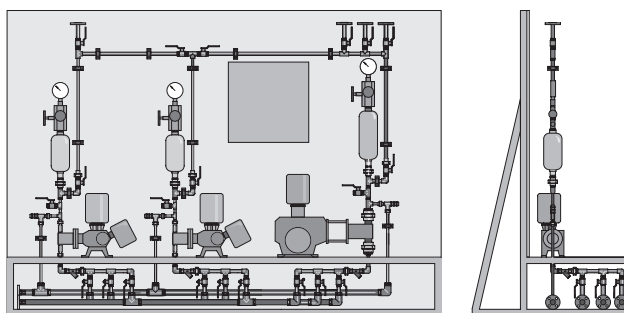
pk_7_035
Fig. A: Portable dosing stations



pk_7_036
Fig. B: Dosing stations, can be suspended from wire frame

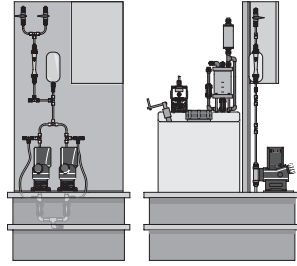


pk_7_038
Fig. C: Panel mounted system



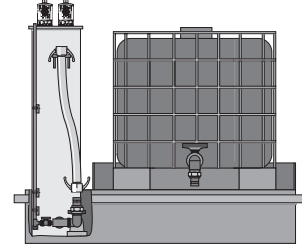
pk_7_040
Fig. D: Frame mounted dosing systems

4.6 Customized Dosing Systems DULCODOS® custom



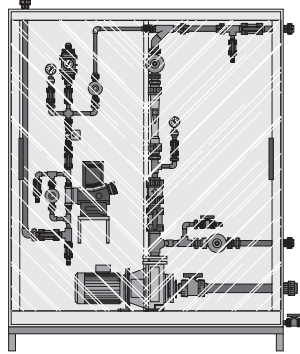
pk_7_037

Fig. E: Dosing stations mounted onto dosing tanks



pk_7_041

Fig. F: Dosing system with bund and chemical feed tank



pk_7_039

Fig. G: Dosing System in dosing cabinet

In addition to the standard materials PVC, PP, PVDF and stainless steel, specialist materials such as PFA are also possible.

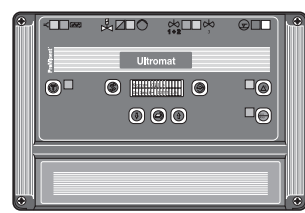
On request, ProMinent will equip the system with measurement and control equipment, terminal boxes, control cabinet or, for larger systems, with PLC control. We will be happy to meet your processing requirements with tailor-made function modules..

Each system is hydraulically and electrically tested on the factory premises..

A team of specialists is available to advise you.

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.1 Ultromat® Systems



pk_3_027

Ultromat® systems have been designed specially for the production of stock solutions and process solutions of synthetic flocculants (polyelectrolyte) and have been well proven in the field.

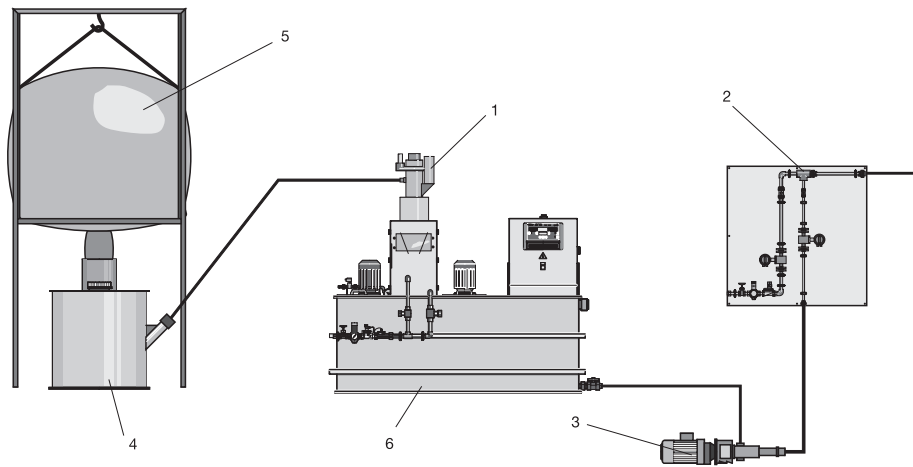
The use of polyelectrolyte as a flocculant or flocculation aid has a very large range of applications. It can be used wherever colloidal solids require to be removed from liquids on a commercial scale.

Recommended applications include:

- Wastewater and sludge treatment
- Paper production
- Drinking and process water treatment
- Treatment of sand and diatomite
- Treatment of brine
- Ore enrichment

The Ultromat® models AF/AT/ATF, AFK, AFP/ATP/ATFP are fitted with a ProMinent® compact controller. The solution concentrations and the volumetric settings of the dry feeder and the liquid concentrate pump are controlled by the operator. Warnings are indicated by alarm and text messages in the display. A flow monitor continuously determines the input of dilution water and values are displayed. Based on the preset solution concentration the controller calculates the requirement of polymer and controls the dry feeder or the concentrate pump in analogue form. Thus, the concentration of polymer solution remains constant even when the water supply fluctuates..

Application example for a complete polymer dosing system:

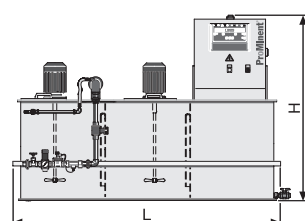


- 1 Powder delivery unit
- 2 dilution
- 3 Transfer pump
- 4 Powder storage tank
- 5 Big-Bag
- 6 Ultromat®

pk_7_028

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.2 Ultromat® AF/AT/ATF Continuous Flow Systems



pk_7_056_2
Ultromat® AF

Ultromat® continuous flow systems for the preparation of flocculants to prepare a 0.05 - 0.5 % polymer solution. The tank is comprised of three chambers. Discharge of the polymer solution as well as emptying of the individual chambers is performed at the front end of the tank.

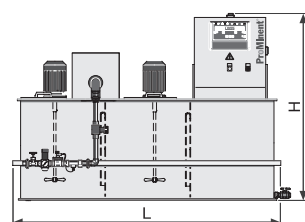
The following types of polymers can be processed:

- Type AF0: only liquid polymers
- Type AT0: only powdery polymers
- Type ATF: liquid and powdery polymers

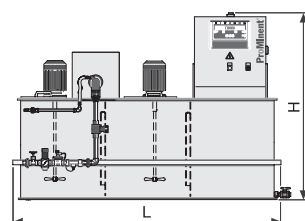
A selection system (Identcode) helps to easily, quickly and flexibly adapt the continuous flow system to your application.

Selectable components:

- Ultromat® type (type of polymers: liquid, powder)
- Tank size / discharge volume
- Layout (standard or mirror-imaged)
- Wetting fitting (Y flushing-in or wetting cone)
- Electrical connection
- Control type
- Options hopper loader TG 205
- Add-on hopper (to fill the powder feeder with powdery polymer)
- Vibrator for powder feeder (promotes continuous feeding of polymer in the powder feeder)
- Agitator for 3rd chamber (recommended)
- Liquid concentrate pump (pump to transport the liquid concentrate from the storage tank to the Ultromat®)
- Monitoring for liquid concentrate pump (float switch for concentrate tank prevents dry running. Flow monitor protects stator/rotor of the Spectra pump if flow stops)
- Language (default of the language when selecting ProMinent® control)



pk_7_083
Ultromat® AT



pk_7_098
Ultromat® ATF

Technical data

Discharge volume	l/h	400	1,000	2,000	4,000	8,000
Tank volume	l	400	1,000	2,000	4,000	8,000
Diluent water max.	l/h	1,500	1,500	3,000	6,000	12,000
Water pressure	bar	3-5	3-5	3-5	3-5	3-5
Powdery polymer	kg/h	0.8-18	0.8-18	0.8-18	3.6-55	4.8-110
Length	mm	1,960	2,581	3,256	3,243	4,539
Width	mm	905	970	1,155	1,515	1,922
Height	mm	1,250	1,600	1,750	2,182	2,290
Water connection	"	1	1	1	1 1/2	2
Discharge nozzle DN	mm	25	25	32	40	50
Concentrate addition DN	mm	15	15	15	20	20

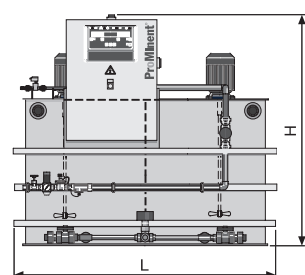
4.7 Polymer Preparation and Dosing Systems Ultromat®

Identcode Ordering System Ultromat® AF/AT/ATF Continuous Flow Systems

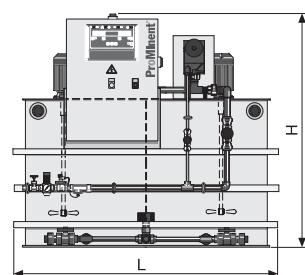
ULTa	Type	
	AF0	continuous flow system for liquid polymer
	AT0	continuous flow system for powdery polymer
	ATF	continuous flow system for liquid and powdery polymer
Tank type / tank size / discharge volume		
	0400	400 l volume / 400 l/h
	1000	1.000 l volume / 1.000 l/h
	2000	2.000 l volume / 2.000 l/h
	4000	4.000 l volume / 4.000 l/h
	8000	8.000 l volume / 8.000 l/h
Design		
	0	standard
	1	mirror-imaged
Wetting fitting		
	0	Y wetting fitting
	1	Feed funnel, PVC piping for 0400 – 2000
	2	Feed funnel, PVC piping for 4000 – 8000
	3	Feed funnel, PP piping for 0400 – 2000
	4	Feed funnel, PP piping for 4000 – 8000
Electrical connection		
	A	400 VAC, 50/60 Hz (3ph, N, PE)
Control type		
	0	with ProMinent controller
Options		
	0	without options
	1	with overflow valve for Ultromat® tank
	2	with evaluation water shortage dilution unit
	3	with 1 + 2
Add-on hopper, hopper loader FG 205		
	0	none
	1	with add-on hopper 50 l (for 400, 1000, 2000)
	2	with add-on hopper 75 l (for 4000)
	3	with add-on hopper 100 l (for 8000)
	4	with add-on hopper 50 l + hopper loader FG 205 (for 400, 1000, 2000)
	5	with add-on hopper 75 l + hopper loader FG 205 (for 4000)
	6	with add-on hopper 100 l + hopper loader FG 205 (for 8000)
	7	with adapter cover + hopper loader FG 205
Vibrator for powder feeder		
	0	none
	1	with vibrator for powder feeder
Agitator for 3rd chamber		
	0	none
	1	agitator for tank 400, 0.18 kW, 50/60 Hz, 750/900 rpm
	2	agitator for tank 1000, 0.55 kW, 50/60 Hz, 750/900 rpm
	3	agitator for tank 2000, 0.75 kW, 50/60 Hz, 750/900 rpm
	4	agitator for tank 4000, 1.1 kW, 50/60 Hz, 750/900 rpm
	5	agitator for tank 8000, 2.2 kW, 50/60 Hz, 750/900 rpm
Liquid concentrate pump (installed at Ultromat®)		
	0	none
	1	with Sigma
	2	with Spectra
Monitoring for liquid concentrate pump		
	0	none
	1	with float switch for concentrate tank
	2	with flow monitor (only Spectra)
	3	with float switch and flow monitor (only Spectra)
Language		
	DE	German
	EN	English
	FR	French
	CS	Czech
	IT	Italian
	NL	Dutch
	PL	Polish
	ES	Spanish

4.7 Polymer Preparation and Dosing Systems Ultromat®

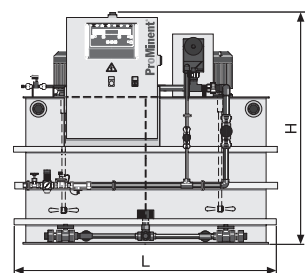
4.7.3 Ultromat® AFP/ATP/ATFP 2-chamber Batch Systems



pk_7_058_2
Ultromat® AFP



pk_7_015_2
Ultromat® ATP



pk_7_057
Ultromat® ATFP

Ultromat® 2-chamber batch systems for the preparation of flocculants to prepare a 0.05 - 0.5 % polymer solution. The tank is comprised of two separate tanks.

The following types of polymers can be processed:

- Type AFP: only liquid polymers
- Type ATP: only powdery polymers
- Type ATFP: liquid and powdery polymers

The 2-chamber batch systems basically consist of the following components:

- Tanks with reinforcements and brackets for mounting of other aggregates, material of the tanks PP (standard) or stainless steel (option)
- Dry feeder with metering pipe heating and powder shortage sensor
- Piping for metering of liquid concentrate (only AFP and ATFP)
- Wetting system for flushing-in and wetting of the powder, incl. wetting cone and injector (only ATP and ATFP)
- Water fitting with flow meter and fitting kit for in-line water and reversal unit
- Set of change-over valves for filling and discharge of polymer solution
- 2 slow electric agitators
- Control cabinet with ProMinent® control for automatic control of the entire system

Technical data

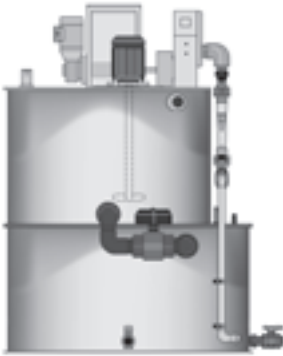
Discharge volume	l/h	400	1,000	2,000	4,000
Tank volume	l	2 x 400	2 x 1,000	2 x 2,000	2 x 4,000
Diluent water max.	l/h	1,600	4,000	8,000	14,000
Water pressure	bar	3-5	3-5	3-5	3-5
Powdery polymer	kg/h	0.8-18	0.8-18	3.6-55	4.8-110
Length	mm	1,820	2,680	3,180	4,380
Width	mm	1,285	1,820	1,970	2,645
Height	mm	1,680	1,770	2,180	2,400
Water connection	"	1	1 1/4	1 1/2	2
Discharge nozzle DN	mm	25	32	40	50
Concentrate addition DN	mm	15	15	20	20
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50	400/50
Power Uptake	kW	2.5	3.2	5.5	7.0

The systems are also available with storage tank, aerator, level sensors, equipment for pneumatically operated powder feed from the delivery drum (e.g. Big-Bag), dilution units, flushing units, metering gauges and metering pumps for the concentrate and the prepared solution.

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.4

Ultromat® AFD/ATD/ATFD Double-Deck System



pk_7_085_sw
Ultromat® AFD

Ultromat® double-deck systems for the preparation of flocculants to prepare a 0.05 – 0.5 % polymer solution. The tank is comprised of two separate tanks on top of each other.

The following types of polymers can be processed:

- Type AFD: only liquid polymers
- Type ATD: only powdery polymers
- Type ATFD: liquid and powdery polymers

The double-deck systems basically consist of the following components:

- two separate tanks on top of each other, material PP/PE
- dry feeder with metering pipe heating and powder shortage sensor
- piping for metering of liquid concentrate (only AFD and ATFD)
- wetting system for flushing-in and wetting of the powder (only ATD and ATFD)
- water fitting with flow meter and fitting kit for in-line water
- motor valve for filling the bottom tank
- slow electric agitator in the upper tank
- control cabinet with S7 control for automatic control of the entire system.

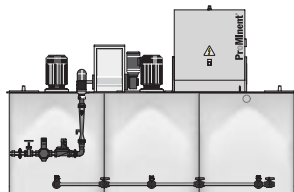
Technical data

Discharge volume	l/h	400	1,000	2,000
Tank volume	l	2 x 400	2 x 1,000	2 x 2,000
Diluent water max.	l/h	1,600	4,000	8,000
Water pressure	bar	3–5	3–5	3–5
Powdery polymer	kg/h	0.8–18	0.8–18	3.6–55
Length	mm	1,300	1,600	2,000
Width	mm	1,300	1,600	2,000
Height	mm	2,050	2,700	3,000
Water connection	"	1	1 1/4	1 1/2
Discharge nozzle DN	mm	25	32	40
Concentrate addition DN	mm	15	15	20
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50
Power Uptake	kW	1.5	2.6	3.2

The systems are also available with storage tank, aerator, level sensors, equipment for pneumatically operated powder feed from the delivery drum (e.g. Big-Bag), dilution units, flushing units, metering gauges and metering pumps for the concentrate and the prepared solution.

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.5 Ultromat® ATR Continuous Flow System (with round tanks)



P_UL_0020_SW

Ready-for-use, assembled, automatic 3-chamber preparation system for powdery flocculants to prepare a 0.05 - 0.5 % polymer solution. The Ultromat® consists of 3 individual round PP tanks with the functions preparation, maturing, and storage tank. The round tanks are hydraulically connected to each other through overflow channels. The tanks are extraordinarily stable and require not additional reinforcements. This also significantly reduces the transport weight of the Ultromat system.

The Ultromat® basically consists of the following components:

- Ultromat tank comprising 3 individual round PP tanks with the functions preparation, maturing, and storage tank
- Dry feeder with drive motor, metering pipe heating and powder hopper with plug-in cover
- Wetting system for flushing-in and wetting of the powder, incl. wetting cone, flow meter and fitting kit for in-line water
- 2 slow electric agitators
- Control cabinet for automatic control of the entire system

Technical data

Discharge volume	l/h	400	1,000	2,000
Tank volume	l	400	1,000	2,000
Diluent water max.	l/h	1,500	1,500	3,000
Water pressure	bar	3-5	3-5	3-5
Powdery polymer	kg/h	0.8-18	0.8-18	0.8-18
Length	mm	1,632	2,296	2,976
Width	mm	940	980	1,190
Height	mm	1,250	1,605	1,766
Water connection	"	1	1	1
Discharge nozzle DN	mm	25	25	32
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50
Power Uptake	kW	1.5	2.6	3.2

	Use solution l/h	Order no.
Ultromat® ATR 400	400	1033810
Ultromat® ATR 1000	1,000	1033811
Ultromat® ATR 2000	2,000	1033812

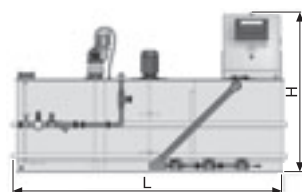
Accessories

	Order no.
3. Agitator for 0.18 kW for ATR 400	1033794
3. Agitator for 0.55 kW for ATR 1000	1033795
3. Agitator for 0.75 kW for ATR 2000	1033803
Overflow sensor for Ultromat® tank	1021604
Vibrator for powder feeder	1033808

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.6

Ultromat® AFK Continuous Flow System (only for liquid polyelectrolytes)



pk_7_087
Ultromat® AFK

Ready-for-use, assembled, automatic 2-chamber continuous flow system for liquid flocculants to prepare a 0.05 – 1.0% metering solution, including an integrated day tank to store liquid concentrate.

The day tank can be continuously refilled through a transfer pump (e.g. Spectra) from the central chemicals storage. Thus, suction problems do not occur when replacing the delivery drum because the suction lance is permanently immersed in the liquid polymer.

The Ultromat® AFK basically consists of the following components:

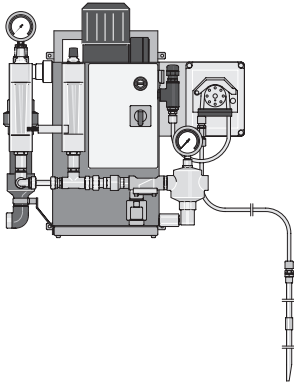
- combined preparation and storage tank with integrated day tank for liquid concentrate. Material of the tank PP (standard) or stainless steel (option)
- metering pump Sigma (e.g.: S1CA H 12017 PVT 0000UA01000) with 4-20mA current input for proportional metering of liquid concentrate, including metering valve and suction lance.
- dilution system with fitting kit and flow meter for the diluent water
- slow electric agitator with 2 propellers
- control cabinet for automatic control of the entire system.

Technical data

Type		AFK260	AFK660	AFK1300	AFK2600
Discharge volume	l/h	400	1,000	2,000	4,000
Tank volume	l	260	660	1,300	2,600
Diluent water max.	l/h	1,500	1,500	3,000	6,000
Water pressure	bar	3–5	3–5	3–5	3–5
Metering pump	l/h	17	17	35	50
Metering pump type		S1CaH 12017 PVT	S1CaH 12017 PVT	S1CaH 12035 PVT	S1CaH 10050 PVT
Length	mm	1,640	2,276	2,917	2,954
Width	mm	925	960	1,110	1,530
Height	mm	1,250	1,605	1,720	1,952
Water connection	"	1	1	1	1 1/2
Discharge nozzle DN	mm	25	25	32	40
Concentrate addition DN	mm	15	15	15	20
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50	400/50
Power Uptake	kW	1.5	2.6	3.2	5.0

4.7 Polymer Preparation and Dosing Systems Ultramat®

4.7.7 POLYMORE For Liquid Polyelectrolytes



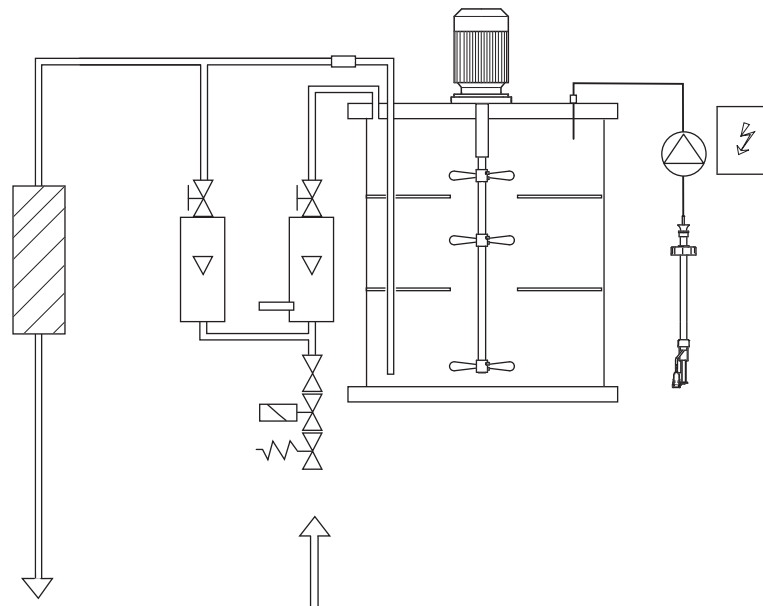
pk_7_091

POLYMORE is an in-line polymer preparation station for the processing of liquid polymers. Using a peristaltic pump, the liquid polymer is metered into the multi-zone mixer unit to the diluent water and processed into a homogeneous and effective polymer solution. The unit was designed for wall mounting and thus requires only little space. For commissioning, only water, liquid polymer and the supply voltage have to be connected to the unit. If the maturing time is not sufficient for certain applications, a maturing tank with agitator and metering pump can be installed downstream.

POLYMORE basically consists of the following components:

- peristaltic pump for metering the liquid polymer
- water fitting including pressure reducer, solenoid valve
- flameproof mixer unit for an effect preparation of the polymer solution
- re-dilution unit with static mixer and manometer
- control for automatic control of the system. manual or 4-20 mA control of the peristaltic pump.

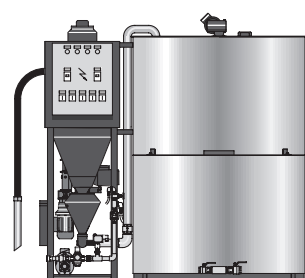
	Diluent water max.	Metering output liquid polymer	Order no.
	l/h	kg/h	
POLYMORE mini 2-0.08	120	0.08	1029568
POLYMORE mini 3-0.6	180	0.60	1029570
POLYMORE mini 5-0.6	300	0.60	1029571
POLYMORE mini 5-1.2	300	1.20	1029572
POLYMORE mini 10-1.2	600	1.20	1029574
POLYMORE mini 10-2.4	600	2.40	1029575
POLYMORE mini 30-3.0	1,800	3.00	1029576
POLYMORE duo 40-6.0	2,400	4.00	1029577
POLYMORE duo 65-9.0	3,900	8.00	1029579
POLYMORE midi 100-12	6,000	12.00	1029580
POLYMORE midi 160-24	9,600	20.00	1029581
POLYMORE maxi 300-54	18,000	50.00	1029584



pk_7_099

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.8 PolyRex For Powdery And Liquid Polyelectrolytes



pk_7_092

PolyRex is a double-deck preparation station for the processing of liquid and powdery polymers. The preparation station consists of the delivery and mixer unit and the two double-deck tanks made of stainless steel. The upper tank is the preparation/maturing tank, the bottom tank is the storage tank for the prepared polymer solution. The powdery polymer is transported to the powder feeder by a vacuum conveyor and mixed with water in the bottom mixer unit. The solution is then transferred to the upper tank (preparation/maturing tank) using the water pressure of the diluent water. Having matured, the solution can be transferred to the bottom storage tank via the motor valve.

When using liquid polymers, the system switches to the Spectra eccentric screw pump.

The system is automatically controlled by a Siemens PLC S7.

PolyRex basically consists of the following components:

- vacuum conveyor and powder feeder to meter powdery polymers and an eccentric screw pump to meter liquid polymers.
- water fitting with wetting cone and injector to produce an effective and homogeneous polymer solution from powdery polymers (modified system when using liquid polymers)
- double-deck tank made of stainless steel for maturing and storing the polymer solution.
- motor valve to transfer the solution to the storage tank.
- agitator in the upper tank for a gentle mixing of the polymer solution
- control cabinet with S7 control for automatic control of the system.

	Tank volume m ³	Discharge volume l/h	Metering output liquid polymer kg/h	Order no.
PolyREX 0.6	2 x 0.30	240	1.2	1029556
PolyREX 1.0	2 x 0.60	460	2.3	1029558
PolyREX 2.0	2 x 1.00	940	4.7	1029559
PolyREX 3.0	2 x 1.50	1,280	6.4	1029560
PolyREX 4.0	2 x 2.00	1,900	9.5	1029562
PolyREX 5.4	2 x 2.70	2,400	12.0	1029563
PolyREX 6.6	2 x 3.30	3,200	16.0	1029564
PolyREX 8.4	2 x 4.20	3,820	19.2	1029565

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.9 Ultromat® MT For Batch Operation



pk_7_088

For manual preparation of products in liquid and powder form in batch operation. These systems are used if continuous operation is not required. The flocculant solution is prepared manually as batch. Having matured, it can then be metered.

The systems consist of:

- 1 Batching tank made of PP
- 1 Wetting system for flushing-in and wetting of the powder, incl. wetting cone, injector and fitting kit for in-line water
- 1 Slow electric agitator
- 1 Level switch with three switching points

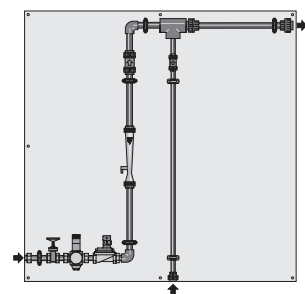
Technical data

Type		MT 120	MT 250	MT 500	MT 1000	MT 2000	MT 3000	MT 4000	MT 5000
Discharge volume	l/h	120	210	440	920	1,890	2,850	3,800	4,800
Tank volume	l	120	210	440	920	1,890	2,850	3,800	4,800
Diameter of tank(D)	mm	640	640	850	1,250	1,450	1,750	1,650	1,650
Height of tank (H1)	mm	700	1,100	1,000	1,000	1,500	1,600	2,050	2,550
Height	mm	1,020	1,410	1,300	1,340	1,840	2,000	2,400	2,900
Water connection DN	mm	20	20	20	25	32	40	40	40
Discharge nozzle DN	mm	20	20	20	25	32	40	40	50
Voltage/Frequency	VAC/ Hz	400/ 50	400/ 50	400/ 50	400/ 50	400/ 50	400/ 50	400/ 50	400/ 50
Power Uptake	kW	0.18	0.55	0.75	1.10	2.20	3.00	3.00	3.00

The systems are also available with rinsing water fitting, level indicator and switchgear.

4.7 Polymer Preparation and Dosing Systems Ultromat®

4.7.10 Ultromat® Accessories



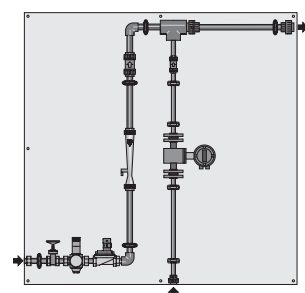
pk_7_030

Ultromat® VS dilution unit

The Ultromat® dilution units are pre-assembled turnkey units for dilution of polymer solutions comprising essentially:

- 1 water apparatus for the dilution water with manual stop tap, pressure release valve, solenoid valve (230 V, option: 24 V DC) and float-type flow meter including minimum contact
- 1 pipe for the polymer solution to be diluted including non-return valve
- 1 static mixer for mixing stock solution with dilution water

	Use solution	Order no.
VS 1000	1,000 l/h	1005566
VS 2000	2,000 l/h	1005567
VS 5000	5,000 l/h	1005568
VS 10000	10,000 l/h	1005569
VS 20000	20,000 l/h	1005570
VS 30000	30,000 l/h	1005571
VS 50000	50,000 l/h	1005572



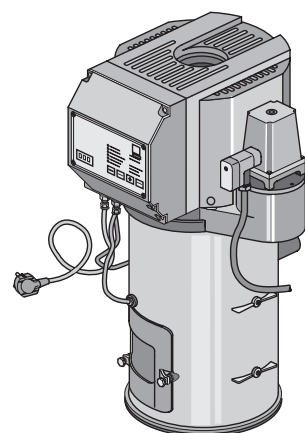
pk_7_031

Ultromat® VS-IP dilution unit with flow meter

The Ultromat® dilution units are pre-assembled turnkey units for dilution of polymer solutions comprising essentially:

- 1 water apparatus for the dilution water with manual stop tap, pressure release valve, solenoid valve (230 V, option: 24 V DC) and float-type flow meter including minimum contact
- 1 pipe work for the polymer solution to be diluted including non-return valve and inductive flow meter
- 1 static mixer for mixing stock solution with dilution water

	Use solution	Order no.
VS 1000 IP	1,000 l/h	1005584
VS 2000 IP	2,000 l/h	1005585
VS 5000 IP	5,000 l/h	1005586
VS 10000 IP	10,000 l/h	1005587
VS 20000 IP	20,000 l/h	1005588
VS 30000 IP	30,000 l/h	1005589
VS 50000 IP	50,000 l/h	1005590



pk_3_032

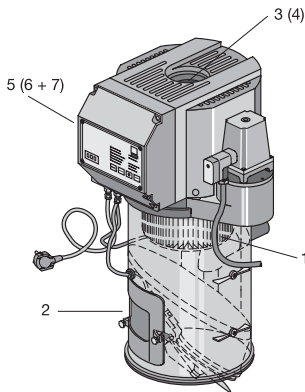
Ultromat® hopper loader FG 205

The Ultromat® hopper loader 205 acts to refill the dry feeder in the Ultromat® systems with commercially available powdered polymers. With the aid of a suction hose and suction lance the powder is sucked out of the storage container (Big-Bag, powder storage tank) into the powder conveyor and via a flap into the powder feed screw of the polymer diluting station. The powder conveyor is self-operating and simply requires a 230 V DC terminal. External control contacts are not necessary. Depending upon the powder quality, approx. 75-90 kg of powder polymer per hour can be conveyed. The 4 m feed tube and the suction nozzle are included as standard.

	Feed rate	Order no.
Hopper loader FG 205	75 – 90 kg/h	1000664

4.7 Polymer Preparation and Dosing Systems Ultramat®

Spare parts for the FG 205 hopper loader



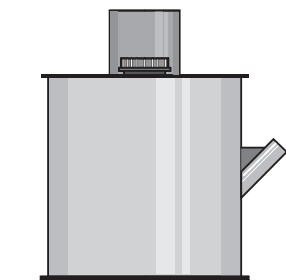
pk_2_105

- 1 Filter cartridge
- 2 Filter mat
- 3 Blower
- 4 Set of carbon brushes
- 5 Controller
- 6 Power pcb
- 7 Control pcb

	Order no.
Filter cartridge 0,2 m³	1010773
Filter insert	1010774
Fan K 50	1010768
Carbon brushes set	1010769
Controller assembly (consisting of 1010772 + 1010771)	1010770
Circuit board	1010772
Control circuit board	1010771

Powder pre-storage tank

The powder pre-storage tank is used for interim storage of powder polymers that are delivered in big bag packages. The big bag is suspended over the tank on a frame and emptied into the powder pre-storage tank.

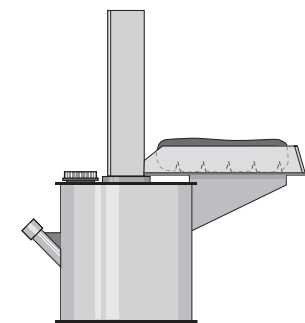


pk_7_033

	Tank volume	Order no.
Powder pre-storage tank	280 l	1005573

Powder pre-storage tank with sack tipper

The powder pre-storage tank with sack tipper is used for interim storage of powder polymers that are delivered in 25 kg sacks.



pk_7_060

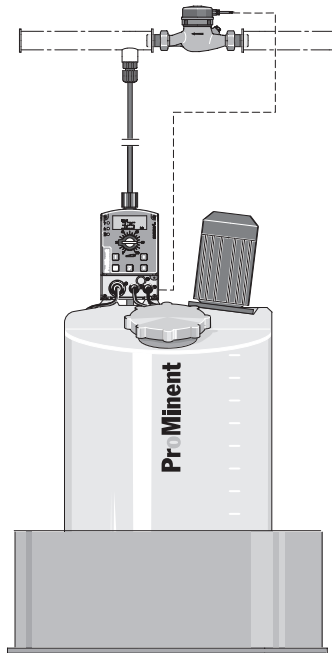
	Tank volume	Order no.
Powder pre-storage tank with sack tipper	280 l	1025137

4.8 Application Examples

4.8.1 Volume-proportional Metering Of Phosphate

Product: **DULCODOS® eco**
 Metering medium: **Phosphate**
 Industry: **Drinking water**
 Application: **Drinking water conditioning**

The liquid phosphate is added to the drinking water proportional to the volume. The flow meter sends impulses to the gamma/ L pump. The metering volume is adjusted by increasing or decreasing the incoming impulses.



pk_7_093

Tasks and requirements

Metering of phosphate to drinking water to prevent lime deposits and corrosion in the piping

Operating conditions

- Treatment of drinking water
- Fluctuating water demand
- Water temperature between 4 – 30°C

Application information

- Proportional metering of phosphate depending on the water supply
- Control of the metering pump through a contact water meter
- Measure the metering pump capacity during commissioning

Solution

- DULCODOS® eco with 140 litres metering tank and drip pan
- gamma/ L with contact input and pulse control
- Contact water meter

Benefit

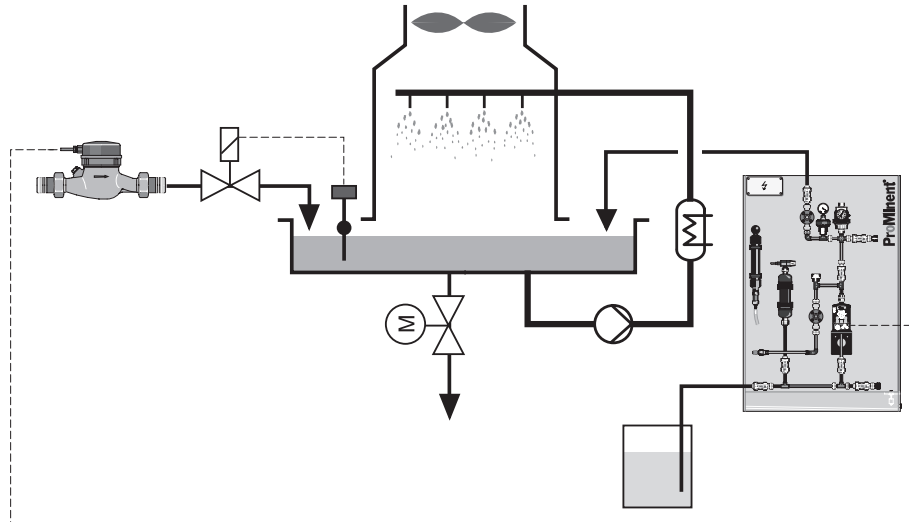
- Constant solution concentration even given fluctuating water supply
- Fully-automatic operation with a minimum of staff and maintenance
- Flexible process design thanks to adaptation of the pump to various concentration demands

4.8 Application Examples

4.8.2 Inhibitor Metering In Cooling Water

Product: **DULCODOS® panel**
 Metering medium: **Corrosion inhibitor**
 Industry: **Process industry, Power stations**
 Application: **Cooling water conditioning**

The corrosion inhibitor is added to the fresh water in proportion to the volume. The water meter detects the supply water volume and sends the impulses to the gamma/ L pump.



pk_7_060_1

Tasks and requirements

Metering of corrosion inhibitors to the supply water to prevent lime deposits and corrosion in the cooling water circuit.

Operating conditions

- Treatment of flow water
- Fluctuating water demand
- Water temperature between 4 – 20 °C

Application information

- Proportional metering of inhibitor depending on the water supply
- Control of the metering pump through a contact water meter
- Calibrate the metering pump capacity during commissioning

Solution

- DULCODOS® panel including standby pump
- gamma/ L with contact input and pulse control
- Contact water meter

Benefit

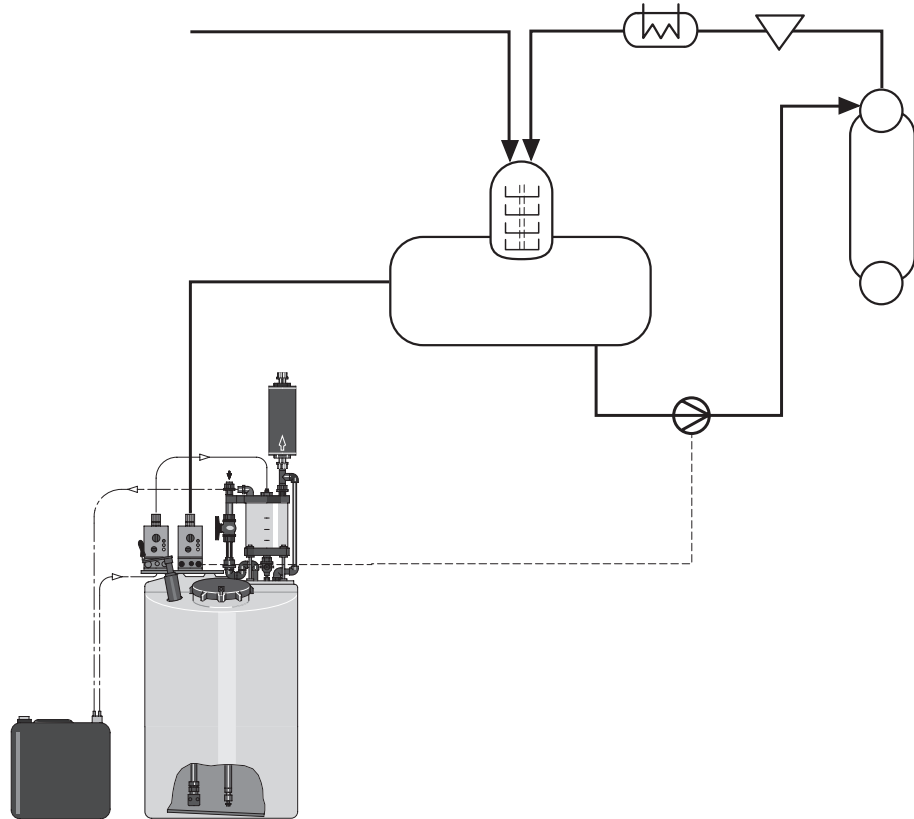
- Protection against corrosion in the pipings and the heat exchanger
- Constant solution concentration even given fluctuating water supply
- Fully-automatic operation with a minimum of staff and maintenance
- Flexible process design thanks to adaptation of the pump to various concentration demands

4.8 Application Examples

4.8.3 Inhibitor Metering In Boiler Feed Water

Product: **DULCODOS® Hydrazin**
 Metering medium: **Oxygen binding agent**
 Industry: **Process industry, power stations**
 Application: **Boiser feed water treatment**

The oxygen binding agent is added to the fresh water in proportion to the volume. The water meter detects the supply water volume and sends the impulses to the gamma/ L pump at the hydrazine unit.



pk_7_095

Tasks and requirements

Metering of oxygen binding agent to the boiler feed water to prevent oxygen corrosion in the boiler area.

Operating conditions

- Fully desalinated drinking water
- Continuous operation

Application information

- Proportional metering of oxygen binding agent depending on the boiler feed water
- he 15 % concentrate is metered to the metering tank with a metering pump tank through a metering unit and diluted with water to produce a 1 % metering solution.
- Measure the metering pump capacity during commissioning

Solution

- DULCODOS® Hydrazin with 250 litres metering tank

Benefit

- Semi-automatic operation
- Flexible process design thanks to adaptation of the pump to various concentration demands

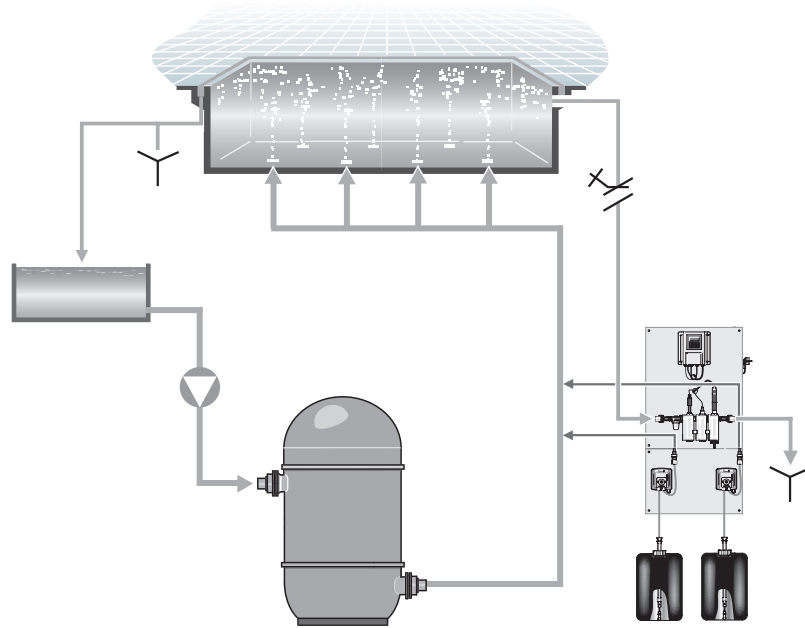
MaharFan

4.8 Application Examples

4.8.4 Swimming Pool: pH/Chlorine Metering

Product:	DULCODOS® Pool
Metering medium:	Acid and sodium hypochlorite
Industry:	Swimming pool
Application:	Bath water disinfecton

The pH value and the chlorine concentration are measured and controlled using the D2C controller. The pH value drives the acid pump; the chlorine value drives the sodium hypochlorite pump.



pk_7_096

Tasks and requirements

Disinfection of the swimming pool water with sodium hypochlorite and controlling of the pH value.

Operating conditions

- Quickly changing load conditions
- High ambient temperatures in the control room

Application information

- The chlorine concentration in the pool water should range between 0.3 and 0.6 mg/l
- The pH value is to be adjusted to a pH value between 6.5 and 7.6
- Excessive pH values deteriorate the disinfection effect of the sodium hypochlorite
- Sample water port required (ideal sampling point directly from the pool, approx. 15-20 cm below the water surface)

Solution

- DULCODOS® Pool with 2-channel controller to measure and control the pH value and the chlorine concentration in the swimming pool water

Benefit

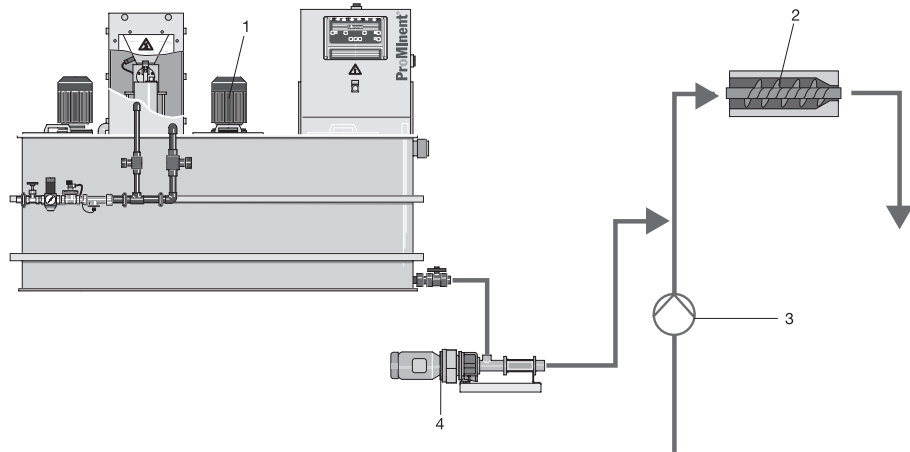
- Fully-automatic operation with a minimum of staff and maintenance
- Hygienic water
- High level of process safety

4.8 Application Examples

4.8.5 Sludge Dewatering

Product: **Ultromat®**
 Metering medium: **Polymer solution**
 Industry: **Waste water**
 Application: **Sludge dewatering**

The Ultromat® prepares a 0.2 % polymer solution. The polymer solution is metered to the sludge through the Spectra eccentric screw pump. The centrifuge dewateres the sludge to a dry matter contents of 30 %.



- 1 Ultromat® AT 4000
- 2 Centrifuge
- 3 Sludge pump
- 4 Spectra

pk_7_060_2

Tasks and requirements

Dewatering of sludge by adding polymer solution

Operating conditions

- Sludge with a dry matter contents of approx. 3 %
- Temperature up to 60 °C

Application information

- The eccentric screw pump Spectra is controlled proportionally to the sludge pump
- Calibrate the metering pump capacity during commissioning
- Protect the eccentric screw pump against running dry

Solution

- Ultromat® AT 4000 to prepare a 0.2 % polymer solution
- Eccentric screw pump of the type Spectra 3/3000 FB

Benefit

- Fully-automatic operation with a minimum of staff and maintenance
- Flexible process design thanks to adaptation of the pump to various concentration demands
- Reduction of the sludge disposal costs by obtaining higher dewatering ratios (high dry matter contents)

4.8 Application Examples

5 Tanks And Transfer Pumps

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5.0 Overview Of Tanks And Transfer Pumps

5.0.1 Product Overview

Tanks

Dosing Tanks and Bunds

Effective capacity from 35 to 1000 litres.

Tanks and bunds made from PE available in matching sizes and different colours.



pk_3_052

Storage Tanks

Effective capacity from 500 litres up to 15 m³.

Both standardised and customised polyethylene storage tanks and drip trays, also available with general WHG approval.



pk_3_053

Transfer Pumps

Spectra Progressive Cavity Pump

Output range 0.1 – 12,000 l/h, 12 – 3 bar.

Progressive cavity pump for conveying liquid polyelectrolytes in concentrated and diluted form.

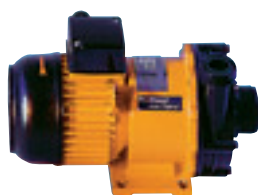


pk_3_054

von Taine® Magnetically Coupled Centrifugal Pump

Output range up to 22,500 l/h, delivery head up to 23.5 m water column

Centrifugal pump with magnetic clutch for conveying liquid media. Leak-free transfer from tank to tank. Not self-priming, infeed necessary.



pk_3_055

Duodos Air Operated Diaphragm Pump

Output range: up to 6,700 l/h, 7 bar

Compressed air operated diaphragm pump for conveying liquid media. Run-dry safe and self-priming, no electrical components.



pk_3_056

DULCO®Trans Barrel Pump

Output range: 900 l/h, 2,400 l/h, 3,000 l/h

Barrel pump for filling, discharging and refilling liquids from canisters, drums and containers.



pk_3_057

5.0 Overview Of Tanks And Transfer Pumps

5.0.2 Selection Guide

Selection Guide - Tanks:

	Shape	WHG approval	Effective volume
Dosing Tanks PE	Cylindrical		35 - 1,000 l
PE Storage Tank With General WHG Approval	Cylindrical	x	500 - 25,000 l
PP/PE Storage Tanks, Custom-Built	Cylindrical or rectangular		500 - 25,000 l

Selection Guide - Transfer Pumps:

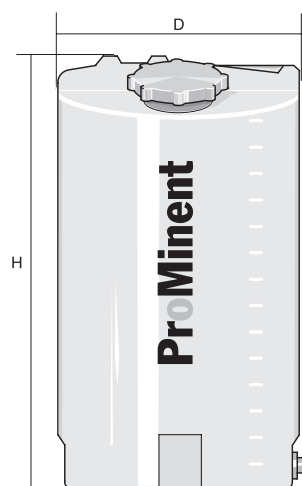
Pump type	Priming	Drive	Output range
Spectra progressive cavity pump	Self-priming	Electric	0.1 - 12,000 l/h
von Taine® magnetically coupled centrifugal pump	Normal-priming (infeed necessary)	Electric	Up to 22,500 l/h
Duodos air operated diaphragm pump	Self-priming	Compressed air	Up to 6,700 l/h
DULCO® Trans barrel pump	Self-priming	Electric	900 - 3,000 l/h

5.1 Dosing Tanks And Bunds PE

5.1.1 Dosing Tanks PE

Made of UV-stabilised polyethylene with scale for litres and US gallons and screw cap (35 l drum with push cap) integral sintered threaded bushes for the assembly of ProMinent® electronic metering pumps, mounting flange with integral sintered threaded bushes for manual or electric stirrers. All tanks designed for extreme robustness with ProMinent® logo and 3 lateral flats for mounting drum.

Natural coloured/transparent PE dosing tank



pk_3_0001_1a

Usable capacity l	D mm	H mm	Threaded bush for the dosing pumps	Weight empty kg	Order no.
35	350	485	without threaded bushes	3.5	791993
60	410	590	gamma/ L, D_4a	5.0	791994
100	500	760	alpha, Beta®, gamma/ L, D_4a	7.0	1001490
140	500	860	gamma/ L, D_4a	9.5	791995
250	650	1,100	alpha, Beta®, gamma/ L, D_4a, Sigma/ 1/ 2/ 3, delta®	17.5	1023175
500	820	1,190	2 x gamma/ L, 2 x D_4a, 2 x Sigma/ 1, delta®	24.5	791997
1,000	1,070	1,260	2 x gamma/ L, 2 x D_4a, 2 x Sigma/ 1/ 2/ 3, delta®	51.0	1010909

Natural coloured/transparent PE dosing tank

prepared for the installation of a hand operated or electronic stirrer.

Usable capacity l	with an opening for	Order no.
60	A hand operated stirrer	792104
60	An electric stirrer	792105
100	A hand operated stirrer	1002034
100	An electric stirrer	1002033
140	A hand operated stirrer	792106
140	An electric stirrer	792107
250	A hand operated stirrer	792108
250	An electric stirrer	792109
500	A hand operated stirrer	792110
500	An electric stirrer	792111
1,000	A hand operated stirrer	1010910
1,000	An electric stirrer	1010911

A threaded socket R 3/4" is cast into the tanks of 35-1,000 litres for emptying purposes, which can be drilled out to a Ø of 10 mm should the customer require this. A sealing plug made out of PE R 3/4" fitted with a seal can be screwed in (accessory order number 200692).

Metering tanks without ProMinent® logo are available on request.

5.1 Dosing Tanks And Bunds PE

Made of UV-stabilised polyethylene with scale for litres and US gallons and screw cap (35 l drum with push cap) integral sintered threaded bushes for the assembly of ProMinent® electronic metering pumps, mounting flange with integral sintered threaded bushes for manual or electric stirrers. All tanks designed for extreme robustness with ProMinent® logo and 3 lateral flats for mounting drum.



pk_3_001_1

Black PE dosing tank

For light sensitive media.

Usable capacity	Order no.
l	
35	791998
60	791999
100	1001322
140	792000
250	1023176
500	792002
1,000	1010912

Blue PE dosing tank

Usable capacity	Order no.
l	
35	1003812
60	1003813
100	1003814
140	1003815
250	1023177
500	1003817
1,000	1010913

Yellow PE dosing tank

Usable capacity	Order no.
l	
35	1003818
60	1003819
100	1003820
140	1003821
250	1023178
500	1003823
1,000	1010914

Red PE dosing tank

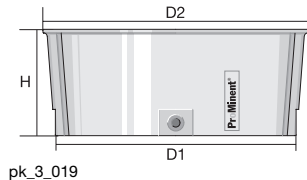
Usable capacity	Order no.
l	
35	1003824
60	1003825
100	1003826
140	1003827
250	1023179
500	1003829
1,000	1010915

Metering tanks without ProMinent® logo are available on request.

5.1 Dosing Tanks And Bunds PE

5.1.2 Stackable Bunds For Dosing Tanks PE

Made of UV stabilised polyethylene, stackable, with ProMinent® logo. Incorporating 2 lateral flats for mounting bund.



PE colourless/transparent stackable bunds

Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
35	PE	565	507	220	1010879
60	PE	680	607	270	1010880
100	PE	802	727	320	1010881
140	PE	811	727	370	1010882
250	PE	917	807	520	1010883
500	PE	1,155	1,009	670	1010884

PE black stackable bunds

Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
35	PE	565	507	220	1010885
60	PE	680	607	270	1010886
100	PE	802	727	320	1010887
140	PE	811	727	370	1010888
250	PE	917	807	520	1010889
500	PE	1,155	1,009	670	1010890

PE blue stackable bunds

Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
35	PE	565	507	220	1010891
60	PE	680	607	270	1010892
100	PE	802	727	320	1010893
140	PE	811	727	370	1010894
250	PE	917	807	520	1010895
500	PE	1,155	1,009	670	1010896

PE yellow stackable bunds

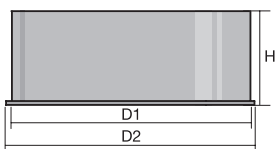
Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
35	PE	565	507	220	1010897
60	PE	680	607	270	1010898
100	PE	802	727	320	1010899
140	PE	811	727	370	1010900
250	PE	917	807	520	1010901
500	PE	1,155	1,009	670	1010902

5.1 Dosing Tanks And Bunds PE

PE red stackable bunds

Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
35	PE	565	507	220	1010903
60	PE	680	607	270	1010904
100	PE	802	727	320	1010905
140	PE	811	727	370	1010906
250	PE	917	807	520	1010907
500	PE	1,155	1,009	670	1010908

For discharge purposes, an R 3/4" threaded socket is already moulded on to the 35-500 l drip trays. The customer can drill out the threaded socket to 10 mm Ø if necessary. A sealing plug made out of PE R 3/4" fitted with a seal can be screwed in (accessory order number 200692).



pk_3_018a

PE natural and black bunds

Usable capacity l	Material	D2 mm	D1 mm	H mm	Order no.
1,000	PE-black	1,280	1,200	980	740726
1,000	PE-natural	1,280	1,200	980	740719

5.1.3 Spare Part Kits

	Order no.
Push cap for 35 l tank	740708
Screw cap with seals for 60/100/140/250	740715
Screw cap with seals for 500/1000	740718
Sealing plugs with 3/4" seals PE	200692

5.2 Accessories For Dosing Tanks

5.2.1 Fittings And Detachable Parts

Attachment of pumps to dosing tanks

PP mounting plate

for mounting metering pumps onto dosing tanks (including screws for attachment of mounting plates to the dosing tank).



pk_3_003

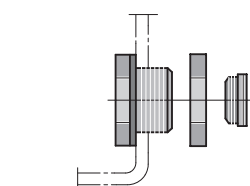
	Order no.
Mounting plate, Sigma/ 1/ 2/ 3	740476
Mounting plate, alpha	790850
Mounting plate, Sigma/ 1, EXtronic®	801569
Mounting plate, EXtronic®	801573
Mounting plate, Beta®, gamma/ L, D_4a	801575
Mounting plate, 3 x gamma/ L, 3 x Beta®	801580
Mounting plate, 2 x gamma/ L, 2 x Beta®	801583

The order no. for the mounting plates can be found in the table below.

Metering pumps	Dosing tank						
	35 l	60 l	100 l	140 l	250 l	500 l	1000 l
alpha	790850	790850	x	790850	x	790850	790850
Beta®	801575	x	x	x	x	2x	2x
gamma/ L	801575	x	x	x	x	2x	2x
D_4a	801575	x	x	x	x	2x	2x
EXtronic®	-	801569	801569	801569	801573	801573	801569
Sigma/ 1	-	801569	740476	740476	x	2x	2x
Sigma/ 2	-	-	-	-	x	740476	2x
Sigma/ 3	-	-	-	-	x	740476	2x
2 x Beta® or 2 x gamma/ L	-	801583	801583	801583	801583	2x801583	2x801583
3 x Beta® or 3x gamma/ L	-	-	801580	801580	801580	2x801580	2x801580

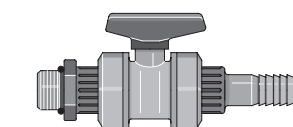
- x = Pump mounted directly onto a tank
- 2x = 2 pumps mounted directly onto a tank (only 500 and 1000 litre)
- - = pump cannot be installed onto the tank

Tank connectors with PE plugs



pk_3_004

	Order no.
R 3/4" as an additional connection for dosing tanks PE 35-1000 l	809756
R 1/2" as an additional connection for dosing tanks PE 35-1000 l	809755



pk_3_005

PP discharge tap

	Order no.
For dosing tanks with d 20, Ø 20 mm hose nozzle and 3/4" nipple for direct connection to the threaded connector on the tank.	809714

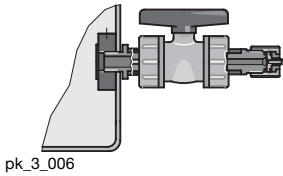
PVC discharge tap

	Order no.
For dosing tanks with d 16, Ø 16 mm hose nozzle and 3/4" nipple for direct connection to the threaded connector on the tank	809745

5.2 Accessories For Dosing Tanks

Screw cap lock

	Order no.
Lock with key for screw cap	200683



PP Tank connector with strainer

A laboratory ball tap and hose connector made of PP for connecting the dosing pump at the base of the dosing tank.

A hole with a \varnothing of 17 mm is required on the construction side.

Material	o \varnothing x i \varnothing mm	Order no.
PP	6 x 4	809947
PP	8 x 5	809948
PP	10 x 4	1002933
PP	12 x 9	809949
PP	12 x 6	809950

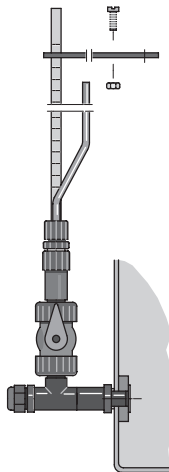
PVC Tank connector with strainer

Material	o \varnothing x i \varnothing mm	Order no.
PVC	6 x 4	814566
PVC	8 x 5	814567
PVC	10 x 4	1002934
PVC	12 x 9	814568
PVC	12 x 6	814569

PVC Calibration assembly

For checking the dosing volumes and indicating the liquid level; with a graduated measuring tube having 1 ml graduations, a foot valve, a multi-way valve and the necessary fittings. (Specific information should be given when ordering when there are differing hose and tank sizes).

Suction pipe \varnothing mm	Tank contents Litres	Order no.
6	35, 60	914740
8	60	914741
8	100, 140	914742
12	250	914743
12	500, 1,000	914744

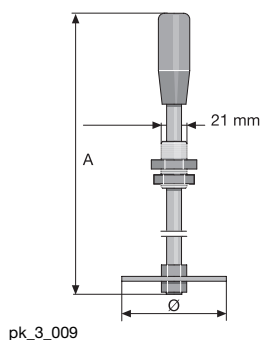


5.2 Accessories For Dosing Tanks

5.2.2 Stirrers

PP Hand mixer

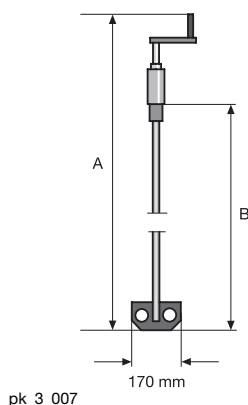
completely assembled.



	A mm	Ø mm	Order no.
for tanks 35 and 60 l	515	90	741118
for tanks 100 and 140 l	715	90	741119
for tanks 250 and 500 l	1,040	130	741120

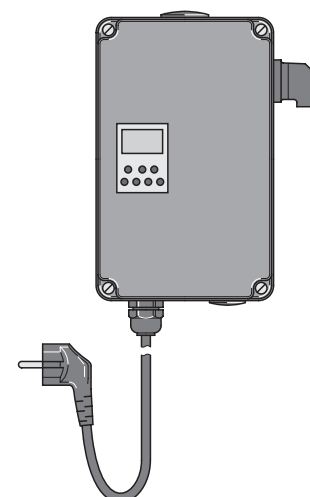
PP Hand stirrer

with crank, completely assembled



	A mm	B mm	Order no.
for tank 60 l	670	465	914701
for tank 100 l	855	650	914738
for tank 140 l	965	765	914702
for tank 250 and 500 l	1,175	965	914703
for tank 1000 l	1,240	1,040	914705

Timer with digital clock



	Order no.
In plastic housing for the control of a stirrer or a metering pump, 230 V, 50 Hz, max. 6A, IP 65. Day and week programs, shortest switching time 1 min. with 2 m power cable and euro plug.	1005561

Agitators are to be operated only via the motor protection switch!

5.2 Accessories For Dosing Tanks

Stainless steel electric stirrer

For batching and mixing of liquids of up to max. 500 mPas viscosity. Intermittent operation via time switch clock recommended.

Wide range voltage motor with 1400 rpm, insulation class F, suitable for tropic, stainless steel 1.4571 shaft, polypropylene (PP) turbine or PVDF for 1000 l.

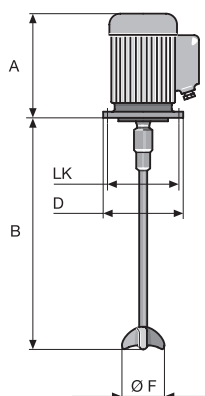
The 0.02-0.25 kW motors run on a single-phase 230 V/50-60 Hz AC supply.

The 0.75 kW motor runs on a three-phase 380-415 V/50-60 Hz AC supply.

A motor safety switch is to be fitted on site for all motors.

Not suitable for gas-emitting media.

	El. connection	Enclosure rating	Order no.
for tank 60 l	20 W/230 V/0.38 A	IP55	818576
for tank 100 l	180 W/230 V/1.40 A	IP55	1001566
for tank 140 l	180 W/230 V/1.40 A	IP55	791502
for tank 250 l	180 W/230 V/1.40 A	IP55	791503
for tank 500 l	250 W/230 V/1.80 A	IP55	791504
for tank 1000 l	750 W/400 V/2.00 A	IP55	791458



pk_3_008

Size	A	B	Ø D	Ø LK	Ø F
60	195	490	115	100	70
100	200	675	160	130	70
140	200	780	160	130	70
250	200	950	160	130	70
500	200	950	160	130	70
1000	230	1190	200	165	130

Chemical resistant electric stirrer

Extended range motor, speed 1400 rpm, insulation class F, insulated for tropics, stainless steel shaft with PVDF coating, hard PP agitator blades.

The 0.02-0.25 kW motors run on a single-phase 230 V/50-60 Hz AC supply.

The 0.75 kW motor runs on a three-phase 380-415 V/50-60 Hz AC supply.

A motor safety switch is to be fitted on site for all motors..

Not suitable for gas-emitting media.

	El. connection	Enclosure rating	Order no.
for tank 60 l	20 W/230 V/0.38 A	IP55	818577
for tank 100 l	180 W/230 V/1.40 A	IP55	1002035
for tank 140 l	180 W/230 V/1.40 A	IP55	791454
for tank 250 l	180 W/230 V/1.40 A	IP55	791455
for tank 500 l	250 W/230 V/1.80 A	IP55	791456
for tank 1000 l	750 W/400 V/2.00 A	IP55	791457

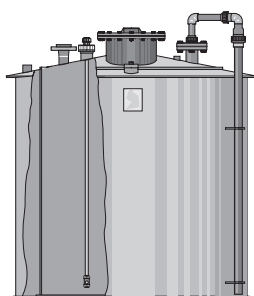
5.3 Storage Tanks PP/PE

5.3.1 PE/PP Tanks And Apparatus

Plastic tanks are indispensable in today's system technology. That's one reason why we have expanded our product range in terms of welded tanks and apparatus produced from thermoplastics; polyethylene (PE) and polypropylene (PP). These technologically proven materials have high resistance to an extremely wide range of chemicals and can be processed in extremely flexible ways making them ideal for a wide spectrum of applications.

- Waste water technology
- Electroplating
- Storage, including chemicals which cannot come into contact with water
- Exhaust air treatment
- Domestic technology
- Drinking and process water treatment
- Swimming pool technology, etc.

5.3.2 PE Storage Tank With General WHG Approval



pk_3_014

The storage of chemicals which cannot come into contact with water (Water Hazard Class WGK 0-3) stipulates strict official conditions.

We supply tanks in accordance with German WHG §19 I admission suitable for internal and outdoor locations. The tanks are available complete with monitoring accessories, level control unit, filling facility, heating, discharge and metering facility up to a storage volume of 12 m³ as standard and up to 25 m³ on request.

Storage tanks PE-HD

- Approval mark Z-40.21-229 in accordance with WHG §19 (Water Resource Management Law)
- Design and manufacture carried out in accordance with the construction and test principles of the DIBT (German Institute of Building Technology)
- For atmospheric pressure operation up to a max. operating temperature of 30 °C
- Material polyethylene PE-HD
- For indoor or outdoor installation
- For chemicals in accordance with DIBT media list

Usable volume 95 % fill level	Internal diameter	External diameter	Height of cylindrical section	Overall height	Weight empty
l	mm	mm	mm	mm	kg
500	800	860	1,050	1,300	50
750	1,000	1,060	1,050	1,300	60
1,000	1,000	1,060	1,350	1,600	70
1,250	1,200	1,260	1,150	1,400	80
1,500	1,200	1,260	1,400	1,650	90
2,000	1,400	1,480	1,400	1,650	100
2,500	1,400	1,480	1,700	1,950	130
3,000	1,600	1,680	1,550	1,800	170
3,500	1,700	1,780	1,550	1,800	190
4,000	1,700	1,780	1,850	2,100	220
5,000	1,900	1,980	1,850	2,100	280
6,000	2,000	2,080	1,950	2,250	350
7,000	2,150	2,250	1,950	2,250	400
8,000	2,150	2,250	2,250	2,550	500
10,000	2,150	2,250	2,900	3,200	600
12,000	2,150	2,250	3,400	3,700	700

Other tank sizes and dimensions and prices available on request.

5.3 Storage Tanks PP/PE

Bunds PE-HD

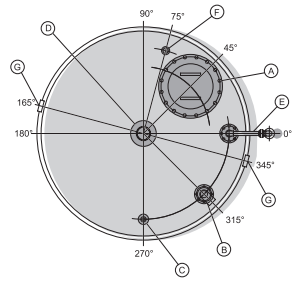
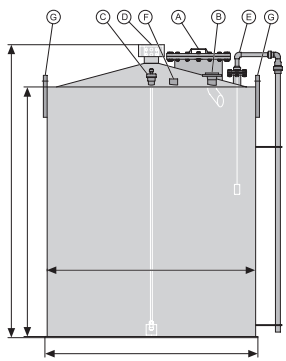
Usable volume 95 % fill level l	Internal diameter mm	External diameter mm	Height of cylindrical section mm	Overall height mm	Weight empty kg
500	1,050	1,150	1,030	1,050	40
750	1,250	1,350	1,030	1,050	45
1,000	1,250	1,350	1,280	1,300	50
1,250	1,450	1,550	1,080	1,100	55
1,500	1,450	1,550	1,330	1,350	60
2,000	1,650	1,750	1,280	1,300	70
2,500	1,650	1,750	1,600	1,620	90
3,000	1,850	1,950	1,470	1,500	105
3,500	1,950	2,050	1,470	1,500	120
4,000	1,950	2,050	1,750	1,780	140
5,000	2,150	2,250	1,750	1,780	160
6,000	2,250	2,350	1,900	1,950	200
7,000	2,390	2,490	1,910	1,960	220
8,000	2,390	2,490	2,200	2,250	270
10,000	2,390	2,490	2,750	2,800	350
12,000	2,390	2,490	3,300	3,350	450

Other tank sizes and dimensions and prices available on request.

5.3 Storage Tanks PP/PE

Standard equipment of our storage tanks and bunds with approval marks

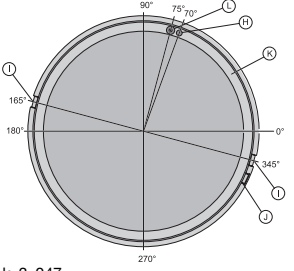
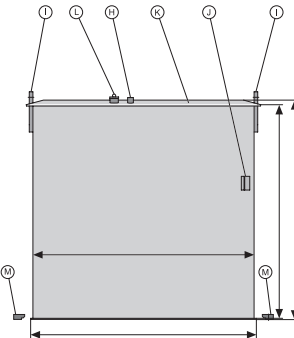
for indoor or outdoor installation; other internal fittings/accessories on request.



pk_3_046

Item	Quantity	Name	500 l - 1,250 l	1,500 l - 2,000 l	2,500 l - 3,500 l	4,000 l - 12,000 l
A	1	Handhole/manhole, bolted 1.4301	DN 250	DN 250	DN 500	DN 500
B	1	Filling connection with 45° inlet elbow	DN 32	DN 50	DN 50	DN 50
C	1	Sampling pipe PVC/EPDM	DN 15	DN 15	DN 15	DN 20
D	1	Vent pipe with dome	DN 80	DN 100	DN 100	DN 100
E	1	Cable-operated level indicator	DN 80/40	DN 80/40	DN 80/40	DN 80/40
F	1	Screwed socket for overflow protection	Rp 2"	Rp 2"	Rp 2"	Rp 2"
G	2	Crane lifting eye	-	yes	yes	yes

Bunds for external installation



pk_3_047

Item	Quantity	Name	500 l - 1,250 l	1,500 l - 12,000 l
H	1	Leakage probe support	Rp 2"	Rp 2"
I	2	Crane lifting eye	-	yes
J	1	Rating plate	yes	yes
K	1	Rain collar	yes	yes
L	1	Inspection port	yes	yes
M	1	Floor claw set	yes	yes

Bunds for installation

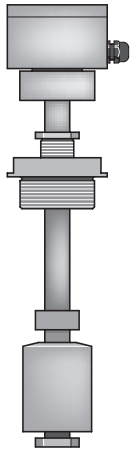
Item	Quantity	Name	500 l - 1,250 l	1,500 l - 12,000 l
H	1	Leakage probe support	Rp 2"	Rp 2"
I	2	Crane lifting eye	-	yes
J	1	Rating plate	yes	yes

5.3 Storage Tanks PP/PE

Accessories Meeting The Requirements Of WHG § 19 and VAWS (Directive On Systems For Storage And Handling Of Water-Endangering Substances)

Overfill protection with approval mark

Level detector T200 with float as max. level limit switch, without downstream transmitter, see below. Length 500 mm.

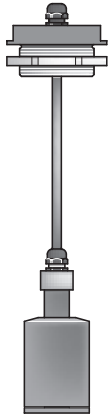


pk_3_037

	Order no.
Overfill protection with approval mark	1009334

Leakage probe with approval mark

Leakage detection system T200 consisting of level detector with float, without downstream transmitter, see below. Length 3,000 mm.

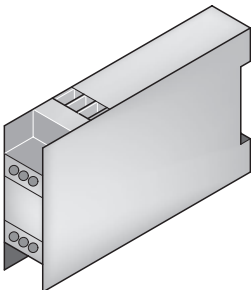


pk_3_038

	Order no.
Leakage probe with approval mark	1009340

Transmitter with approval mark

For installation in control cabinets by others, suitable for leakage and overfill protection.



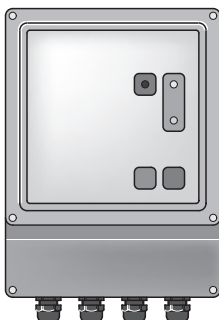
pk_3_040

	Order no.
Transmitter with approval mark	1009348

Alarm indicator unit

For overfill protection and leakage probe with approval mark, complete with signal horn and two transmitters.

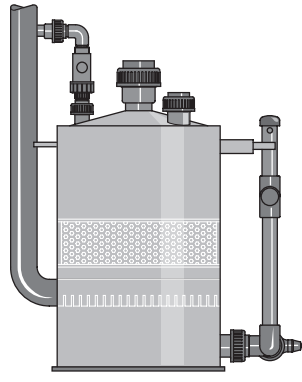
Price on request.



pk_3_039

5.3 Storage Tanks PP/PE

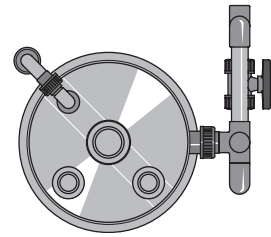
Absorption vessel



For ventilation of sealed storage tanks.

Material: polyethylene PE-HD complete with connections, ball valve PVC/EPDM and fixed pipework to storage tank; sizes and prices according to tank volume and stored medium.

Price on request.



pk_3_041

Acid vapour separator



Size and combining agent according to tank volume and stored medium.

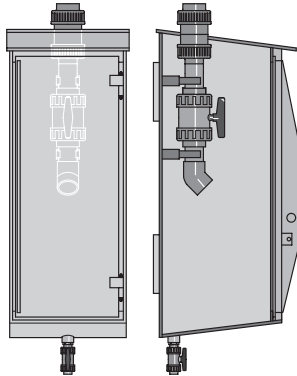
Price on request.

pk_3_042

5.3 Storage Tanks PP/PE

Other Accessories

Chemical filling station



pk_3_043

Suitable for third-party wall mounting.

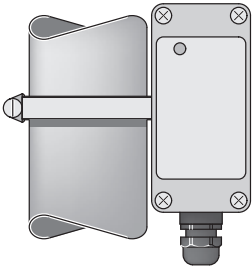
Material: polyethylene PE-HD.

Size: approx. 420x420x1000 mm (LxWxH), complete with ball valve DN 50 PVC/EPDM, threaded connector DN 50 and drip tray with ball valve DN 25

PVC/EPDM connection: Rp 20 (parallel female thread)

Other internal fittings such as tanker couplings, automatic valves, heating, etc. are possible; prices on request.

Bistable changeover contact



pk_3_044

With approval mark for fitting on cable-operated level indicator.

	Order no.
Bistable changeover contact	1009349

Storage tank heating



pk_3_045

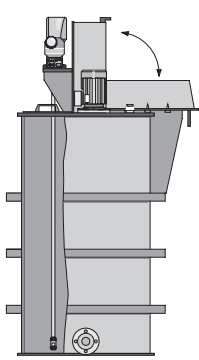
With temperature and level control for run-dry protection; on request, according to stored medium and tank volume.

Optional in addition to insulation of the storage tank.

Price on request.

5.3 Storage Tanks PP/PE

5.3.3 PP/PE Storage Tanks, Custom-Built



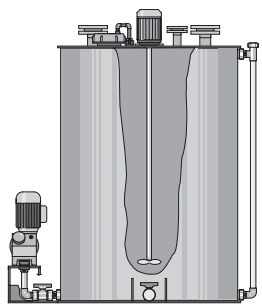
pk_3_015

Very often, space considerations or system requirements prevent the use of conventional dosing containers.

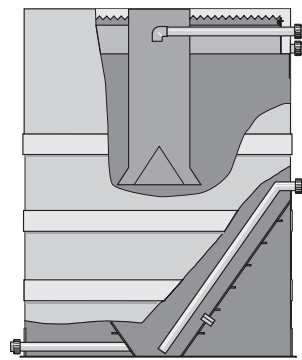
In many cases space constraints or system-specific requirements prevent the use of ready-made dosing containers.

With welded PE/PP tanks we can solve this problem. A tank can be optimally adapted to your specific requirements.

In addition, system installations and appliances such as salt-dissolving baskets, sack-pouring equipment, adsorption containers, angled and hopper bases can be added to improve or enhance the tank functions.



pk_3_016



pk_3_017

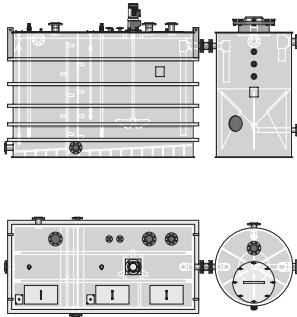
Circular tanks

- Material polyethylene PE-HD or polypropylene PP
- Base design, flat base, tapered base, sloping base
- Roof design, flat roof, tapered roof or open, suitable for atmospheric pressure operation at operating temperatures up to 80 °C
- Standard equipment: 2 crane lifting eyes on circular tanks with usable volumes above 2000 litres
- Prices on request according to application

Usable volume 95 % fill level	Internal diameter	External diameter	Height of cylindrical section	Overall height
l	mm	mm	mm	mm
500	800	860	1,050	1,070
750	1,000	1,060	1,050	1,070
1,000	1,000	1,060	1,350	1,370
1,250	1,200	1,260	1,150	1,170
1,500	1,200	1,260	1,400	1,425
2,000	1,400	1,480	1,400	1,425
2,500	1,400	1,480	1,700	1,730
3,000	1,600	1,680	1,550	1,580
3,500	1,700	1,780	1,550	1,580
4,000	1,700	1,780	1,850	1,880
5,000	1,900	1,980	1,850	1,880
6,000	2,000	2,080	1,950	1,980
7,000	2,150	2,250	1,950	1,990
8,000	2,150	2,250	2,250	2,290
10,000	2,150	2,250	2,900	2,950
12,000	2,150	2,250	3,400	3,450

Other tank sizes up to 25 m³ and dimensions available on request.

5.3 Storage Tanks PP/PE



pk_3_048

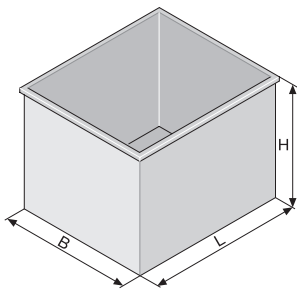
Rectangular tanks

- Material polyethylene PE-HD or polypropylene PP
- Base design, flat base or sloping base, full-face contact with foundation
- Roof design, flat roof or open, suitable for atmospheric pressure operation at operating temperatures up to 80 °C
- Surrounding steel tube reinforcement, PE or PP coated
- Standard equipment: 4 crane lifting eyes on rectangular tanks with usable volumes above 2000 litres.
- Prices on request according to application

Usable volume 95 % fill level	Internal dimensions (L x W x H) mm	External dimensions (L x W x H) mm
l	mm	mm
500	950 x 750 x 750	1,100 x 900 x 770
750	1,000 x 1,000 x 800	1,150 x 1,150 x 820
1,000	1,000 x 1,000 x 1,060	1,150 x 1,150 x 1,080
1,250	1,250 x 1,000 x 1,060	1,400 x 1,150 x 1,080
1,500	1,500 x 1,000 x 1,060	1,750 x 1,250 x 1,090
2,000	1,500 x 1,250 x 1,130	1,750 x 1,500 x 1,160
2,500	1,750 x 1,250 x 1,210	2,000 x 1,500 x 1,240
3,000	1,750 x 1,250 x 1,450	2,000 x 1,500 x 1,480
3,500	1,750 x 1,500 x 1,410	2,000 x 1,750 x 1,440
4,000	2,000 x 1,500 x 1,410	2,250 x 1,750 x 1,440
5,000	2,500 x 1,500 x 1,410	2,750 x 1,750 x 1,440
6,000	2,500 x 1,750 x 1,450	2,750 x 2,000 x 1,480
7,000	2,500 x 1,750 x 1,700	2,750 x 2,000 x 1,730
8,000	2,500 x 2,000 x 1,700	2,750 x 2,250 x 1,730
10,000	3,000 x 2,000 x 1,760	3,350 x 2,350 x 1,800
12,000	3,500 x 2,000 x 1,810	3,850 x 2,350 x 1,850
15,000	4,000 x 2,000 x 2,000	4,350 x 2,350 x 2,050

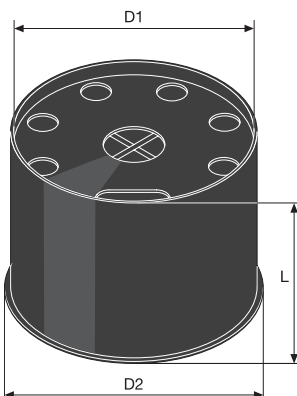
Other tank sizes up to 25 m³ and dimensions available on request

5.3.4 Drip Trays For PE Supply Drums



pk_3_021

Usable capacity	Material	External dimensions (L x W x H) mm	Internal dimensions (L x W x H) mm	Order no.
l		mm	mm	
40	PE black	500 x 400 x 266	450 x 350 x 260	791726
70	PE black	500 x 430 x 378	470 x 400 x 370	740309



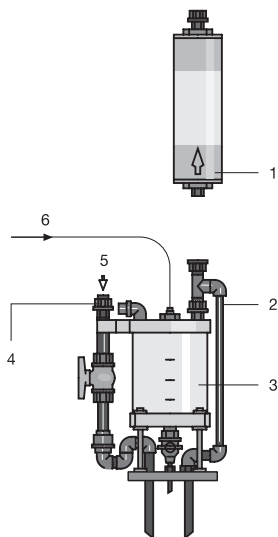
pk_3_022

Usable capacity	Material	D2	D1	H	Order no.
l		mm	mm	mm	
250	PE-neutral	840	800	508	791727

5.3 Storage Tanks PP/PE

5.3.5 PVC Batch Box

For metering solutions of concentrated fluids e. g. hydrazine, ammonia, caustic soda etc. The batch box is designed for attachment to our 140 and 250/500 litre dosing tanks.



pk_3_023

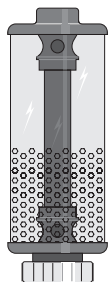
- 1 Activated carbon filter
- 2 Venting line
- 3 Batch box
- 4 Gas displacement tubing
- 5 Water intake
- 6 Fluid concentrate

Batch Box	Usable capacity	Tanks	Order no.
	l		
Disposable drums	2	140 l	1020438
Disposable drums	5	250/500 l	1020441
Reusable drums	2	140 l	1020443
Reusable drums	5	250/500 l	1020455

	Order no.
Activated carbon filter with bracket	1020442

5.3.6 Chemical Vapour Lock

Compact chemical vapour lock with screw-attachment for a tank. The chemical vapour lock is filled with the binder Cosa D and is ideal for the storage of aluminium chloride, formic acid, hydrochloric acid, phosphoric acid etc.

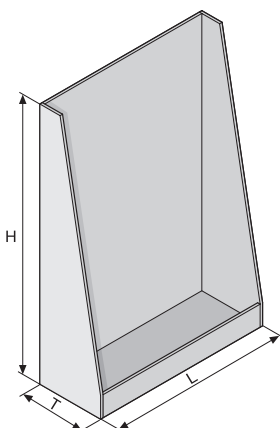


pk_3_024

	Usable capacity	Exhaust air, max.	DN	Order no.
	l	l/h		
SDA-90	0.5	1,300	DN 25	1020457
SDA-160	7.0	9,500	DN 65	1020458

5.3.7 PP Mounting Rack

with integrated drip tray for mounting metering station.

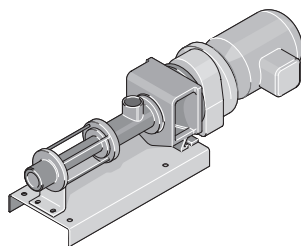


pk_3_025

Dimensions H x W x D	Order no.
mm	
1,200 x 800 x 300	1008779
1,200 x 800 x 400	1008780

5.4 Spectra Eccentric Screw Pump

5.4.1 Spectra: Transfer Pumps For Polymer Solutions



pk_3_032

The Spectra eccentric screw pumps were designed for the metering of polymer solutions. Stators in FPM, rotors in stainless steel (Cr Ni Mo 17-12-2) and floating ring seals reduce the maintenance effort and can still be used even if oleiferous polymer solutions are metered.

The pumps are offered in the following types:

- Spectra with manually adjustable gear
- Spectra for frequency converter operation with external fan

Spectra with manual gearbox:

without base plate

	Delivery rate at 3 bar	Maximum back pressure bar	Power Uptake kW	Order no.
Spectra 12/2 H	0.6...2.2 l/h	12	0.37	1025244
Spectra 12/13 H	2.4...13.2 l/h	12	0.37	1025245
Spectra 12/30 H	6.5...30.0 l/h	12	0.37	1025246
Spectra 12/105 H	20.0...105.0 l/h	12	0.37	1025247
Spectra 6/300 H	50.0...300.0 l/h	6	0.37	1025248
Spectra 6/600 H	110.0...600.0 l/h	6	0.75	1025249
Spectra 5/1400 H	300.0...1,400.0 l/h	5	0.75	1025250
Spectra 3/3000 H	600.0...3,000.0 l/h	3	1.10	1025251
Spectra 3/6000 H	1,000.0...6,000.0 l/h	3	1.50	1025252
Spectra 3/12000 H	2,000.0...12,000.0 l/h	3	2.20	1025253

with base plate

	Delivery rate at 3 bar	Maximum back pressure bar	Power Uptake kW	Order no.
Spectra 12/2 HB	0.6...2.2 l/h	12	0.37	1025254
Spectra 12/13 HB	2.4...13.2 l/h	12	0.37	1025255
Spectra 12/30 HB	6.5...30.0 l/h	12	0.37	1025256
Spectra 12/105 HB	20.0...105.0 l/h	12	0.37	1025257
Spectra 6/300 HB	50.0...300.0 l/h	6	0.37	1025258
Spectra 6/600 HB	110.0...600.0 l/h	6	0.75	1025259
Spectra 5/1400 HB	300.0...1,400.0 l/h	5	0.75	1025260
Spectra 3/3000 HB	600.0...3,000.0 l/h	3	1.10	1025261
Spectra 3/6000 HB	1,000.0...6,000.0 l/h	3	1.50	1025262
Spectra 3/12000 HB	2,000.0...12,000.0 l/h	3	2.20	1025263

5.4 Spectra Eccentric Screw Pump

Spectra for frequency converter operation with external fan

without base plate

	Delivery rate at 3 bar	Maximum back pressure bar	Power Uptake kW	Order no.
Spectra 12/2 F	0.1...2.4 l/h	12	0.37	1025284
Spectra 12/13 F	0.6...13.2 l/h	12	0.37	1025285
Spectra 12/33 F	2.4...33.0 l/h	12	0.37	1025286
Spectra 12/100 F	5.0...100.0 l/h	12	0.37	1025287
Spectra 6/300 F	20.0...300.0 l/h	6	0.37	1025288
Spectra 6/650 F	40.0...650.0 l/h	6	0.55	1025289
Spectra 5/1400 F	50.0...1,400.0 l/h	5	0.75	1025290
Spectra 3/3000 F	100.0...3,000.0 l/h	3	0.75	1025291
Spectra 3/6500 F	100.0...6,500.0 l/h	3	1.50	1025292
Spectra 3/12000 F	400.0...12,000.0 l/h	3	2.20	1025293

with base plate

	Delivery rate at 3 bar	Maximum back pressure bar	Power Uptake kW	Order no.
Spectra 12/2 FB	0.1...2.4 l/h	12	0.37	1025294
Spectra 12/13 FB	0.6...13.2 l/h	12	0.37	1025295
Spectra 12/33 FB	2.4...33.0 l/h	12	0.37	1025296
Spectra 12/100 FB	5.0...100.0 l/h	12	0.37	1025297
Spectra 6/300 FB	20.0...300.0 l/h	6	0.37	1025298
Spectra 6/650 FB	40.0...650.0 l/h	6	0.55	1025299
Spectra 5/1400 FB	50.0...1,400.0 l/h	5	0.75	1025300
Spectra 3/3000 FB	100.0...3,000.0 l/h	3	0.75	1025301
Spectra 3/6500 FB	100.0...6,500.0 l/h	3	1.50	1025302
Spectra 3/12000 FB	400.0...12,000.0 l/h	3	2.20	1025303

The frequency converters are not included in the standard delivery.

5.4 Spectra Eccentric Screw Pump

Frequency converters for Spectra F:

		recommended for pumps up to	Order no.
SK550/1 FCT	0.55 kW, 1 ph, 230 V, incl. control panel	0.37 kW	1010980
SK750/1 FCT	0.75 kW, 1 ph, 230 V, incl. control panel	0.55 kW	1010981
SK1100/1 FCT	1.10 kW, 1 ph, 230 V, incl. control panel	0.75 kW	1025304
SK1500/1 FCT	1.50 kW, 1 ph, 230 V, incl. control panel	1.10 kW	1010982
SK2200/3 FCT	2.20 kW, 3 ph, 400 V, incl. control panel	2.20 kW	1025305

5.4.2

Spare Parts

	Order no.
Stator FPM for Spectra 12/2	1025306
Stator FPM for Spectra 12/13	1025307
Stator FPM for Spectra 12/30, 12/33	1025308
Stator FPM for Spectra 12/105, 12/100	1025309
Stator FPM for Spectra 6/300	1025310
Stator FPM for Spectra 6/600, 6/650	1025311
Stator FPM for Spectra 5/1400	1025312
Stator FPM for Spectra 3/3000	1025313
Stator FPM for Spectra 3/6000, 3/6500	1025314
Stator FPM for Spectra 3/12000	1025315
Rotor Cr Ni Mo 17-12-2 for Spectra 12/2	1025316
Rotor Cr Ni Mo 17-12-2 for Spectra 12/13	1025317
Rotor Cr Ni Mo 17-12-2 for Spectra 12/30, 12/33	1025318
Rotor Cr Ni Mo 17-12-2 for Spectra 12/105, 12/100	1025319
Rotor Cr Ni Mo 17-12-2 for Spectra 6/300	1025320
Rotor Cr Ni Mo 17-12-2 for Spectra 6/600, 6/650	1025321
Rotor Cr Ni Mo 17-12-2 for Spectra 5/1400	1025322
Rotor Cr Ni Mo 17-12-2 for Spectra 3/3000	1025323
Rotor Cr Ni Mo 17-12-2 for Spectra 3/6000, 3/6500	1025324
Rotor Cr Ni Mo 17-12-2 for Spectra 3/12000	1025325
Spare parts kit mech. sealing for Spectra 12/2 - 12/105	1025326
Spare parts kit mech. sealing for Spectra 6/300 - 5/1400	1025330
Spare parts kit mech. sealing for Spectra 3/3000	1025333
Spare parts kit mech. sealing for Spectra 3/6000, 3/6500	1025334
Spare parts kit mech. sealing for Spectra 3/12000	1025335
Pin joints spare parts kit Spectra 12/2 - 12/105	1025346
Pin joints spare parts kit Spectra 6/300 - 5/1400	1025350
Pin joints spare parts kit Spectra 3/3000	1025353
Pin joints spare parts kit Spectra 3/6000, 3/6500	1025354
Pin joints spare parts kit Spectra 3/12000	1025355

5.4 Spectra Eccentric Screw Pump

5.4.3 Technical Data

	Weight kg	Dimensions L x W x H (mm)	Housing material	Material rot. parts	Suction/discharge connection
Spectra 12/2 H	20	825 x 270 x 197	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/13 H	20	825 x 270 x 197	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/30 H	20	825 x 270 x 197	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/105 H	20	825 x 270 x 197	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 6/300 H	36	985 x 270 x 212	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 6/600 H	36	1,021 x 270 x 220	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 5/1400 H	36	1,021 x 270 x 220	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/3000 H	51	1,147 x 270 x 218	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/6000 H	71	1,354 x 270 x 249	Grey cast iron	Cr Ni Mo 17-12-2	DN 50, flange
Spectra 3/12000 H	116	1,812 x 270 x 337	Grey cast iron	Cr Ni Mo 17-12-2	DN 65, flange
Spectra 12/2 HB	24	825 x 270 x 285	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/13 HB	24	825 x 270 x 285	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/30 HB	24	825 x 270 x 285	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/105 HB	24	825 x 270 x 285	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 6/300 HB	43	985 x 270 x 292	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 6/600 HB	43	1,021 x 270 x 300	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 5/1400 HB	43	1,021 x 270 x 300	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/3000 HB	59	1,147 x 270 x 298	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/6000 HB	82	1,354 x 270 x 327	Grey cast iron	Cr Ni Mo 17-12-2	DN 50, flange
Spectra 3/12000 HB	131	1,812 x 270 x 417	Grey cast iron	Cr Ni Mo 17-12-2	DN 65, flange
Spectra 12/2 F	24	739 x 200 x 182	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/13 F	24	739 x 200 x 182	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/33 F	24	739 x 200 x 182	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/100 F	24	739 x 200 x 182	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 6/300 F	26	874 x 223 x 192	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 6/650 F	26	874 x 223 x 192	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 5/1400 F	26	874 x 223 x 192	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/3000 F	36	950 x 223 x 193	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/6500 F	56	1,172 x 237 x 224	Grey cast iron	Cr Ni Mo 17-12-2	DN 50, flange
Spectra 3/12000 F	81	1,487 x 264 x 244	Grey cast iron	Cr Ni Mo 17-12-2	DN 65, flange
Spectra 12/2 FB	28	739 x 220 x 232	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/13 FB	28	739 x 220 x 232	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/33 FB	28	739 x 220 x 232	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 12/100 FB	28	739 x 220 x 232	Cr Ni Mo 17-12-2	Cr Ni Mo 17-12-2	1/2", female
Spectra 6/300 FB	33	874 x 230 x 242	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 6/650 FB	33	874 x 230 x 242	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 5/1400 FB	33	874 x 230 x 242	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/3000 FB	44	950 x 230 x 242	Grey cast iron	Cr Ni Mo 17-12-2	1 1/4", female
Spectra 3/6500 FB	67	1,172 x 237 x 274	Grey cast iron	Cr Ni Mo 17-12-2	DN 50, flange
Spectra 3/12000 FB	96	1,487 x 265 x 294	Grey cast iron	Cr Ni Mo 17-12-2	DN 65, flange

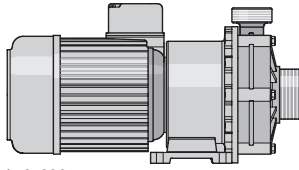
5.4.4 Motor Data

Type	Phases (el. connection)	Frequency	Enclosure rating	
Type H	3 ph	400	50	IP 55
Type F	3 ph	400	50	IP 55

3 PTC thermistors in winding
external fan: 1~, 230 VAC, 50 Hz

5.5 von Taine® Centrifugal Pump

5.5.1 von Taine® Magnetically Coupled Centrifugal Pumps



pk_3_026

Metering pumps for liquid media.

von Taine® pumps are magnetically coupled centrifugal pumps. Thanks to the magnetic coupling, the pumps transport the liquid media leak-free from container to container or from a container into a pressure line. The von Taine® centrifugal pumps deliver media up to 22,500 l/hr and up to a delivery height of 23.5 metres. Because the capacity heavily depends on the backpressure, the delivery characteristic must be absolutely observed. When selecting the pumps, the material compatibility is to be checked and density, viscosity, solid fraction, and temperature of the delivered medium are to be considered. A low solid fraction in the delivered medium is permissible. The pump is not self-priming and requires a feed.

The following material types are available:

- Pump head: PP or PVDF
- Gaskets: FPM or EPDM

The bearings of the pumps are made of "oxide ceramics" and may not run dry. The pump is to be protected against running dry. The hydraulic connections are equipped with pipe threads according to DIN ISO 228-1 (internal and external thread cylindrical).

von Taine®, PP/FPM version

	Feed rate max. l/h	Feed lift max. m	Power Uptake kW	Voltage/frequency	Weight	Order no.
von Taine® 0502 PP/FPM	1,800	4.5	0.06	1~/230 V/50 Hz	2.7 kg	1023089
von Taine® 0807 PP/FPM	6,600	7.9	0.25	3~/400 V/50 Hz	5.0 kg	1023090
von Taine® 1010 PP/FPM	9,600	10.0	0.37	3~/400 V/50 Hz	7.6 kg	1023091
von Taine® 1313 PP/FPM	13,200	13.2	0.65	3~/400 V/50 Hz	8.7 kg	1023092
von Taine® 1820 PP/FPM	19,500	18.1	1.10	3~/400 V/50 Hz	16.0 kg	1023093
von Taine® 2323 PP/FPM	22,500	23.5	1.50	3~/400 V/50 Hz	17.0 kg	1023094

von Taine®, PVDF/FPM version

	Feed rate max. l/h	Feed lift max. m	Power Uptake kW	Voltage/frequency	Weight	Order no.
von Taine® 0502 PVDF/FPM	1,800	4.5	0.06	1~/230 V/50 Hz	2.8 kg	1023095
von Taine® 0807 PVDF/FPM	6,600	7.9	0.25	3~/400 V/50 Hz	5.2 kg	1023096
von Taine® 1010 PVDF/FPM	9,600	10.0	0.37	3~/400 V/50 Hz	8.0 kg	1023097
von Taine® 1313 PVDF/FPM	13,200	13.2	0.65	3~/400 V/50 Hz	9.0 kg	1023098
von Taine® 1820 PVDF/FPM	19,500	18.2	1.10	3~/400 V/50 Hz	16.7 kg	1023099
von Taine® 2323 PVDF/FPM	22,500	23.5	1.50	3~/400 V/50 Hz	17.7 kg	1023100

5.5 von Taine® Centrifugal Pump

von Taine®, PP/EPDM version

	Feed rate max. l/h	Feed lift max. m	Power Uptake kW	Voltage/frequency	Weight	Order no.
von Taine® 0502 PP/EPDM	1,800	4.5	0.06	1~/230 V/50 Hz	2.7 kg	1028551
von Taine® 0807 PP/EPDM	6,600	7.9	0.25	3~/400 V/50 Hz	5.0 kg	1028552
von Taine® 1010 PP/EPDM	9,600	10.0	0.37	3~/400 V/50 Hz	7.6 kg	1028553
von Taine® 1313 PP/EPDM	13,200	13.2	0.65	3~/400 V/50 Hz	8.7 kg	1028564
von Taine® 1820 PP/EPDM	19,500	18.1	1.10	3~/400 V/50 Hz	16.0 kg	1028565
von Taine® 2323 PP/EPDM	22,500	23.5	1.50	3~/400 V/50 Hz	17.0 kg	1028566

von Taine®, PVDF/EPDM version

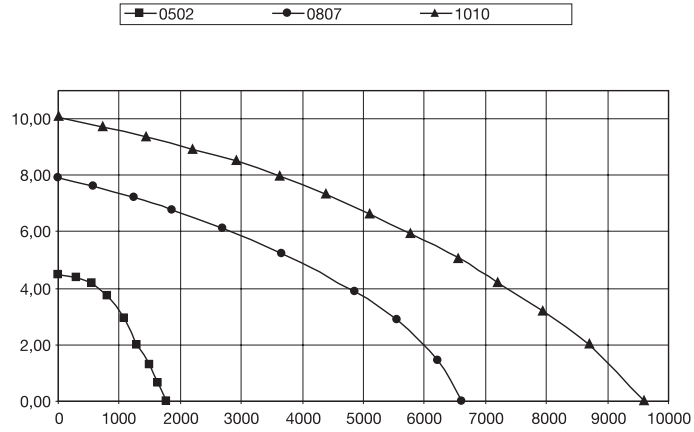
	Feed rate max. l/h	Feed lift max. m	Power Uptake kW	Voltage/frequency	Weight	Order no.
von Taine® 0502 PVDF/EPDM	1,800	4.5	0.06	1~/230 V/50 Hz	2.8 kg	1028567
von Taine® 0807 PVDF/EPDM	6,600	7.9	0.25	3~/400 V/50 Hz	5.2 kg	1028568
von Taine® 1010 PVDF/EPDM	9,600	10.0	0.37	3~/400 V/50 Hz	8.0 kg	1028569
von Taine® 1313 PVDF/EPDM	13,200	13.2	0.65	3~/400 V/50 Hz	9.0 kg	1028570
von Taine® 1820 PVDF/EPDM	19,500	18.1	1.10	3~/400 V/50 Hz	16.7 kg	1028571
von Taine® 2323 PVDF/EPDM	22,500	23.5	1.50	3~/400 V/50 Hz	17.7 kg	1028572

Parameters For Use

	Medium temperature max. °C	Maximum density kg/dm ³	max. Viscosity m Pas	max. System pressure at 20° C bar
von Taine® 0502 PP	80	1.25...1.35	20	1.0
von Taine® 0807 PP	80	1.20...1.80	20	2.5
von Taine® 1010 PP	80	1.60...2.00	20	2.5
von Taine® 1313 PP	80	1.60...1.90	20	2.5
von Taine® 1820 PP	80	1.10...1.80	20	5.0
von Taine® 2323 PP	80	1.00...2.00	20	5.0
von Taine® 0502 PVDF	95	1.25...1.35	20	1.0
von Taine® 0807 PVDF	95	1.20...1.80	20	2.5
von Taine® 1010 PVDF	95	1.60...2.00	20	2.5
von Taine® 1313 PVDF	95	1.60...1.90	20	2.5
von Taine® 1820 PVDF	95	1.10...1.80	20	5.0
von Taine® 2323 PVDF	95	1.00...2.00	20	5.0

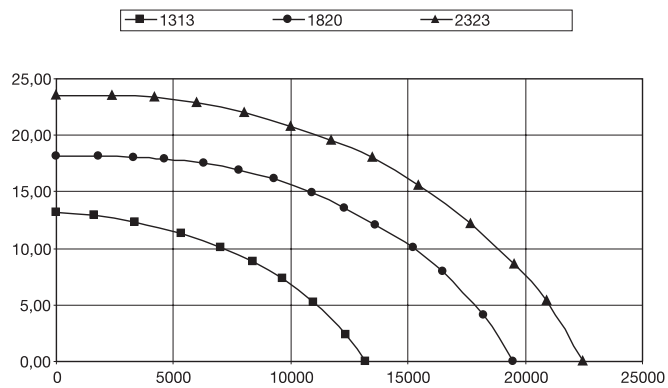
5.5 von Taine® Centrifugal Pump

Characteristic Curves



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Delivered quantity [l/h] as a function of delivery head [mWC]

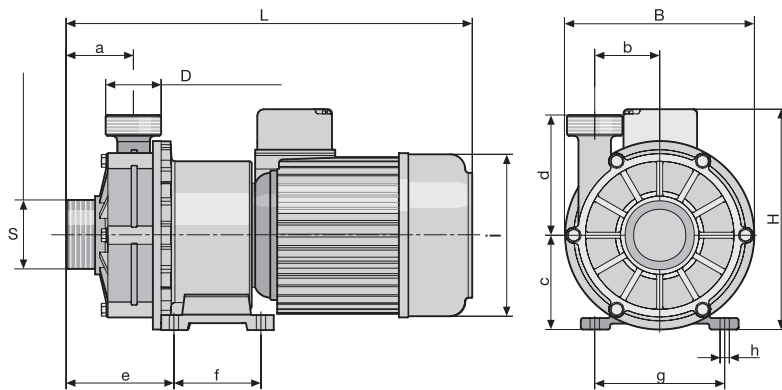


pk_2_115

Delivered quantity [l/h] as a function of delivery head [mWC]

5.5 von Taine® Centrifugal Pump

Dimensions



pk_3_027

		von Taine® 0502 PVDF	von Taine® 0807 PVDF	von Taine® 1010 PVDF	von Taine® 1313 PVDF	von Taine® 1820 PVDF	von Taine® 2323 PVDF
Discharge connector (D)		G 1"	G 1 1/4"	G 1 1/2"	G 1 1/2"	G 2"	G 2"
Suction connector (S)		G 1 1/4"	G 1 1/4"	G 2"	G 2"	G 2 1/4"	G 2 1/4"
L	mm	240	283	320	350	430	430
B	mm	120	138	163	163	205	205
H	mm	145	185	191	191	227	227
a	mm	37.0	45.0	58.5	58.5	70.0	70.0
b	mm	29.5	29.5	56.0	56.0	70.0	70.0
c	mm	60.0	70.0	82.0	82.0	104.5	104.5
d	mm	65.5	86.0	104.0	104.0	134.5	134.5
e	mm	129	50	106	106	115	115
f	mm	78	71	74	74	100	100
g	mm	91	91	114	114	130	130
h	mm	6.5	8.5	8.5	8.5	10.0	10.0
i	mm	92	135	135	135	155	155
Enclosure rating		IP 55	IP 55	IP 55	IP 55	IP 55	IP 55
Min. flow	l/h	30	60	60	60	90	120

5.5 von Taine® Centrifugal Pump

5.5.2

Spare Parts Kits

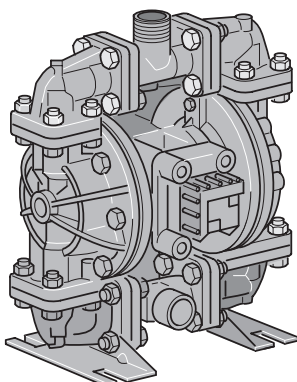
	Order no.
PP/FPM liquid end for von Taine 0502	1023978
PP/FPM liquid end for von Taine 0807	1023979
PP/FPM liquid end for von Taine 1010	1023980
PP/FPM liquid end for von Taine 1313	1023981
PP/FPM liquid end for von Taine 1820	1023982
PP/FPM liquid end for von Taine 2323	1023983
PVDF/FPM liquid end for von Taine 0502	1023994
PVDF/FPM liquid end for von Taine 0807	1023995
PVDF/FPM liquid end for von Taine 1010	1023996
PVDF/FPM liquid end for von Taine 1313	1023997
PVDF/FPM liquid end for von Taine 1820	1023998
PVDF/FPM liquid end for von Taine 2323	1023999

	Order no.
PP/FPM liquid end for von Taine 0502	1028573
PP/FPM liquid end for von Taine 0807	1028574
PP/FPM liquid end for von Taine 1010	1028575
PP/FPM liquid end for von Taine 1313	1028576
PP/FPM liquid end for von Taine 1820	1028577
PP/FPM liquid end for von Taine 2323	1028578
PVDF/FPM liquid end for von Taine 0502	1028579
PVDF/FPM liquid end for von Taine 0807	1028580
PVDF/FPM liquid end for von Taine 1010	1028581
PVDF/FPM liquid end for von Taine 1313	1028582
PVDF/FPM liquid end for von Taine 1820	1028583
PVDF/FPM liquid end for von Taine 2323	1028584

	Order no.
Motor for von Taine 0502	1024000
Motor for von Taine 0807	1024001
Motor for von Taine 1010	1024002
Motor for von Taine 1313	1024003
Motor for von Taine 1820	1024004
Motor for von Taine 2323	1024005

5.6 Duodos Air Operated Diaphragm Pump

5.6.1 Duodos Air Operated Diaphragm Pumps



pk_2_062

Duodos pumps are air operated double diaphragm pumps. Thanks to the operation with air, the pump has no electrical components. Duodos pumps are dry-running safe and self-priming. By adjusting the pressure in the air supply, the delivery rate of the pump can be controlled. The air control is designed for oil-free operation. The maintenance-free air control valve facilitates a trouble-free operation and guarantees a re-start. No pressure-control valves are required, the pump simply stops in case of high backpressure and re-starts automatically if the pressure is released. Duodos pumps are the optimal solution for metering liquid chemicals. Duodos pumps transport media up to approx. 6,700l/h or up to a delivery height of 70m. Because the capacity heavily depends on the backpressure, the delivery characteristic must be absolutely observed. But the differential pressure between the hydraulic and the pneumatic end should not exceed the value of 2 bar. Higher values reduce the life of the pump. When selecting the pump, the material compatibility should be checked. In addition, density, viscosity, solid fraction, and temperature of the delivered medium are to be considered.

The following materials are available:

- PP pump chambers with Santoprene® diaphragms and valves
- PVDF pump chambers with PTFE diaphragms and valves

Parameters For Use

	Min. temperature °C	Max. temperature °C	max. Viscosity m Pas	Suction capacity dry m	Suction capacity wet m
Duodos 10 PP	5	65	200	1.7	7.7
Duodos 10 PVDF	-13	93	200	1.7	7.7
Duodos 15 PP	5	65	200	3.6	8.2
Duodos 15 PVDF	-13	93	200	2.3	8.2
Duodos 20 PP	5	65	200	1.8	8.2
Duodos 20 PVDF	-13	93	200	2.1	8.2
Duodos 25 PP	5	65	200	5.1	8.2
Duodos 25 PVDF	-13	93	200	5.4	8.2

Duodos PP

	Housing material	Diaphragms/ valves	Delivery rate (2 bar differential pressure) l/h	Order no.
Duodos 10 PP	PP	Santoprene®	0...650*	1010793
Duodos 15 PP	PP	Santoprene®	0...2,000*	1010794
Duodos 20 PP	PP	Santoprene®	0...3,000*	1010795
Duodos 25 PP	PP	Santoprene®	0...6,700*	1010796

Delivery rate at a differential pressure of 2 bar (0.5 bar backpressure, 2.5 bar air pressure)..

Santoprene® is a registered trademark of the Monsanto Corporation.

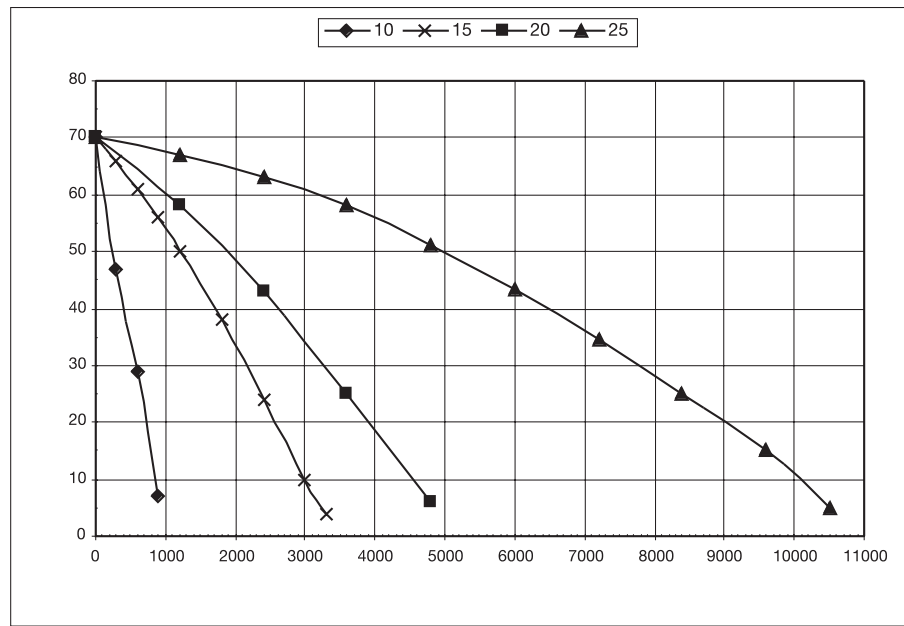
5.6 Duodos Air Operated Diaphragm Pump

Duodos PVDF

	Housing material	Diaphragms/valves	Delivery rate (2 bar differential pressure) l/h	Order no.
Duodos 10 PVDF	PVDF	Teflon	0...650*	1010797
Duodos 15 PVDF	PVDF	Teflon	0...2,000*	1010798
Duodos 20 PVDF	PVDF	Teflon	0...3,000*	1010799
Duodos 25 PVDF	PVDF	Teflon	0...6,700*	1010800

Delivery rate at a differential pressure of 2 bar (0.5 bar backpressure, 2.5 bar air pressure).

Characteristic Curves



pk_2_114
Feed lift [mWS] over feed rate [l/h] at 7 bar air supply

5.6.2 Spare Part Kits

Spare part kits for pneumatics comprising:

- Seals
- O-rings
- Clamp collars
- Air control valve

	Order no.
Spare part kit, pneumatics for Duodos 10 PP/PVDF	1010810
Spare part kit, pneumatics for Duodos 15/20 PP/PVDF	1010811
Spare part kit, pneumatics for Duodos 25 PP/PVDF	1010813

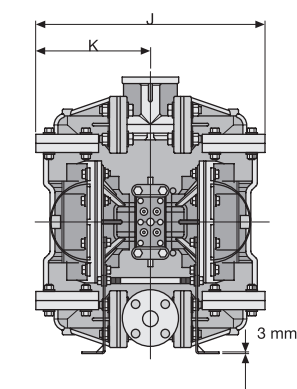
5.6 Duodos Air Operated Diaphragm Pump

Spare part kits for the liquid end comprising

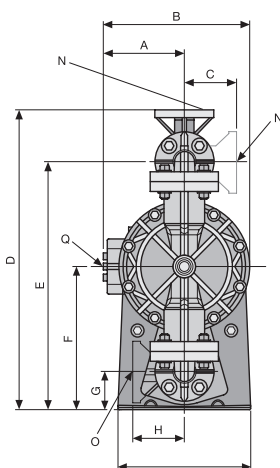
- Diaphragms
- Valve balls
- Seals

	Order no.
Spare part kit, liquid end for Duodos 10 PP	1010801
Spare part kit, liquid end for Duodos 15 PP	1010802
Spare part kit, liquid end for Duodos 20 PP	1010803
Spare part kit, liquid end for Duodos 25 PP	1010804
Spare part kit, liquid end for Duodos 10 PVDF	1010806
Spare part kit, liquid end for Duodos 15 PVDF	1010807
Spare part kit, liquid end for Duodos 20 PVDF	1010808
Spare part kit, liquid end for Duodos 25 PVDF	1010809

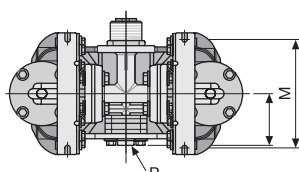
Dimensions



pk_2_072



pk_2_106

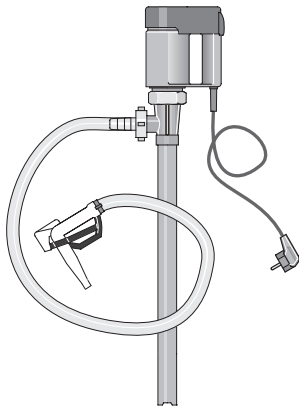


pk_2_107

		Duodos 10	Duodos 15	Duodos 20	Duodos 25
A	mm	79	103	103	143
B	mm	140	179	179	260
C	mm	32	44	60	92
D	mm	198	287	339	527
E	mm	167	243	279	435
F	mm	87	140	163	249
G	mm	19	35	46	64
H	mm	32	44	60	92
I	mm	78	143	143	130
J	mm	178	258	300	433
K	mm	89	129	150	216
L	mm	33	92	114	123
M	mm	66	76	76	102
Discharge connector		1/2" NPT	1"	1 1/2"	1" ANSI flange
Suction connector		1/2" NPT	1"	1 1/2"	1" ANSI flange
Air consumption	m ³ /h	0.5...11	3.5...27	7.0...34	8.5...77
Differential pressure	bar	2	2	2	2
Air connection		1/4" NPT	1/4" NPT	1/4" NPT	1/2" NPT
Weight (PP)	kg	2	8	9	24
Weight (PVDF)	kg	2.5	9.0	9.5	29.0

5.7 DULCO®Trans Barrel Pump

5.7.1 DULCO®Trans Barrel Pumps



pk_3_029

DULCO®Trans is used for bottling, emptying and transferring liquids from canisters, hobbocks, barrels, tanks and containers. The capacity of the DULCO®Trans is 900, 2,400 or 3,000 l/h, depending on the size. Included in the delivery is a metering hose with pump nozzle. The application range of the DULCO®Trans depends on the chemical resistance of the used materials.

The following materials come into contact with the liquids:

- polypropylene external and internal pipe, pump nozzle
- Hastelloy C drive shaft
- ETFE rotor
- oxide ceramics/PTFE/carbon floating ring seal
- FPM O-rings
- PVC metering hose

A flexible coupling connected to the drive shaft serves as connection between the drive motor and the pump. At the end of the drive shaft, the rotor is located which presses the liquid between the internal pipe and the external pipe to the top. The drive shaft is located in the internal pipe and is mechanically sealed at the shaft feedthrough. The shaft thus only comes into contact with the medium in the rotor zone. The sealing between internal pipe and external pipe is made using an O-ring made of FKM. The internal pipe is reinforced by a steel core; the pump thus receives the stability which is required for a proper functioning of the floating ring seal.

	Feed rate max. *	Feed lift max. m	Order no.
DULCO®Trans 25/700 PP	900 l/h *	5.0	1023085
DULCO®Trans 40/1000 PP	2400 l/h *	7.5	1023086
DULCO®Trans 50/1200 PP	3000 l/h *	12.0	1023087

* The specified delivery rate includes hose and pump nozzle.

Parameters For Use

	Medium temperature max. °C	Maximum density *	max. Viscosity m Pas
DULCO®Trans 25/700 PP	50	1.2 kg/dm ³ *	150
DULCO®Trans 40/1000 PP	50	1.5 kg/dm ³ *	500
DULCO®Trans 50/1200 PP	50	1.8 kg/dm ³ *	500

* The pumps can also be used at higher density values for short periods.

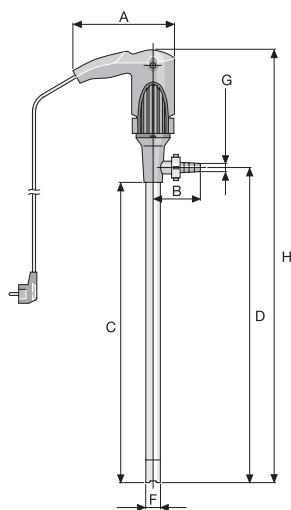
5.7 DULCO®Trans Barrel Pump

Technical data

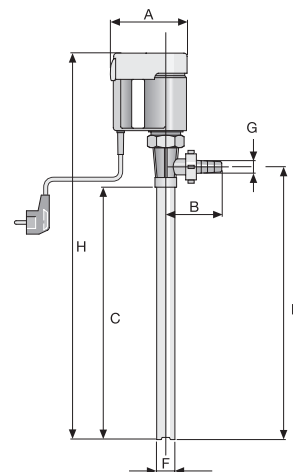
	DULCO®Trans 25/700 PP	DULCO®Trans 40/1000 PP	DULCO®Trans 50/1200 PP
Feed rate max.	900 l/h	2,400 l/h	3,000 l/h
Feed lift max.	5.0 m	7.5 m	12.0 m
Suction pipe immersion depth	672mm	961mm	1,161mm
Suction pipe outer diameter	25mm	40mm	50mm
Hose connection	d13	d19	d25
Discharge hose	1.5 m, PVC, 13/18 mm	2.0 m, PVC, 19/27 mm	3.0 m, PVC, 25/34 mm
Dispensing gun	PP, d 13	PP, d 19	PP, d 25
Motor rating	230 W	450 W	800 W
Enclosure rating	IP 24	IP 24	IP 24
Voltage/frequency	230 V/1~/50 Hz	230 V/1~/50 Hz	230 V/1~/50 Hz
Under-voltage cut-out	without	with	with
Overtoltage safety switch	with	with	with
Connection cable	5 m, with EUR plug	5 m, with EUR plug	5 m, with EUR plug
Weight	2.4 kg	4.9 kg	7.4 kg
Dimensions H x W x D	927 x 197 x 83mm	1,260 x 171 x 95mm	1,489 x 217 x 115mm

Dimensions

		DULCO®Trans 25/700 PP	DULCO®Trans 40/1000 PP	DULCO®Trans 50/1200 PP
A	mm	197	171	217
B	mm	83	113	113
C	mm	672	961	1,161
D	mm	700	1,006	1,206
F	mm	25	40	50
G		d 13	d 19	d 25
H	mm	927	1,260	1,489



pk_3_028



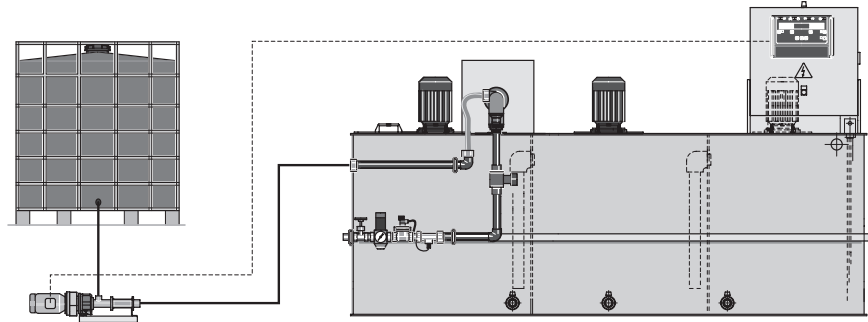
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5.8 Application Examples

5.8.1 Metering Polymers

Product:	Eccentric screw pump Spectra
Metering medium:	Polymer, liquid concentrate
Industry:	Waste water
Application:	Treatment of flocculants

Production of a 0.5% polymer solution with the Ultramat® AFT 2000 and Spectra 12/33 F. The Spectra pump feeds the polymer concentrate from the disposable container to the Ultramat®.



pk_3_049

Task and requirements

Preparation of a 0.1 – 0.5 % polymer solution.

Operating conditions

- Fluctuating water feed
- Automatic activation of progressive cavity pump
- Highly viscous medium

Application information

- Gauge capacity of progressive cavity pump during initial operation
- Provide dry-running protection facility for progressive cavity pump
- Proportional metering of liquid polymer as a function of water feed
- Activation of progressive cavity pump by means of a frequency converter

Solution

- Spectra 12/33 F progressive cavity pump for metering liquid concentrate
- ATF 2000 Ultramat for preparing a 0.1 – 0.5 % polymer solution

Benefits

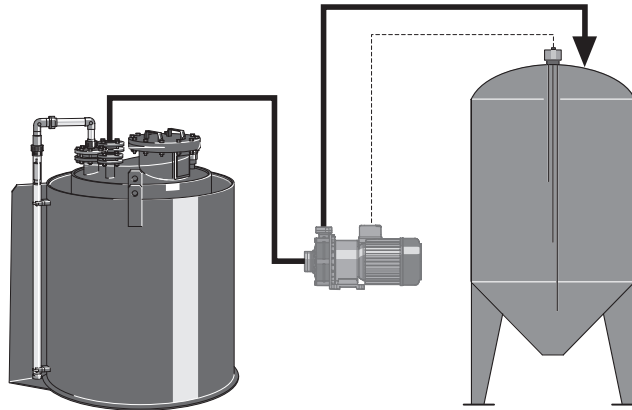
- Constant solution concentration also in connection with fluctuating water feed
- Fully automatic operation with minimum personnel and maintenance requirements
- Flexible process configuration by adapting the pump to different concentration requirements

5.8 Application Examples

5.8.2 Filling a Day Tank

Product:	vonTaine® centrifugal pump
Metered medium:	32 % hydrochloric acid solution
Sector:	Food
Application:	Chemical transfer

The von Taine® centrifugal pump is switched on and off automatically by the level control facility in the day tank.



pk_3_050

Task and requirements

- Automatically filling service tanks with 32 % hydrochloric acid solution

Operating conditions

- Indoor operation
- Automatic activation of pump

Application information

- Centrifugal pump controlled by level control facility in metering tank
- The centrifugal pump is not self-priming and requires feed
- Hydrochloric acid compatibility of materials must be ensured (PP, PVDF; EPDM)
- Provide dry-running protection facility for centrifugal pump

Solution

- vonTaine® 1820 PP centrifugal pump
- Service tank with level control

Benefits

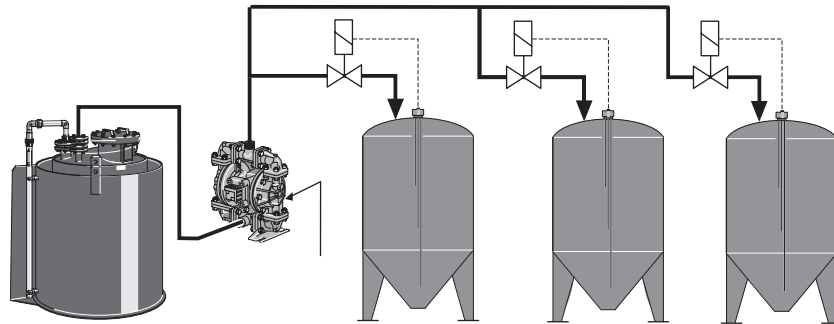
- Safe handling of hydrochloric acid
- Fully automatic operation with minimum personnel and maintenance requirements

5.8 Application Examples

5.8.3 Filling Day Tanks

Product:	Duodos air operated diaphragm pump
Metered medium:	Detergent
Sector:	Laundry
Application:	Chemical transfer

The level control facility for the day tanks opens the solenoid valves when the level drops below minimum. With decreasing backpressure, the Duodos pump automatically begins to pump medium into the metering line and switches off when the maximum level in the tank is reached and the solenoid valve is switched off.



pk_3_051

Task and requirements

- Automatic filling of day tanks with detergent

Operating conditions

- Compressed air necessary for operating compressed air diaphragm pump
- Automatic filling of day tanks

Application information

- Compressed air diaphragm-type pump controlled by level control facility in metering tank
- The compressed air diaphragm pump is self-priming
- Also suitable for viscous media
- The level control facility for the day tanks opens the solenoid valves when the level drops below minimum. With decreasing backpressure, the compressed air diaphragm-type pump automatically begins to pump medium into the metering line and switches off when the maximum level in the tank is reached and the solenoid valve is switched off

Solution

- Duodos air operated diaphragm pump
- Day tank with level control

Benefits

- Simplified logistics through central storage
- Fully automatic operation with minimum personnel and maintenance requirements

6 Panel-Mounted Measuring/Control Stations

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6.0 Overview Panel-Mounted Measuring/Control Stations

6.0.1

Product Overview

DULCOTROL® Panel-Mounted Measuring/Control Stations

DULCOTROL® measuring/control stations are complete and compact online process measuring/control stations mounted on a PE panel which can be installed as plug&play modules into a process water bypass. They are divided into the following series which are assigned to the important applications of water treatment and which include customised components suitable for the target application.

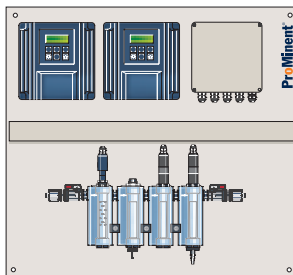
- DULCOTROL® drinking water/F&B
- DULCOTROL® cooling water
- DULCOTROL® waste water

In these model series, 1-3 measured variables can be configured specific to the sample water on one panel. The measuring devices can be equipped with a measuring function or numerous control functions as required. A compatible filter, pressure reducer, heat exchanger, a sample water pump and a peristaltic pump can be optionally ordered for sample water conditioning. Measurement panels from two controllers onward include a terminal box for a safe electrical connection. All connecting cables are routed in a cable conduit.

- DULCOTROL® free chlorine - pH-independent

These model series facilitate measurement/controlling of free chlorine at high or unstable pH values in all applications mentioned above. For this purpose, a pH buffer solution is metered into the sample water bypass via a peristaltic pump.

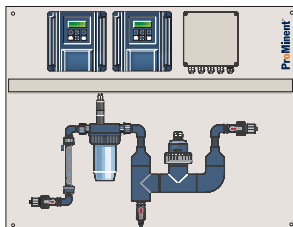
For all DULCOTROL® series, the desired layout of the measuring station can be easily configured through an user-orientated Identcode system.



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DULCOTROL® Drinking Water/F&B

The measuring/control stations DULCOTROL® drinking water/F&B are specifically designed for the drinking water industry as well as the food and beverages industry (F&B = Food&Beverage). Furthermore, the special requirements are met which are given on the part of the drinking water / product water treatment and the rinsing water, service water, and process water treatment.



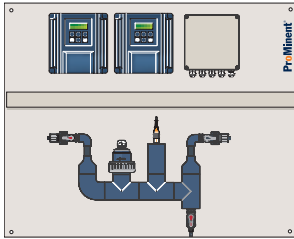
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DULCOTROL® Cooling Water

The measuring/control stations DULCOTROL® cooling water are used in all industry segments where cooling water is treated. The following applications are covered:

- In the closed cooling circuit, the conditioning of the cooling water through pH value adjustment, metering of corrosion inhibitors, and the disinfection of the cooling water with non-oxidative biocides and oxidative disinfectants.
- In the open cooling circuit (cooling tower), in addition to the functions mentioned above the automatic desalination (blow down) of the cooling water.

6.0 Overview Panel-Mounted Measuring/Control Stations

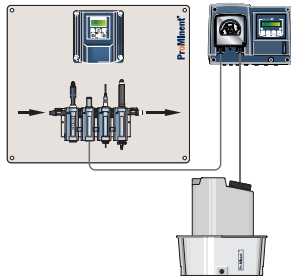


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DULCOTROL® Waste Water

The measuring/control stations DULCOTROL® waste water are used in all industry segments where waste water is treated. The following applications may e.g. be covered:

- pH neutralisation and pH value adjustment
- Disinfection of clarified water
- Decontamination of waste water by eliminating reductives and oxidants
- Monitoring of rinsing water
- Desalination of process water
- Control of the dissolved oxygen in the biologic clarification stage



P_DCT_0023_C

DULCOTROL® Free chlorine - pH-independent

The measuring/control stations DULCOTROL® free chlorine - pH-independent is used wherever free chlorine needs to be measured and in applications where pH-values are either unstable or higher than 8.0.

6.0 Overview Panel-Mounted Measuring/Control Stations

6.0.2 Selection Guide

Measuring, control, monitoring tasks in water treatment

DULCOTROL® drinking water/F&B	DULCOTROL® cooling water	DULCOTROL® waste water
Treatment of drinking water, water of quality similar to drinking water as well as of rinsing water, industrial water and process water treatment through <ul style="list-style-type: none"> ■ Disinfection ■ CIP ■ pH value adjustment ■ Monitoring 	Treatment of cooling water in open cooling circuits and closed cooling circuits <ul style="list-style-type: none"> ■ Desalination ■ Disinfection ■ pH value adjustment ■ Metering of corrosion inhibitors 	Treatment of industrial and municipal wastewater <ul style="list-style-type: none"> ■ pH neutralisation ■ Disinfection ■ Decontamination ■ Desalination of process waters ■ Controlling of dissolved oxygen ■ Monitoring

6.0.3 DULCOTROL® Ordering System

The DULCOTROL® measuring/control stations are available in three series assigned to the applications drinking water/F&B, cooling water, and waste water. The measuring/control stations can be configured through the relevant Identcode order system. The DULCOTROL® order system is based on user-related selection criteria such that the right measuring/control station can be selected without necessitating any technical knowledge. In all series, up to a maximum of 3 measured variables can be configured. In the following, the Identcode features of the Identcode are explained in detail. The features apply to all DULCOTROL® measuring/control stations. If required, the content described in the features is explained in the individual DULCOTROL® series. The scope of delivery of the technical components for a certain selection is also specified there.

Feature: „Measured variable“

This determines the parameter to be measured or controlled (e.g. pH or chlorine). Up to three measurement parameters can be simultaneously selected depending on the given options. This determines the sensor class (e.g. pH electrode or chlorine sensor) and the controller suitable for the measured variable as well as the corresponding measuring cable.

Feature: „Water to be measured“

This facilitates a characterisation of the sample water (e.g. “clear water” or “turbid water”) in addition to the main application (e.g. drinking water, cooling water, waste water). Together with the main application, the exact sensor type and the measuring range (e.g. CLE 3-mA-2ppm), the sensor housing (e.g. DGMA) are specified. The price assigned to this feature also includes the piping. In some cases, the selection of the water to be measured (e.g. rinsing water / service water / process water, T > 45 °C and <55 °C) also necessitates a selection of the accessories which is stated in the Identcode as separate feature (e.g. heat exchanger). These cases are correspondingly referenced in the order system.

Feature: „Usage category“

The feature “usage category” determines whether the measuring unit assigned to a measured variable

- Either can only measure
- Or is to have additional control functionality. In this respect, “two-way controlling” means that the controller can both increase and decrease the measured variable. For this purpose, the controller D1Ca is assigned with full control functionality.

In case of several measured variables, the following type of application is also given:

- One-way controlling: this means that the controller may either increase or decrease the measured variable. For this purpose, the controller D2C is assigned. For this reason, only the measured variable combinations can be selected for which a D2C controller exists. These are appropriately specified in the order system. To be noted is the limited functionality of the D2C controller as compared to the D1C controller described in Chapter 7.

In the ordering system, various configurations of measurement and control functions are offered to suit the combination of several measured variables.

6.0 Overview Panel-Mounted Measuring/Control Stations

Feature: „Electrical connection“

This feature determines the voltage supply of the measuring/control station. The electrical connection is made by the user via the “terminal” of the measuring/control station. Measuring/control panels for several measured variables include a terminal box.

Feature: „Sensor equipment“

This feature determines whether the measuring/control panel is supplied with or without sensors. The option “without sensors” should be chosen if the standard sensor types cannot be used (e.g.: non-applicable measuring range) or if a warehousing of the measuring panels is intended.

Feature: „Design “

This feature determines whether and which label is to be affixed to the panel. For DULCOTROL® drinking water/F&B, the components can in addition be installed in a stainless steel cabinet.

Feature: „Sample water treatment“

This feature determines whether a filter ready for connection is included. It is installed by the customer upstream of the measurement/control station. Likewise, a peristaltic pump can also be selected for metering pH buffer solution into the sample water bypass.

Feature: „Accessories“

This feature defines the accessories such as e.g. pressure reducer or sample water pump. These components are delivered together with the measuring and control panel, however, will be installed by the customer external to the panel.

Feature: „Language“

This feature determines the operating language of the measuring/control station.

Feature : „Approval“

This feature states the existing approvals, certificates.

6.1 DULCOTROL® Drinking Water/F&B

6.1.1

DULCOTROL® Drinking Water/F&B Ordering System

The measuring/control stations DULCOTROL® drinking water/F&B are specifically designed for the drinking water industry as well as the food and beverages industry. Furthermore, the special requirements are met which are given on the part of the drinking water / product water treatment and the rinsing water, service water, and process water treatment.

In the following Identcode, the feature “water to be measured” is thus differentiated into:

- “Drinking/product water treatment”: this means the final treatment (e.g. disinfection) of water similar to drinking water as performed in the production of drinking water or in the production of beverages or food
- Rinsing/service/process water: this includes e.g. all rinsing processes in the food and beverages industry aimed at the cleaning and disinfection of pipings, vessels and machines or process or industrial water with a higher level of contamination.

6.1 DULCOTROL® Drinking Water/F&B

6.1.2 Identcode Ordering System

DULCOTROL® Drinking Water/F&B - One Measured Variable

PWCA	Measured variable
C000	Free chlorine (at pH-value < 8.0)
C001	Free chlorine (at pH value > 8.0 or unstable)*
G000	Total chlorine (free+combined chlorine)
P000	pH
R000	ORP
D000	Chlorine dioxide
I000	Chlorite
L000	Conductivity (only "water to be measured" 1)
Z000	Ozone
F000	Fluoride (pH min.= 5.5, pH max. = 8.5)
H000	Hydrogen peroxide
A000	Peracetic acid
X000	Dissolved oxygen
T000	Temperature
	Water to be measured
1	Drinking water / product water, T< 45 °C
2	Rinsing water / service water / process water, T< 45 °C
3	Drinking water / product water T> 45 °C and < 55 °C (only measured variable D000, H000, A000, others only with accessory: heat exchanger)
4	Rinsing water / service water / process water T> 45 °C and <55 °C (only measured variable D000, H000, A000, others only with accessory: heat exchanger)
5	Drinking water / product water T> 55 °C and <80 °C (only with accessory: heat exchanger)
6	Rinsing water / Industrial water / process water T> 55 °C and <80 °C (only with accessory: heat exchanger)
	Usage category
0	All measured variables only measurable
9	All measured variables two-way controllable
	Power supply
A	230 V, 50/60 Hz
C	115 V, 50/60 Hz
	Sensor equipment
0	With sensors
1	Without sensors
	Version
0	With ProMinent Logo
2	Stainless steel cabinet
	Sample water treatments
0	None
1	With filter
2	With peristaltic pump*
3	With filter and peristaltic pump*
	Accessories
0	None
1	With pressure reducer
2	With heat exchanger
3	With sample water pump
4	With pressure reducer and heat exchanger
6	With heat exchanger and sample water pump
	Language
DE	German
EN	English
FR	French
IT	Italian
NL	Dutch
ES	Spanish, not for H000 / A000
PL	Polish, not for H000 / A000
SV	Swedish, not for H000 / A000
HU	Hungarian, not for H000 / A000
PT	Portuguese, not for H000 / A000
CS	Czech, not for H000 / A000
	Approvals
1	CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.1 DULCOTROL® Drinking Water/F&B

Examples

Example 1: PWCA_D000_1_0_A_0_0_0_0_EN_1:

Measuring of chlorine dioxide in drinking water / product water.

Controller:

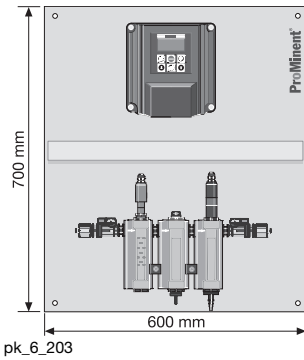
- D1CA_W_0_D_1_0_0_1_4_G_0_0_0_EN

Sensor housing:

- DGM_A_3_1_1_T_0_0_0:
 - 1 Measuring module: Chlorine dioxide sensor, 1 empty measuring module for refitting of temperature,
 - 1 flow monitoring module

Sensors:

- CDE-2-mA 0.5 ppm



Example 2: PWCA_D000_6_9_A_0_0_1_2_EN_1:

Chlorine dioxide control in turbid and hot rinsing water (> 55 °C) in a bottle rinsing plant. A filter and a heat exchanger that are installed outside the panel are included in the scope of delivery.

Controller:

- D1CA_W_0_D_1_2_1_1_4_M_2_2_0_EN

Sensor housing:

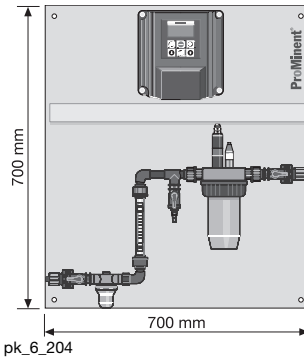
- DLG III for chlorine dioxide and temperature + flow monitoring + filter upstream

Sensors:

- CDP 1-mA-2 ppm
- PT 100

External to the panel (not shown), accessories:

- Filter
- Heat exchanger



6.1 DULCOTROL® Drinking Water/F&B

DULCOTROL® Drinking Water/F&B - Two Measured Variables

PWCA		Measured variable
	CP00	1. Free chlorine / 2. pH (at pH-value < 8.0)
	CP01	1. Free chlorine/ 2. pH (at pH value > 8.0 or unstable)*
	CR00	1. Free chlorine / 2. ORP (at pH-value < 8.0)
	CR01	1. Free chlorine/ 2. ORP (at pH value > 8.0 or unstable)*
	GP00	1. Total chlorine / 2. pH (free+combined chlorine)
	RP00	1. ORP / 2. pH
	HP00	1. Hydrogen peroxide / 2. pH
	FP00	1. Fluoride / 2. pH (pH min.= 5.5, pH max. = 8.5)
	AP00	1. Peracetic acid / 2. pH
	LP00	1. Conductivity / 2. pH
	AL00	1. Peracetic acid / 2. conductivity
	DP00	1. Chlorine dioxide / 2. pH
	DR00	1. Chlorine dioxide / 2. ORP
	DI000	1. Chlorine dioxide / 2. chlorite (only "water to be measured" 1, 3, 5)
	ZR00	1. Ozone / 2. ORP
Water to be measured		
	1	Drinking water / product water, T< 45 °C
	2	Rinsing water / service water / process water, T< 45 °C
	3	Drinking water / product water, T> 45 °C and < 55 °C (only measured variable RP00, HP00, AP00, LP00, AL00, DP00, DR00, others only with accessory: heat exchanger)
	4	Rinsing water / service water / process water, T> 45 °C and < 55 °C (only measured variable RP00, HP00, AP00, LP00, AL00, DP00, DR00, others only with accessory: heat exchanger)
	5	Drinking water / product water, T> 55 °C and < 80 °C(only with accessory: heat exchanger)
	6	Rinsing water / industrial water / process water, T> 55 °C and < 80 °C(only with accessory: heat exchanger)
Usage category		
	0	All measured variables only measurable
	1	1st measured variable two-way controllable, 2nd measured variable only measurable
	2	2nd measured variable two-way controllable, 1st measured variable only measurable
	3	Both measured variables one-way controllable with two-channel controller D2C (only for CP00, CP01, GP00, RP00, DP00)
	9	All measured variables two-way controllable
Power supply		
	A	230 V, 50/60 Hz
	C	115 V, 50/60 Hz
Sensor equipment		
	0	With sensors
	1	Without sensors
Version		
	0	With ProMinent logo
	2	Stainless steel cabinet
Sample water treatments		
	0	None
	1	With filter
	2	With peristaltic pump*
	3	With filter and peristaltic pump*
Accessories		
	0	None
	1	With pressure reducer
	2	With heat exchanger
	3	With sample water pump
	4	With pressure reducer and heat exchanger
	6	With heat exchanger and sample water pump
Language		
	DE	German
	EN	English
	FR	French
	IT	Italian
	NL	Dutch
	ES	Spanish, not for H and A in HP00 / AP00/ AL00
	PL	Polish, not for H and A in HP00 / AP00/ AL00
	SV	Swedish, not for H and A in HP00 / AP00/ AL00
	HU	Hungarian, not for H and A in HP00 / AP00/ AL00
	PT	Portuguese, not for H and A in HP00 / AP00/ AL00
	CS	Czech, not for H and A in HP00 / AP00/ AL00
Approvals		
	1	CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.1 DULCOTROL® Drinking Water/F&B

Examples

Example 1: PWCA_DI00_1_1_A_0_0_0_1_EN_1:

Measuring of chlorine dioxide and chlorite in drinking water / product water. The scope of delivery includes a pressure reducer which is installed externally to the panel.

Controller:

- D1CA_W_0_1_1_0_0_1_4_G_0_0_0_EN
- D1CA_W_0_D_1_0_0_1_4_G_0_0_0_EN
+ terminal box on the panel

Sensor housing:

- DGM_A_3_1_2_T_0_0_2 :
- 2 measuring modules for chlorine dioxide and chlorite sensors, 1 empty measuring module for refitting of temperature, 1 flow monitoring module

Sensors:

- CDE-2-mA 0.5ppm
- CLT 1-mA-0.5ppm

External to the panel (not shown), accessories:

- Pressure reducer

Example 2: PWCA_CP00_6_3_A_0_0_1_6_EN_1

One-way control of pH and chlorine in hot rinsing water (> 55 °C). A filter, a heat exchanger and a sample water pump that are installed outside the panel are included in the scope of delivery.

Controller:

- D2CA_W_0_PC_5_2_0_4_M_2_0_EN

Sensor housing:

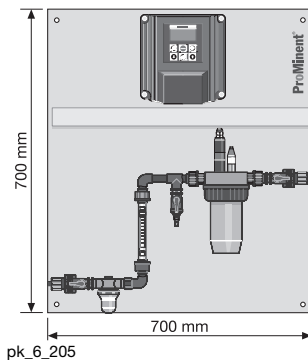
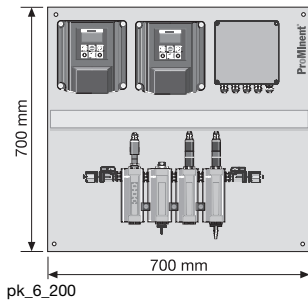
- DLG III for pH and chlorine+ flow monitoring
+ filter upstream

Sensors:

- CLE-3-mA 2ppm
- PHER 112-SE

External to the panel (not shown), accessories:

- Filter
- Sample water pump
- Heat exchanger



6.1 DULCOTROL® Drinking Water/F&B

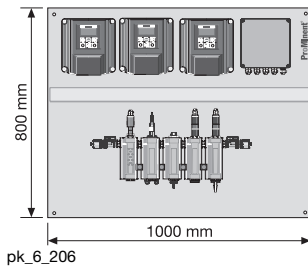
DULCOTROL® Drinking Water/F&B - Three Measured Variables

PWCA		Measured variable
	CPL0	1. Free chlorine / 2. pH / 3. conductivity (at pH-value < 8.0)
	CPL1	1. Free chlorine/ 2. pH /3. conductivity (at pH value > 8.0 or unstable)*
	CRP0	1. Free chlorine / 2. ORP / 3. pH (at pH-value < 8.0)
	CRP1	1. Free chlorine/ 2. ORP /3. pH (at pH value > 8.0 or unstable)*
	GPL0	1. Total chlorine / 2. pH / 3. conductivity (free+combined chlorine)
	GRP0	1. Total chlorine / 2. ORP / 3. pH (free+combined chlorine)
	RPL0	1. ORP / 2. pH / 3. conductivity
	DPR0	1. Chlorine dioxide / 2. pH / 3. ORP (with "water to be measured": 2,4,6 only with manual temperature compensation)
	DPIO	1. Chlorine dioxide / 2. pH / 3. chlorite (only "water to be measured": 1,3,5)
	DRIO	1. Chlorine dioxide / 2. ORP / 3. chlorite (only "water to be measured": 1,3,5)
	ZPR0	1. Ozone / 2. pH / 3. ORP
	ALP0	1. Peracetic acid / 2. conductivity / 3. pH
Water to be measured		
	1	Drinking water / product water, T< 45 °C
	2	Rinsing water / industrial water / process water, T< 45 °C
	3	Drinking water / product water, T> 45 °C and < 55 °C (only measured variable RPL0, DPR0, ALP0)
	4	Rinsing water / industrial water / process water, T> 45 °C and < 55 °C (only measured variable RPL0, DPR0, ALP0)
	5	Drinking water / product water, T> 55 °C and < 80 °C(only with accessory: heat exchanger)
	6	Rinsing water / industrial water / process water, T> 55 °C and < 80 °C(only with accessory: heat exchanger)
Usage category		
	0	All measured variables only measurable
	4	1st measured variable two-way controllable, 2nd + 3rd measured variable only measurable
	5	2nd measured variable two-way controllable, 1st + 3rd measured variable only measurable
	6	1st + 2nd measured variable one-way controllable with two-channel controller D2C and 3rd measured variable only measurement (only for CPL0, CPL1, GPL0, RPL0, DPR0, DPIO)
	7	1st measured variable two-way controllable, 2nd +3rd measured variable one-way controllable with two-channel controller D2C (only for CRP0, CRP1, GRP0, DPR0, ZPR0)
	9	All measured variables two-way controllable
Power supply		
	A	230 V, 50/60 Hz
	C	115 V, 50/60 Hz
Sensor equipment		
	0	With sensors
	1	Without sensors
Version		
	0	With ProMinent logo
	2	Stainless steel cabinet
Sample water treatments		
	0	None
	1	With filter
	2	With peristaltic pump*
	3	With filter and peristaltic pump*
Accessories		
	0	None
	1	With pressure reducer
	2	With heat exchanger
	3	With sample water pump
	4	With pressure reducer and heat exchanger
	6	With heat exchanger and sample water pump
Language		
	DE	German
	EN	English
	FR	French
	IT	Italian
	NL	Dutch
	ES	Spanish, not for A in ALP0
	PL	Polish, not for A in ALP0
	SV	Swedish, not for A in ALP0
	HU	Hungarian, not for A in ALP0
	PT	Portuguese, not for A in ALP0
	CS	Czech, not for A in ALP0
Approvals		
	1	CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.1 DULCOTROL® Drinking Water/F&B

Examples



Example 1: PWCA_DRIO_5_4_A_0_0_0_2_EN_1

Two-way controlling of chlorine dioxide and measuring of chlorite and pH in hot drinking water / product water (> 55 °C). The scope of delivery includes a heat exchanger which is installed externally to the panel.

Controller:

- D1CA_W_0_D_1_2_1_1_4_M_2_2_0_EN
 - D1CA_W_0_I_1_0_0_1_4_G_0_0_0_EN
 - D1CA_W_0_P_5_2_0_1_4_G_0_0_0_EN
- + terminal box on the panel

Sensor housing:

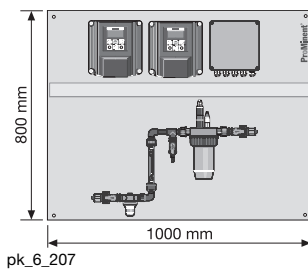
- DGM_A_3_2_2_T_0_0_2 :
- 2 Measuring module chlorine dioxide and chlorite sensors and 1 measuring module pH sensor, 1 empty measuring module for refitting of temperature, 1 flow monitoring module

Sensors:

- CDE2-mA-0.5ppm
- CLT 1-mA-0.5ppm
- PHEP 112 SE

External to the panel, accessory:

- Heat exchanger



Example 2: PWCA_CPL0_2_6_A_0_0_1_0_EN_1

One-way controlling of pH and chlorine and measuring of conductivity in turbid rinsing water. The scope of delivery includes a heat exchanger which is installed externally to the panel.

Controller:

- D2CA_W_0_PC_5_2_0_4_M_2_0_EN
 - D1CA_W_0_L_6_2_0_1_4_G_0_0_0_EN
- + terminal box on the panel

Sensor housing:

- DLG III for pH and chlorine + flow monitoring
- + filter upstream

Sensors:

- CLE-3-mA 2ppm
- PHEP 112-SE
- ICT2 + milk tube fitting mounted external to the panel

Accessories, outside the panel (not illustrated):

- Filter

6.1 DULCOTROL® Drinking Water/F&B

6.1.3 Technical Description Of The Delivery Scope Of DULCOTROL® Drinking Water/F&B

Controller

(for detailed information see chap. Measuring And Control Technology)

The Identcode features “measured variable” and “usage category” determine the equipment of the measuring/control device.

The Identcode specification “measurable” determines the following version of the D1CA measuring unit

- Connection of a correction variable
- Two limit value relays
- Control input „Pause“
- Two freely programmable standard signal outputs

The Identcode feature “two-way controllable” determines the following version of the D1CA controller in addition to the properties listed in “measurable”:

- Feedforward control
- Alarm and 2 solenoid valve relays
- Control of two pumps
- PID Controller

The Identcode feature “one-way controllable” determines the D2CA controller as follows:

- two freely programmable standard signal outputs
- alarm and 2 solenoid valve relays
- PID Controller

The specific Identcodes are as follows:

Measured variable	Measurable	Two-way controllable	One-way controllable
pH	D1CA_W_x_P_5_2_0_1_4_G_0_0_0_x	D1CA_W_x_P_5_2_1_1_4_M_2_2_0_x	
ORP	D1CA_W_x_R_0_0_0_1_4_G_0_0_0_x	D1CA_W_x_R_5_0_1_1_4_M_2_2_0_x	
Conductivity, conductive	D1CA_W_x_L_3_2_0_1_4_G_0_0_0_x	D1CA_W_x_L_3_2_1_1_4_M_2_2_0_x	
Conductivity, inductive	D1CA_W_x_L_6_2_0_1_4_G_0_0_0_x	D1CA_W_x_L_6_2_4_1_4_M_2_2_0_x	
Chlorine	D1CA_W_x_C_1_1_0_1_4_G_0_0_0_x	D1CA_W_x_C_1_1_2_1_4_M_2_2_0_x	
Chlorine dioxide (with CDE sensor)	D1CA_W_x_D_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_D_1_0_1_1_4_M_2_2_0_x	
Chlorine dioxide (with CDP sensor)	D1CA_W_x_D_1_2_0_1_4_G_0_0_0_x	D1CA_W_x_D_1_2_1_1_4_M_2_2_0_x	
Chlorite	D1CA_W_x_I_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_I_1_0_1_1_4_M_2_2_0_x	
Ozone	D1CA_W_x_Z_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_Z_1_0_1_1_4_M_2_2_0_x	
Fluoride	D1CA_W_x_F_1_2_0_1_4_G_0_0_0_x	D1CA_W_x_F_1_2_1_1_4_M_2_2_0_x	
Peracetic acid	D1CA_W_x_A_7_0_0_1_4_G_0_0_0_x	D1CA_W_x_A_7_0_1_1_4_M_2_2_0_x	
Hydrogen peroxide	D1CA_W_x_H_7_0_0_1_4_G_0_0_0_x	D1CA_W_x_H_7_0_1_1_4_M_2_2_0_x	
Dissolved oxygen	D1CA_W_x_X_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_X_1_0_1_1_4_M_2_2_0_x	
Temperature	D1CA_W_x_T_4_0_0_1_4_G_0_0_0_x	D1CA_W_x_T_4_0_1_1_4_M_2_2_0_x	
pH/chlorine			D2CA_W_x_PC_5_2_0_4_M_2_0_x
pH/ORP			D2CA_W_x_PR_5_2_0_4_M_2_0_x + transducer RHV1
pH/pH			D2CA_W_x_PP_5_2_0_4_M_2_0_x + transducer PHV1
pH/chlorine dioxide			D2CA_W_x_PD_5_2_0_4_M_2_0_x

6.1 DULCOTROL® Drinking Water/F&B

Sensors

(for detailed information see chap. DULCOTEST® Sensor Technology)

The Identcode features “measured variable” and “water to be measured” determine the used sensor type as listed below. An accessory such as a heat exchanger for instance may be necessary (see Identcode):

- If a different sensor type is required, the measuring/control panel may also supplied without sensors (see Identcode feature: “Sensor equipment”).
- The sensor ICT2 is not mounted on the panel but adapted to the process via a cable of 10 m length. The process adaptation is made through a milk pipe connection.

Measured variable	Sample water	Sensor type	Order no.
Free chlorine	1/5	CLE 3-mA-0.5 ppm	792927
Free chlorine	2/6	CLE 3-mA-2 ppm	792920
Total chlorine	1/5	CTE 1-mA-0.5 ppm	740686
Total chlorine	2/6	CTE 1-mA-2 ppm	740685
pH	1/3/5	PHEP 112 SE	150041
pH	2/4/6	PHER 112 SE	1001586
ORP	1/3/5	RHEP-Pt-SE	150094
ORP	2/4/6	RHER-Pt-SE	1002534
Chlorine dioxide	1/5	CDE 2-mA-0.5 ppm	792930
Chlorine dioxide (Tmax=60°C)	3	CDE 3-mA-0.5 ppm	1026154
Chlorine dioxide (temp.corr.)	2/4/6	CDP 1-mA-2 ppm	1002149
Chlorite	1/2/5/6	CLT 1-mA-0.5 ppm	1021596
Conductivity	1/3/5	LFT 1 DE	1001376
Inductivity	2/4/6	ICT 2	1023352
Ozone	1/2/5/6	OZE 3-mA-2 ppm	792957
Fluoride (temp.corr.)	1/2/5/6	FLEP 010-SE / FLEP 0100-SE + Reference electrode, REFP-SE (Order no. 1018458) + Temperature sensor, Pt 100 (Order no. 305063)	1028279
Hydrogen peroxide	1/3/5	PER 1-mA-200 ppm	1022509
Hydrogen peroxide	2/4/6	PER 1-mA-2000 ppm	1022510
Peracetic acid	1/3/5	PAA 1-mA-200 ppm	1022506
Peracetic acid	2/4/6	PAA 1-mA-2000 ppm	1022507
Dissolved oxygen	1/2/5/6	DO 1-mA-20 ppm	1020532
Temperature	1/2/3/4/5/6	Temperature sensor, Pt 100	305063

6.1 DULCOTROL® Drinking Water/F&B

Sensor housings

(for detailed information see chap. DULCOTEST® Sensor Technology)

The bypass sensor housing used, depends in particular on the sample water, sometimes also on the measured variable or the combination of the measured variables. For clear water, DGMA with flow monitoring and for contaminated water, DLG III also with upstream flow monitoring are used. The DGMA bypass sensor housing always includes in addition to the required measuring modules a measuring module for refitting the correction variable measurement.

Particularities:

- for fluoride, the DLG IV is used
- for the conductivity with ICT2, a milk pipe connection for direct adaptation to the process is used.
- for dissolved oxygen, a T-adapter is used

Measured variable	Sample water	Sensor type
Chlorine dioxide (CDE 2)	1	DGMA
Chlorine dioxide (CDE 3)	3	DGMA
Chlorine dioxide (CDP)	2/4/6	DLGIII
Chlorite	2/6	DLGIII
Chlorite	1/5	DGMA
Fluoride (temp. corr.)	1/2/5/6	DLGIV
Free chlorine	1/5	DGMA
Free chlorine	2/6	DLGIII
Dissolved oxygen (DO1)	1/2/5/6	Adapter d75 pipe
Total chlorine	2/6	DLGIII
Total chlorine	1/5	DGMA
Conductivity, inductive (ICT2)	2/4/6	milk pipe connection
Conductivity, conductive	1/3/5	DGMA
Ozone	2/6	DLGIII
Ozone	1/5	DGMA
Peracetic acid	1/3/5	DGMA
Peracetic acid	2/4/6	DLGIII
ORP	2/4/6	DLGIII
ORP	1/3/5	DGMA
Temperature	2/4/6	DLGIII
Temperature	1/3/5	DGMA
Hydrogen peroxide	1/3/5	DGMA
Hydrogen peroxide	2/4/6	DLGIII
pH	2/4/6	DLGIII
pH	1/3/5	DGMA

Hydraulic connection

The hydraulic connection of the sample water is made via a 8x5mm hose connection. Shut-off ball valves are installed upstream and downstream of the bypass sensor housing. Upstream of the bypass sensor housing, a sample water filter will be positioned on ordering. The bypass sensor housing include a sampling tap. A metal pin is integrated in the bypass sensor housing for an equipotential bonding line.

6.2 DULCOTROL® Cooling Water

6.2.1 DULCOTROL® Cooling Water

The measuring/control stations DULCOTROL® cooling water are used in all industry segments where cooling water is treated. The following applications are covered:

- in the closed cooling circuit, the conditioning of the cooling water through pH value adjustment, metering of corrosion inhibitors, and the disinfection of the cooling water with non-oxidative biocides and oxidative disinfectants.
- in the open cooling circuit (cooling tower), the automatic desalination (blow down) of the cooling water on the basis of a conductivity measurement in addition to the above mentioned functions.

6.2 DULCOTROL® Cooling Water

6.2.2 Identcode Ordering System

DULCOTROL® Cooling Water - One Measured Variable

CWCA	Measured variable
L000	Conductivity
C000	Free chlorine (at pH-value < 8.0)
C001	Free chlorine (at pH value > 8.0 or unstable)*
G000	Total chlorine (free+combined chlorine)
B000	Bromine organic (e.g. BCDMH, Stabrex)
B001	Free bromine (HOBr)
P000	pH
R000	ORP
D000	Chlorine dioxide (with temperature as correction variable)
Z000	Ozone
H000	Hydrogen peroxide
	Water to be measured
1	Cooling water
	Usage category
0	All measured variables measurable (L000: desalinate, blow down)
9	All measured variables two-way controllable
	Power supply
A	230 V, 50/60 Hz
C	115 V, 50/60 Hz
	Sensor equipment
0	With sensors
1	Without sensors
	Version
0	With ProMinent logo
	Sample water treatments
0	None
1	With filter
2	With peristaltic pump*
3	With filter and peristaltic pump*
	Accessories
0	None
1	With pressure reducer
2	With heat exchanger
3	With sample water pump
4	With pressure reducer and heat exchanger
6	With heat exchanger and sample water pump
	Language
DE	German
EN	English
FR	French
IT	Italian
NL	Dutch
ES	Spanish, not for H000
PL	Polish, not for H000
SV	Swedish, not for H000
HU	Hungarian, not for H000
PT	Portuguese, not for H000
CS	Czech, not for H000
	Approvals
1	CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.2 DULCOTROL® Cooling Water

Examples

Example 1: CWCA_L000_1_0_A_0_0_0_0_EN_1

Measuring of conductivity and desalinating (blow down) as well as time-controlled metering of biocides and corrosion inhibitors.

Controller:

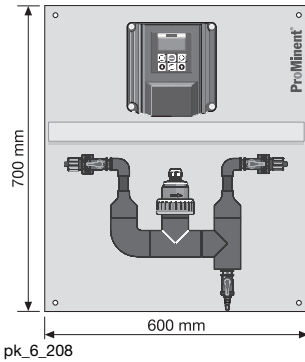
- D1CA_W_0_K_6_2_2_1_1_G_2_0_0_EN

Sensor housing:

- T-piece for ICT 1

Sensors:

- ICT 1



pk_6_208

Example 2: CWCA_B000_1_9_A_0_0_0_6_EN_1

Controlling of organic bromine in turbid and hot (> 45 °C) cooling water. The scope of delivery includes a heat exchanger and a sample water pump which are installed externally to the panel.

Controller:

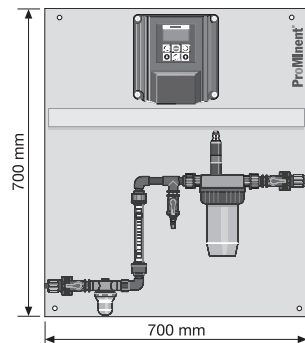
- D1CA_W_0_B_1_0_1_1_4_M_2_2_0_EN

Sensor housing:

- DLG III for bromine + flow monitoring

Sensors:

- BRE-1-mA 2 ppm



pk_6_209

External to the panel (not shown), accessories:

- Sample water pump
- Heat exchanger

6.2 DULCOTROL® Cooling Water

DULCOTROL® Cooling Water - Two Measured Variables

CWCA		Measured variable
LC00	1.	Conductivity / 2. free chlorine (at pH-value < 8.0)
LC01	1.	Conductivity / 2. free chlorine (at pH value > 8.0 or unstable)*
LG00	1.	Conductivity / 2. total chlorine (free+combined chlorine)
LB00	1.	Conductivity / 2. bromine organic (e.g. BCDMH, Stabrex)
LB01	1.	Conductivity / 2. free bromine (HOBr)
LD00	1.	Conductivity / 2. chlorine dioxide (with temperature as correction variable)
LZ00	1.	Conductivity / 2. ozone
LR00	1.	Conductivity / 2. ORP
LP00	1.	Conductivity / 2. pH
CP00	1.	Free chlorine / 2. pH (at pH-value < 8.0)
CP01	1.	Free chlorine / 2. pH (at pH-value > 8.0)*
GP00	1.	Total chlorine / 2. pH (free+combined chlorine or chlorine measurement for pH value > 8.0)
BP00	1.	Bromine organic / 2. pH
BP01	1.	Free bromine (HOBr) / 2. pH
DP00	1.	Chlorine dioxide / 2. pH (with temperature as correction variable)
HP00	1.	Hydrogen peroxide / 2. pH
RP00	1.	ORP / 2. pH
Water to be measured		
1		Cooling water
Usage category		
0		All measured variables measurable (Lx0x: desalinate, blow down)
1		1st measured variable = conductivity: desalinate (blow down), others two-way controllable, 2nd measured variable only measurable
2		2nd measured variable two-way controllable, 1st measured variable = conductivity: desalinate (blow down), others only measurable
3		Both measured variable one-way controllable with two-channel controller D2C (CP00, CP01, GP00, RP00, DP00)
9		All measured variables two-way controllable
Power supply		
A		230 V, 50/60 Hz
C		115 V, 50/60 Hz
Sensor equipment		
0		With sensors
1		Without sensors
Version		
0		With ProMinent logo
1		Without ProMinent logo
Sample water treatments		
0		None
1		With filter
2		With peristaltic pump*
3		With filter and peristaltic pump*
Accessories		
0		None
1		With pressure reducer
2		With heat exchanger
3		With sample water pump
4		With pressure reducer and heat exchanger
6		With heat exchanger and sample water pump
Language		
DE		German
EN		English
FR		French
IT		Italian
NL		Dutch
ES		Spanish, not for H in HP00
PL		Polish, not for H in HP00
SV		Swedish, not for H in HP00
HU		Hungarian, not for H in HP00
PT		Portuguese, not for H in HP00
CS		Czech, not for H in HP00
Approvals		
1		CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.2 DULCOTROL® Cooling Water

Examples

Example 1: CWCA_LB00_1_2_A_0_0_0_0_EN_1

Controlling of organic bromine (BCDMH) and measuring of conductivity for desalination as well as time-controlled metering of biocides and corrosion inhibitors.

Controller:

- D1CA_W_0_K_6_2_2_1_1_G_2_0_0_EN
- D1CA_W_0_B_1_0_1_1_4_M_2_2_0_EN
- + terminal box on the panel

Fitting:

- DLG III (flushable) for bromine + flow monitoring
- T-piece for ICT 1

Sensors:

- ICT 1
- BRE 1-mA 2 ppm

Example 2: CWCA_RP00_1_3_A_0_0_1_3_EN_1

One-way controlling of organic bromine in turbid cooling water. The scope of delivery includes a sample water pump which is installed externally to the panel.

Controller:

- D2CA_W_0_PR_5_2_0_4_M_2_0_EN + transducer RHV1

Sensor housing:

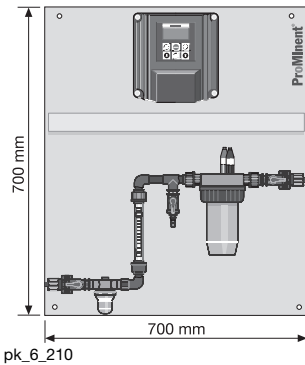
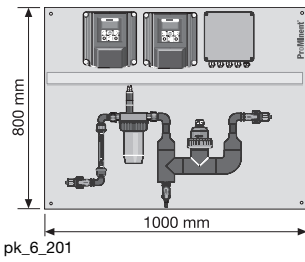
- DLG III for pH and ORP + flow monitoring

Sensors:

- RHER-Pt SE
- PHER 112 SE

External to the panel (not shown), accessories:

- Filter
- Sample water pump



6.2 DULCOTROL® Cooling Water

DULCOTROL® Cooling Water - Three Measured Variables

CWCA	Measured variable
LCP0	1. Conductivity / 2. free chlorine / 3. pH (at pH-value < 8.0)
LCP1	1. Conductivity / 2. free chlorine / 3. pH (at pH value > 8.0 or unstable)*
LGP0	1. Conductivity / 2. total chlorine (free+combined chlorine) / 3. pH
LBP0	1. Conductivity / 2. bromine organic (e.g. BCDMH, Stabrex) / 3. pH
LBP1	1. Conductivity / 2. free bromine (HOBr) / 3. pH
LDP0	1. Conductivity / 2. chlorine dioxide (with temperature as correction variable) / 3. pH
LZP0	1. Conductivity / 2. ozone / 3. pH
LHP0	1. Conductivity / 2. hydrogen peroxide / 3. pH
	Water to be measured
1	Cooling water
	Usage category
0	All measured variables measurable (Lxxx: desalinate, blow down)
4	1st measured variable = conductivity: Demineralisation, 2nd +3rd measured variable only measurable
5	2nd measured variable two-way controllable, 1st measured variable = conductivity: desalinate, blow down, 3rd measured variable only measurable
6	1st measured variable = conductivity: desalinate (blow down), 2nd + 3rd measured variable one-way controllable with two-channel controller D2C (only LCP0/LGP0/LDP0)
7	1st measured variable = conductivity: desalinate (blow down), 2nd + 3rd measured variable two-way controllable
9	All measured variables two-way controllable
	Power supply
A	230 V, 50/60 Hz
C	115 V, 50/60 Hz
	Sensor equipment
0	With sensors
1	Without sensors
	Version
0	With ProMinent logo
	Sample water treatments
0	None
1	With filter
2	With peristaltic pump*
3	With filter and peristaltic pump*
	Accessories
0	None
1	With pressure reducer
2	With heat exchanger
3	With sample water pump
4	With pressure reducer and heat exchanger
6	With heat exchanger and sample water pump
	Language
DE	German
EN	English
FR	French
IT	Italian
NL	Dutch
ES	Spanish, not for H in LHP0
PL	Polish, not for H in LHP0
SV	Swedish, not for H in LHP0
HU	Hungarian, not for H in LHP0
PT	Portuguese, not for H in LHP0
CS	Czech, not for H in LHP0
	Approvals
1	CE

* includes pH buffer solution
available from 2nd quarter of 2009

6.2 DULCOTROL® Cooling Water

Examples

Example 1: CWCA_LCP0_1_6_A_0_0_0_1_EN_1

One-way controlling of chlorine and pH and measuring of conductivity for desalination as well as time-controlled metering of biocides and corrosion inhibitors. The scope of delivery includes a pressure reducer which is installed externally to the panel.

Controller:

- D1CA_W_0_K_6_2_2_1_1_G_2_0_0_EN
- D2CA_W_0_PC_5_2_0_4_M_2_0_0_EN
- + terminal box on the panel

Fitting:

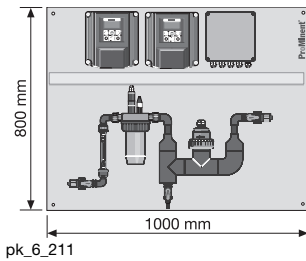
- DLG III (flushable) for pH and chlorine + flow monitoring
- T-piece for ICT 1

Sensors:

- ICT 1
- CLE 3-mA 0.5 ppm
- PHER-112-SE

External to the panel (not shown), accessories:

- pressure reducer



Example 2: CWCA_LBP0_1_7_A_0_0_0_3_EN_1

Two-way controlling of organic bromine and pH and measuring of conductivity for desalination as well as time-controlled metering of biocides and corrosion inhibitors. The scope of delivery includes a sample water pump which is installed externally to the panel.

Controller:

- D1CA_W_0_K_6_2_2_1_1_G_2_0_0_EN
- D1CA_W_0_B_1_0_1_1_4_M_2_2_0_EN
- D1CA_W_0_P_5_2_1_1_4_M_2_2_0_EN
- + terminal box on the panel

Fitting:

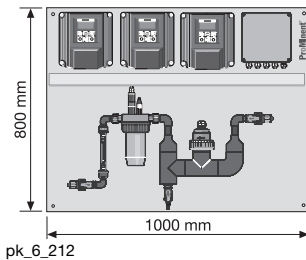
- DLG III for pH and bromine + flow monitoring
- T-piece for ICT 1

Sensors:

- ICT 1
- BRE 1-mA 2 ppm
- PHER-112-SE

External to the panel (not shown), accessories

- Sample water pump



6.2 DULCOTROL® Cooling Water

6.2.3 Technical Description Of The Delivery Scope Of DULCOTROL® Cooling Water

Controller

(for detailed information see chap. Measuring And Control Technology)

The Identcode features “measured variable” and “Usage category” determine the equipment of the measuring/control device. For measuring the conductivity for desalination (blow down) as well as for metering of biocides and corrosion inhibitors, the control unit of the D1Ca in the version Cool-Control with the Identcode D1CA_W_x_K_6_2_2_1_1_G_2_0_0_x is used.

The Identcode specification “measurable” determines the following version of the D1CA measuring unit for the other measured variables:

- Connection of a correction variable
- Two limit value relays
- Control input “Pause”
- Two freely programmable standard signal outputs

The Identcode feature “two-way controllable” determines the following version of the D1CA controller in addition to the properties listed in “measurable”:

- Feedforward control
- Alarm and 2 solenoid valve relays
- Control of two pumps
- PID Controller

The Identcode feature “one-way controllable” determines the D2CA controller as follows

- Two freely programmable standard signal outputs
- Alarm and 2 solenoid valve relays
- PID Controller

The specific Identcodes are as follows:

Measured variable	Measurable	Two-way controllable	One-way controllable
pH	D1CA_W_x_P_5_2_0_1_4_G_0_0_0_x	D1CA_W_x_P_5_2_1_1_4_M_2_2_0_x	
ORP	D1CA_W_x_R_0_0_0_1_4_G_0_0_0_x	D1CA_W_x_R_5_0_1_1_4_M_2_2_0_x	
Conductivity, inductive	D1CA_W_x_K_6_2_2_1_1_G_2_0_0_x	D1CA_W_x_L_6_2_4_1_4_M_2_2_0_x	
Chlorine	D1CA_W_x_C_1_1_0_1_4_G_0_0_0_x	D1CA_W_x_C_1_1_2_1_4_M_2_2_0_x	
Bromine	D1CA_W_x_B_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_B_1_0_1_1_4_M_2_2_0_x	
Chlorine dioxide (with CDP sensor)	D1CA_W_x_D_1_2_0_1_4_G_0_0_0_x	D1CA_W_x_D_1_2_1_1_4_M_2_2_0_x	
Ozone	D1CA_W_x_Z_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_Z_1_0_1_1_4_M_2_2_0_x	
Hydrogen peroxide	D1CA_W_x_H_7_0_0_1_4_G_0_0_0_x	D1CA_W_x_H_7_0_1_1_4_M_2_2_0_x	
pH/chlorine			D2CA_W_x_PC_5_2_0_4_M_2_0_x
pH/ORP			D2CA_W_x_PR_5_2_0_4_M_2_0_x + transducer RHV1
pH/chlorine dioxide			D2CA_W_x_PD_5_2_0_4_M_2_0_x

6.2 DULCOTROL® Cooling Water

Sensors

(for detailed information see chap. DULCOTEST® Sensor Technology)

The Identcode feature “measured variable” determines the used sensor type as listed below. An accessory such as a filter for instance may be necessary:

- If a different sensor type is required, the measuring/control panel may also be supplied without sensors (see Identcode feature: “Sensor equipment”).

Measured variable	Sensor type	Order no.
Conductivity, inductive	ICT 1	1023244
Total chlorine	CTE 1-mA-0.5 ppm	740686
Bromine organic	BRE 1-mA-2 ppm	1006894
Free bromine	BRE 2-mA-10 ppm	1020529
Free chlorine	CLE 3-mA-0.5 ppm	792927
ORP	RHER-Pt-SE	1002534
pH	PHER 112 SE	1001586
Chlorine dioxide	CDR 1-mA-0,5 ppm	1033762
Ozone	OZE 3-mA-2 ppm	792957
Hydrogen peroxide	PER 1-mA-50 ppm	1030511

6.2 DULCOTROL® Cooling Water

Sensor housings

The Identcode feature “measured variable” determines the used sensor housings as listed below:

Measured variable	Sample water	Sensor type
Bromine	1	DLGIII
Chlorine dioxide (temp. corr.)	1	DLGIII
Free chlorine	1	DLGIII
Total chlorine	1	DLGIII
Conductivity	1	Adapter DN40 pipe
Ozone	1	DLGIII
ORP	1	DLGIII
pH	1	DLGIII

Hydraulic connection

The hydraulic connection of the sample water is made via a 8x5 mm hose connection. Shut-off ball valves are installed upstream and downstream of the bypass sensor housing. Upstream of the bypass sensor housing, a sample water filter will be positioned on ordering. The sensor housing includes a sampling tap. A metal pin is integrated in the bypass sensor housing for an equipotential bonding line.

6.3 DULCOTROL® Waste Water

6.3.1 DULCOTROL® Waste Water

The measuring/control stations DULCOTROL® waste water are used in all industry segments where waste water is treated. The following applications may e.g. be covered:

- pH neutralisation and pH value adjustment
- Disinfection of clarified water
- Decontamination of waste water by eliminating reductives and oxidants
- Monitoring of rinsing water
- Desalination of process water
- Control of the dissolved oxygen in the biologic clarification stage

The selection of the components is further optimised by further differentiating the feature “water to be measured” in the Identcode order system:

- “Clear water”: this means all waste water which shows almost no or no visible solid fractions.
- “Water with solid fraction, turbid”: this means all waste water which shows a low solid fraction which, however, is clearly seen as cloudy turbidity.
- “Water with solid fraction, muddy”: this means all waste water which shows a high amount of solids. In a sample, solids either clearly precipitate or the sample is no longer translucent.
- “Water with fluoride and $\text{pH} < 7$ ”: in such water, a higher content of free hydrofluoric acid (HF) is to be reckoned with, which damages certain materials (e.g. also glass).

6.3 DULCOTROL® Waste Water

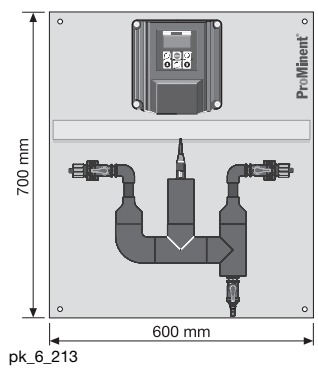
6.3.2 Identcode Ordering System

DULCOTROL® Waste Water - One Measured Variable

WWCA	Measured variable
G000	Total chlorine (free+combined chlorine or chlorine measurement for pH value > 8.0) for "water to be measured" 1, 2
P000	pH
R000	ORP for "water to be measured" 1, 2, 3
L000	Conductivity
D000	Chlorine dioxide (with temperature as correction variable) for "water to be measured": 1,2
Z000	Ozone for "water to be measured": 1,2
H000	Hydrogen peroxide for "water to be measured": 1,2
F000	Fluoride for "water to be measured" 1, 2, 4 (pH min. = 5.5, pH max. = 8.5)
T000	Temperature for "water to be measured": 1, 2, 3
Water to be measured	
1	Clear water
2	Water with solid fraction, turbid
3	Water with solid fraction, muddy (sensor directly within pipe, without filter
4	Water with fluoride and pH < 7
Usage category	
0	All measured variables only measurable
9	All measured variables two-way controllable
Power supply	
A	230 V, 50/60 Hz
C	115 V, 50/60 Hz
Sensor equipment	
0	With sensors
1	Without sensors
Version	
0	With ProMinent logo
Sample water treatments	
0	None
1	With filter
Accessories	
0	None
2	With heat exchanger
3	With sample water pump
6	With heat exchanger and sample water pump
Language	
DE	German
EN	English
FR	French
IT	Italian
NL	Dutch
ES	Spanish, not for H000
PL	Polish, not for H000
SV	Swedish, not for H000
HU	Hungarian, not for H000
PT	Portuguese, not for H000
CS	Czech, not for H000
Approvals	
1	CE

6.3 DULCOTROL® Waste Water

Examples



Example 1: WWCA_P000_3_9_A_0_0_0_0_EN_1

Two-way controlling of pH in muddy waste water.

Controller:

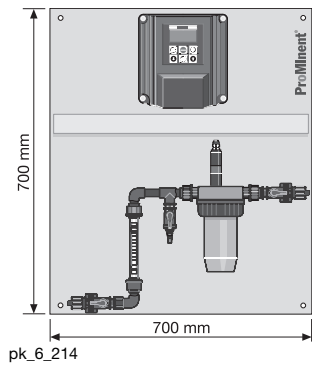
- D1CA_W_0_P_5_2_1_1_4_M_2_2_0_EN

Sensor housing:

- T-piece for pH electrodes

Sensors:

- PHEX-112-SE



Example 2: WWCA_H000_2_9_A_0_0_0_0_EN_1

Two-way controlling of hydrogen peroxide in turbid waste water.

Controller:

- D1CA_W_0_H_7_0_1_1_4_M_2_2_0_EN

Fitting:

- DLG III for hydrogen peroxide + flow monitoring

Sensors:

- PER1-200 ppm

6.3 DULCOTROL® Waste Water

DULCOTROL® Waste Water - Two Measured Variables

WWCA		Measured variable	
	GP00	1. Total chlorine / 2. pH (free+combined chlorine or chlorine measurement for pH value > 8.0), for "water to be measured" 1, 2	
	GR00	1. Total chlorine / 2. ORP (free+combined chlorine or chlorine measurement for pH value > 8.0), for "water to be measured" 1, 2	
	PP00	1. pH / 2. pH	
	PR00	1. pH / 2. ORP for "water to be measured" 1, 2, 3	
	PL00	1. pH / 2. conductivity	
	RL00	1. ORP / 2. conductivity for "water to be measured" 1, 2, 3	
	DP00	1. Chlorine dioxide (with temperature as correction variable) / 2. pH for "water to be measured" 1, 2	
	DR00	1. Chlorine dioxide (with temperature as correction variable) / 2. ORP for "water to be measured" 1, 2	
	ZP00	1. Ozone / 2. pH for "water to be measured" 1, 2	
	ZR00	1. Ozone / 2. ORP for "water to be measured" 1, 2	
	HP00	1. Hydrogen peroxide / 2. pH for "water to be measured" 1, 2	
	XP00	1. Dissolved oxygen / 2. pH for "water to be measured" 1, 2, 3	
	PF00	1. pH / 2. fluoride for "water to be measured" 1, 2, 4 (pH min. = 5.5, pH max. = 8.5)	
Water to be measured			
	1	Clear water	
	2	Water with solid fraction, turbid	
	3	Water with solid fraction, muddy	
	4	Water with fluoride and pH < 7	
Usage category			
	0	All measured variables only measurable	
	1	1st measured variable two-way controllable, 2nd measured variable only measurable	
	2	2nd measured variable two-way controllable, 1st measured variable only measurable	
	3	Both measured variables one-way controllable with two-channel controller D2C (only for GP00/ PR00 / DP00/ PP00)	
	9	All measured variables two-way controllable	
Power supply			
	A	230 V, 50/60 Hz	
	C	115 V, 50/60 Hz	
Sensor equipment			
	0	With sensors	
	1	Without sensors	
Version			
	0	With ProMinent Logo	
Sample water treatments			
	0	None	
	1	With filter	
Accessories			
	0	None	
	2	With heat exchanger	
	3	With sample water pump	
	6	With heat exchanger and sample water pump	
Language			
	DE	German	
	EN	English	
	FR	French	
	IT	Italian	
	NL	Dutch	
	ES	Spanish, not for H in HP00	
	PL	Polish, not for H in HP00	
	SV	Swedish, not for H in HP00	
	HU	Hungarian, not for H in HP00	
	PT	Portuguese, not for H in HP00	
	CS	Czech, not for H in HP00	
Approvals			
	1	CE	

6.3 DULCOTROL® Waste Water

Examples

Example 1: WWCA_DR00_2_1_A_0_0_1_3_EN_1

Two-way controlling of chlorine dioxide and redundant check measuring of ORP in turbid waste water.

Controller:

- D1CA_W_0_D_1_2_1_1_4_M_2_2_0_EN
- D1CA_W_0_R_5_2_0_1_4_G_0_0_0_EN
- + terminal box on the panel

Sensor housing:

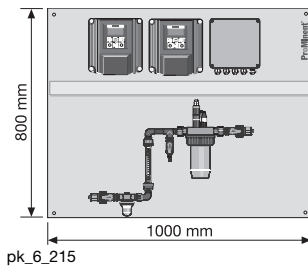
- DLG III for ORP, temperature, and chlorine dioxide
- + flow monitoring,
- + filter upstream

Sensors:

- CDR-1-mA 2ppm
- RHER Pt-SE
- Pt 100

External to the panel (not shown), accessories:

- Filter
- Sample water pump



Example 2: WWCA_PL00_3_1_A_0_0_0_0_EN_1

Two-way controlling of pH and measuring of conductivity in muddy waste water.

Controller:

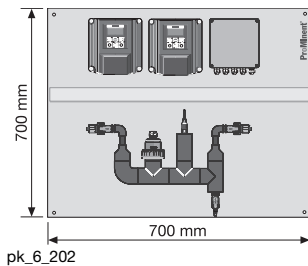
- D1CA_W_0_P_5_2_1_1_4_M_2_2_0_EN
- D1CA_W_0_L_6_2_0_1_4_G_0_0_0_EN
- + terminal box on the panel

Sensor housing:

- T-piece for pH-electrode
- T-piece for ICT 1

Sensors:

- ICT 1
- PHEX 112-SE



6.3 DULCOTROL® Waste Water

DULCOTROL® Waste Water - Three Measured Variables

WWCA		Measured variable	
RPL0	1.	ORP / 2. pH / 3. conductivity for "water to be measured"	1, 2, 3
GRP0	1.	Total chlorine / 2. ORP / 3. pH for "measured water"	1, 2
DPR0	1.	Chlorine dioxide / 2. pH / 3. ORP for "measured water"	1, 2 (only manual temp. compensation)
ZPR0	1.	Ozone / 2. pH / 3. ORP for "measured water"	1, 2
GPL0	1.	Total chlorine / 2. pH / 3. conductivity for "measured water"	1, 2
PDL0	1.	pH / 2. chlorine dioxide (with temp.) / 3. conductivity for sample water	1, 2
PZL0	1.	pH / 2. ozone / 3. conductivity for "measured water"	1, 2
PLX0	1.	pH / 3. conductivity / 2. dissolved oxygen for "measured water"	1, 2, 3
PHL0	1.	pH / 2. hydrogen peroxide / 3. conductivity for "measured water"	1, 2
		Water to be measured	
1		Clear water	
2		Water with solid fraction, turbid	
3		Water with solid fraction, muddy	
4		Water with fluoride and pH< 7	
		Usage category	
0		All measured variables only measurable	
4		1st measured variable two-way controllable, 2nd + 3rd measured variable only measurable	
5		2nd measured variable two-way controllable, 1st + 3rd measured variable only measurable	
6		1st + 2nd measured variable one-way controllable with two-channel controller D2C (only for GPL0, RPL0, DPR0, PDL0) and 3rd measured variable only measurable	
7		1st measured variable two-way controllable, 2nd + 3rd measured variable one-way controllable with two-channel controller D2C (only for GRP0, DPR0, ZPR0)	
9		All measured variables two-way controllable	
		Power supply	
A		230 V, 50/60 Hz	
C		115 V, 50/60 Hz	
		Sensor equipment	
0		With sensors	
1		Without sensors	
		Version	
0		With ProMinent logo	
		Sample water treatments	
0		None	
1		With filter	
		Accessories	
0		None	
2		With heat exchanger	
3		With sample water pump	
6		With heat exchanger and sample water pump	
		Language	
DE		German	
EN		English	
FR		French	
IT		Italian	
NL		Dutch	
ES		Spanish, not for H in PHL0	
PL		Polish, not for H in PHL0	
SV		Swedish, not for H in PHL0	
HU		Hungarian, not for H in PHL0	
PT		Portuguese, not for H in PHL0	
CS		Czech, not for H in PHL0	
		Approvals	
1		CE	

6.3 DULCOTROL® Waste Water

Examples

Example 1: WWCA_DPR0_2_6_A_0_0_1_0_EN_1

One-way controlling of pH and chlorine dioxide and redundant check measuring of ORP in turbid waste water.

Controller:

- D2CA_W_0_DP_5_2_0_4_M_2_0_EN
- D1CA_W_0_R_5_0_0_1_4_G_0_0_0_EN
+ terminal box on the panel

Sensor housing:

- DLG III for ORP, pH, and chlorine dioxide
+ flow monitoring,
+ filter upstream

Sensors:

- CDR-1-mA 2ppm (manual temp. comp.)
- RHER Pt-SE
- PHER 112-SE

Accessories, outside the panel (not illustrated):

- Filter

Example 2: WWCA_PLX0_3_9_A_0_0_0_0_EN_1

Two-way controlling of pH, conductivity and dissolved oxygen in muddy waste water.

Controller:

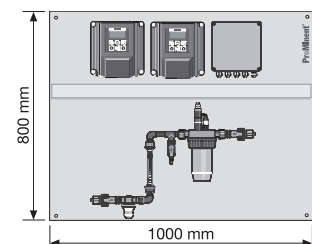
- D1CA_W_0_P_5_2_1_1_4_M_2_2_0_EN
- D1CA_W_0_X_1_0_1_1_4_M_2_2_0_EN
- D1CA_W_0_L_6_2_4_1_4_M_2_2_0_EN
+ terminal box on the panel

Sensor housing:

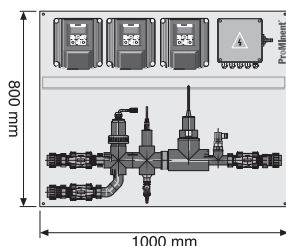
- T-piece for pH-electrode
- T-piece for ICT 1
- T-adapter for DO1

Sensors:

- ICT 1
- PHEX 112-SE
- DO1-mA-20 ppm



pk_6_216



P_DCT_0022_SW

6.3 DULCOTROL® Waste Water

6.3.3 Technical Description Of The Delivery Scope Of DULCOTROL® Waste Water

Controller

(for detailed information see chap. Measuring And Control Technology)

The Identcode features “measured variable” and “usage category” determine the equipment of the measuring/control device.

The Identcode specification “measurable” determines the following version of the D1CA measuring unit:

- Connection of a correction variable
- Two limit value relays
- Control input “Pause”
- Two freely programmable standard signal outputs

The Identcode feature “two-way controllable” determines the following version of the D1CA controller in addition to the properties listed in “measurable”:

- Feedforward control
- Alarm and 2 solenoid valve relays
- Control of two pumps
- PID controller

The Identcode feature “one-way controllable” determines the D2CA controller as follows:

- Two freely programmable standard signal outputs
- Alarm and 2 solenoid valve relays
- PID controller

The specific Identcodes are as follows:

Measured variable	Measurable	Two-way controllable	One-way controllable
pH	D1CA_W_x_P_5_2_0_1_4_G_0_0_0_x	D1CA_W_x_P_5_2_1_1_4_M_2_2_0_x	
ORP	D1CA_W_x_R_0_0_0_1_4_G_0_0_0_x	D1CA_W_x_R_5_0_1_1_4_M_2_2_0_x	
Conductivity, inductive	D1CA_W_x_L_6_2_0_1_4_G_0_0_0_x	D1CA_W_x_L_6_2_4_1_4_M_2_2_0_x	
Chlorine	D1CA_W_x_C_1_1_0_1_4_G_0_0_0_x	D1CA_W_x_C_1_1_2_1_4_M_2_2_0_x	
Chlorine dioxide (with CDP sensor)	D1CA_W_x_D_1_2_0_1_4_G_0_0_0_x	D1CA_W_x_D_1_2_1_1_4_M_2_2_0_x	
Ozone	D1CA_W_x_Z_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_Z_1_0_1_1_4_M_2_2_0_x	
Hydrogen peroxide	D1CA_W_x_H_7_0_0_1_4_G_0_0_0_x	D1CA_W_x_H_7_0_1_1_4_M_2_2_0_x	
Dissolved oxygen	D1CA_W_x_X_1_0_0_1_4_G_0_0_0_x	D1CA_W_x_X_1_0_1_1_4_M_2_2_0_x	
Fluoride	D1CA_W_0_F_1_2_1_1_4_M_2_2_0_D		
Temperature	D1CA_W_x_T_4_0_0_1_4_G_0_0_0_x	D1CA_W_x_T_4_0_1_1_4_M_2_2_0_x	
pH/chlorine			D2CA_W_x_PC_5_2_0_4_M_2_0_x
pH/ORP			D2CA_W_x_PR_5_2_0_4_M_2_0_x + transducer RHV1
pH/pH			D2CA_W_x_PP_5_2_0_4_M_2_0_x + transducer PHV1
pH/chlorine dioxide			D2CA_W_x_PD_5_2_0_4_M_2_0_x

6.3 DULCOTROL® Waste Water

Sensors

(for detailed information see chap. DULCOTEST® Sensor Technology)

The Identcode features "measured variable" and "water to be measured" determine the type of sensor used as specified below.

- If a different sensor type is required, the measuring/control panel may also be supplied without sensors (see Identcode feature: "Sensor equipment")

Measured variable	Sample water	Sensor type	Order no.
pH	1	PHEP 112 SE	150041
pH	2	PHER 112 SE	1001586
pH	3	PHEX 112 SE	305096
pH	4	PHEF 012 SE	1010511
ORP	1	RHEP-Pt-SE	150094
ORP	2	RHER-Pt-SE	1002534
ORP	3	RHEX-Pt-SE	305097
Fluoride (temp.corr.)	1/2/4	FLEP 010-SE / FLEP 0100-SE + Reference electrode, REFP-SE (Order no. 1018458) + Temperature sensor, Pt 100 (Order no. 305063)	1028279
Conductivity, inductive	1/2/3	ICT 1	1023244
Conductivity, inductive	4	ICT 2	1023352
Total chlorine	1/2	CTE 1-mA-10 ppm	740684
Hydrogen peroxide	1/2	PER 1-mA-50 ppm	1030511
Dissolved oxygen	1/2/3	DO 1-mA-20 ppm	1020532
Ozone	1/2	OZE 3-mA-2 ppm	792957
Chlordioxid	1/2	CDR 1-mA-2 ppm	1033393
Temperature	1/2/3	Temperature sensor, Pt 100	305063

Sensor housings

(for detailed information see chap. DULCOTEST® Sensor Technology)

The type of bypass fitting used particularly depends on the "water to be measured" and sometimes on the measured variable or the combination of measured variables. For all clear water or water with a low solid fraction, the sensor housing DLGIII is used. For muddy water, the sensors are, if possible, directly installed in a pipe using a T-piece. Exception:

- for fluoride, the DLG IV is used.

Measured variable	Sample water	Sensor type
pH	1/2/4	DLGIII
pH	3	T-piece
ORP	1/2	DLGIII
ORP	3	T-piece
Total chlorine	1/2	DLGIII
Hydrogen peroxide	1/2	DLGIII
Ozone	1/2	DLGIII
Chlorine dioxide (CDP)	1/2	DLGIII
Temperature	1/2	DLGIII
Temperature	3	T-piece
Fluoride	1/4	DLGIV+magnetic stirrer
Dissolved oxygen (DO1)	1/2/3	Adapter for PVC pipe d75
Conductivity, inductive (ICT1)	1/2	Adapter for PVC pipe DN 40
Conductivity, inductive (ICT1)	3	ICT 1 in T-piece

6.3 DULCOTROL® Waste Water

Hydraulic connection, piping

The "water to be measured" 1, 2, 4 is connected by means of a 8x5 mm hose connection and the "water to be measured" 3 with a DN 25 connector. The hydraulic connection of the sample water is made via a 8x5mm hose connection. Shut-off ball valves are installed upstream and downstream of the bypass sensor housing. Upstream of the bypass sensor housing, a sample water filter will be positioned on ordering. The bypass sensor housing include a sampling tap. A metal pin is integrated in the bypass sample fitting for an equipotential bonding line. For muddy water ("water to be measured" 3), the sensors are, if possible, directly installed in a pipe using a T-piece.

6.4 DULCOTROL® Free Chlorine – pH-independent

6.4.1

DULCOTROL® Free Chlorine – pH-independent

The online measuring/control system "DULCOTROL® Free chlorine - pH-independent" is integrated in all DULCOTROL® measuring systems if sample water with unstable pH or pH > 8.0 is defined in the Identcode. According to the Identcode, it can also be ordered as a separate measurement/control facility panel-mounted or in loose components.

Function and design

In case of clear water, the water to be measured flows through the modular bypass fitting DGMA or in case of turbid water through the bypass fitting DLG.

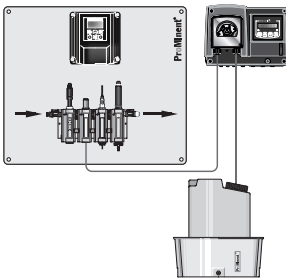
- A flow monitor measures the flow rate and triggers an alarm if 20 l/h are undershot. This alarm can also be sent to a superordinated control desk via the D1Ca controller.
- A peristaltic pump meters a pH buffer solution into a mixer module such that the pH level in the downstream measuring chamber is maintained at pH 6.5. This facilitates a pH-independent amperometric measurement of the free chlorine.
- The in-line probe features an amperometric diaphragm-covered sensor for free chlorine which is connected to the D1Ca controller.
- Depending on the selection via Identcode, the D1Ca controller can be equipped with feedforward control via frequency input for measuring or controlling free chlorine at varying flow rates of the main flow.
- The pH value of the sample water can be controlled via Identcode selection. This function facilitates minimum consumption of the pH buffer solution and extends the servicing intervals and the service life of the peristaltic pump.

Typical applications

- Drinking water disinfection on cruise liners
- Drinking water disinfection in water supply utilities with pH > 8.0
- Process, waste water disinfection

Customer benefits

- **Rapid response time and precise chlorine measurement** ensured by continuous real-time measurement
- **Reliable measurement/control without any interferences**
 - The feedforward control prevents disturbances of the chlorine control caused by flow fluctuations in the main process flow
 - The amperometric measurement prevents disturbances caused by colour and turbidity influences
- **Fully automatic operation**
 - Automatic monitoring of the sample water flow
 - Automatic monitoring of the buffer reagent consumption
 - Fault alarm signalling
- **Cost savings for reagents and wearing parts**
 - pH control of the buffer metering minimises reagent consumption and stress on wearing parts



P_DCT_0023_SW

6.4 DULCOTROL® Free Chlorine – pH-independent

6.4.2 Identcode Ordering System

DULCOTROL® free chlorine pH-independent*

FCCA	Measured variable
C000	Free chlorine (pH value > 8 or instable)
	Water to be measured
1	Clear water
2	Water with solid fraction, turbid
	Usage category
0	Chlorine measurable
1	Chlorine measurable and pH buffer metering controllable
9	Chlorine two-way controllable
3	Chlorine two-way controllable and pH buffer metering controllable
	Power supply
A	230 V, 50/60 Hz
B	115 V, 50/60 Hz
	Sensor equipment
0	with sensors
1	without sensors
	Version
0	Panel-mounted with ProMinent logo
1	Components not panel-mounted
2	Panel-mounted without ProMinent logo
	Sample water treatments
0	none
1	with filter
2	with peristaltic pump
3	with filter and peristaltic pump
	Accessories
0	none
2	with 10 l tank and level monitoring
3	with 30 l tank and level monitoring
	Language
DE	German
EN	English
FR	French
IT	Italian
CS	Czech
	Approvals
1	CE

* available from 2nd quarter of 2009

6.4 DULCOTROL® Free Chlorine – pH-independent

6.4.3

Technical Description Of The Delivery Scope DULCOTROL® free chlorine, pH-independent

D1Ca controller

a: D1CA_W_0_C_1_0_1_1_4_M_2_2_0_DE

- Measured variable: Free chlorine
- Disturbance variable connection: flow as 4-20mA
- Control input: Pause (flow monitoring of the sample water)
- 2 programmable 0/4-20mA signal outputs
- Alarm and 2 solenoid valve relays (pulse length control)
- Pump control: 2 Pumps
- Control characteristics: PID

b: D1CA_W_0_P_5_2_0_1_4_M_2_2_0_DE

optional for the function "pH buffer metering controllable" (Identcode: type of application 1, 3)

- Measured variable: pH
- Control input: Pause (flow monitoring of the sample water)
- 2 programmable 0/4-20mA signal outputs
- Alarm and 2 solenoid valve relays (pulse length control)
- Pump control: 2 Pumps
- Control characteristics: PID

Sensors

a: free chlorine: CLE 3-mA-5 ppm (order no. 1033392)

b: pH

Optional for the function „pH buffer metering controllable“ (Identcode: type of application 1, 3)

1 clear water: PHEP 112-SE (order no. 150041)

2 turbid water: PHER 112 SE (order no. 1001586)

Fittings

a: Clear water: DGMA 3 11T002

b: Turbid water: DLG III (order no. 914955) in addition with flow monitor

Peristaltic pump

DF4A or similar

Reagent tank and level monitoring

a: 10 l Tank

b: 35 l Tank

Buffer reagent

6.4 DULCOTROL® Free Chlorine – pH-independent

7 DULCOTEST® Sensor Technology

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7.0 Overview Of DULCOTEST® Sensors

7.0.1

Product Overview

DULCOTEST® Sensors

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

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

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



pk_6_095_2

Potentiometric DULCOTEST® Sensors

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

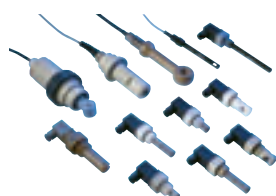
- Long service life ensured by premium glass quality and an optimum combination of automated and manual production
- Precise and reliable measurement for efficient processes and maximum process reliability
- Tailored process integration guaranteed by special versions with individual installation lengths,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



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Amperometric DULCOTEST® Sensors

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



pk_6_097

DULCOTEST® Sensors for Electrolytic Conductivity

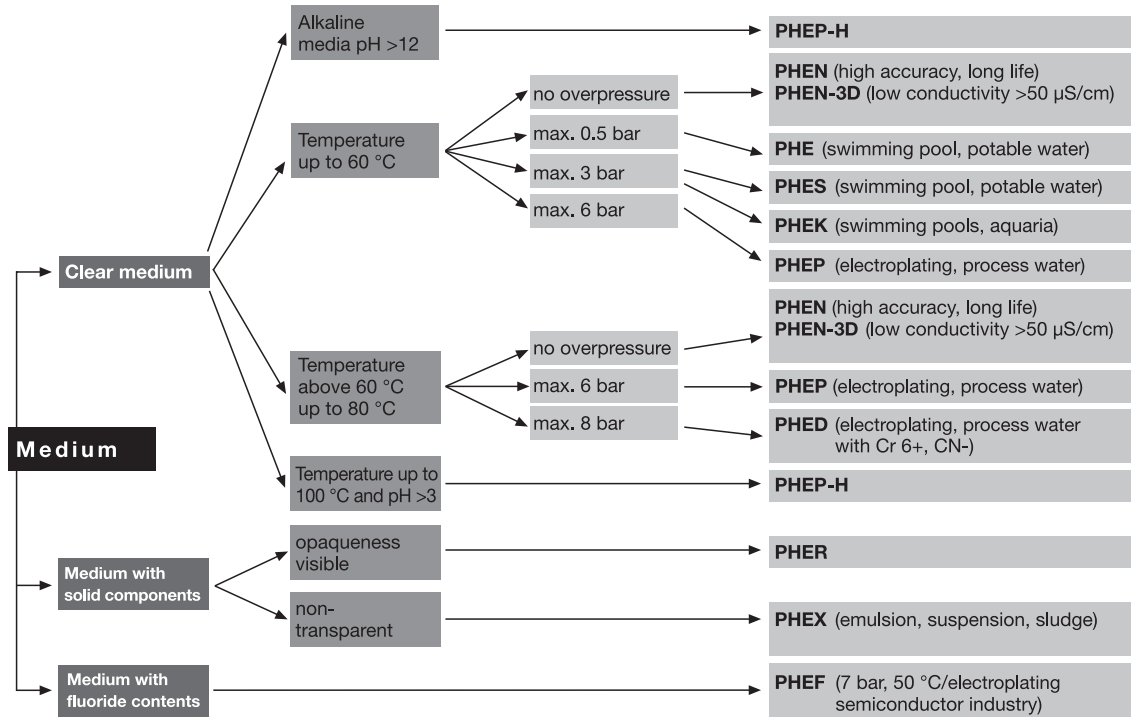
The comprehensive product line of DULCOTEST® conductivity sensors ensures the right sensor is selected with optimum price/performance ratio in applications ranging from simple water treatment through to intricate industrial process waste water processing. 27 different types of sensor tailored to the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

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

7.0 Overview Of DULCOTEST® Sensors

7.0.2 Selection Guide

Selection Guide DULCOTEST® pH Electrodes



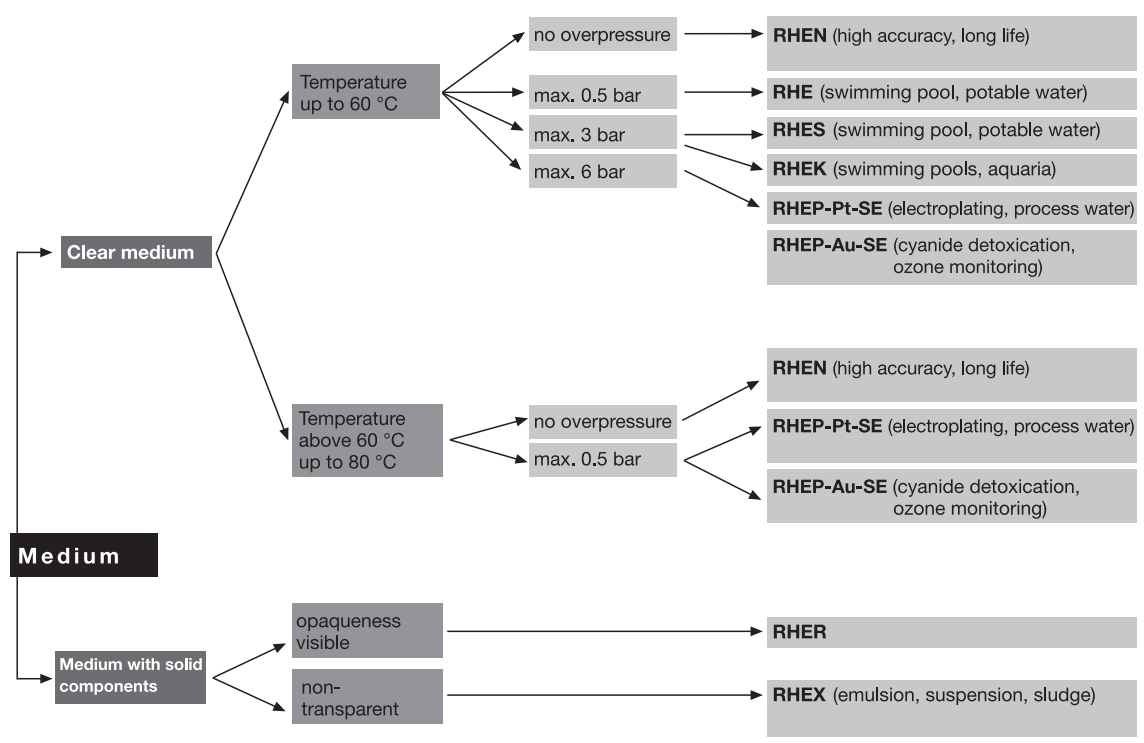
Selection guide - Amperometric sensors

Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Free Chlorine	Drinking, swimming pool, process, service water	0.01–100 mg/l	D1C, D2C, DULCOMARIN®	CLE 3-mA-xppm, CLE 3.1-mA-xppm
Free Chlorine	Drinking, swimming pool, process, service water	0.01–50 mg/l	DMT	CLE 3-DMT-xppm
Free Chlorine	Drinking, swimming pool, process, service water	0.01–10 mg/l	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-xppm
Total chlorine	Swimming pool water with chlorine-organic disinfectants	0.02–10 mg/l	D1C, D2C, DULCOMARIN®	CGE 2-mA-xppm
Total chlorine	Swimming pool water with chlorine-organic disinfectants	0.01–10 mg/l	DULCOMARIN® II	CGE 2- CAN-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 mg/l	D1C, D2C, DULCOMARIN®	CTE 1-mA-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 mg/l	DMT	CTE 1-DMT-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 mg/l	DULCOMARIN® II	CTE 1-CAN-xppm
Combined chlorine	Swimming pool water	0.02–2 mg/l	D2C	CTE 1-mA-2 ppm + CLE 3.1-mA-2 ppm
Combined chlorine	Swimming pool water	0.01–10 mg/l	DULCOMARIN® II	CTE 1-CAN-xppm + CLE 3.1-CAN-xppm
Bromine	Cooling, swimming pool, whirlpool water	0.2–10 mg/l	D1C	Bromine measured variable 1-mA-xppm
Bromine	Cooling, swimming pool, whirlpool water	0.2–10 mg/l	D1C	Bromine measured variable 2-mA-xppm
Chlorine dioxide	Drinking, service, process water	0.01–10 mg/l	D1C	CDE 2-mA-xppm
Chlorine dioxide	Bottle washer system	0.02–2 mg/l	D1C	CDP 1-mA
Chlorite	Drinking, wash water	0.02–2 mg/l	D1C	CLT 1-mA-xppm
Ozone	Drinking, service, process, swimming pool water	0.02–2 mg/l	D1C	OZE 3-mA-xppm
Dissolved oxygen	Drinking, surface water	2–20 mg/l	D1C	DO 1-mA-xppm
Dissolved oxygen	Activated sludge tank, sewage treatment plant	0.1–10 mg/l	D1C	DO 2-mA-xppm

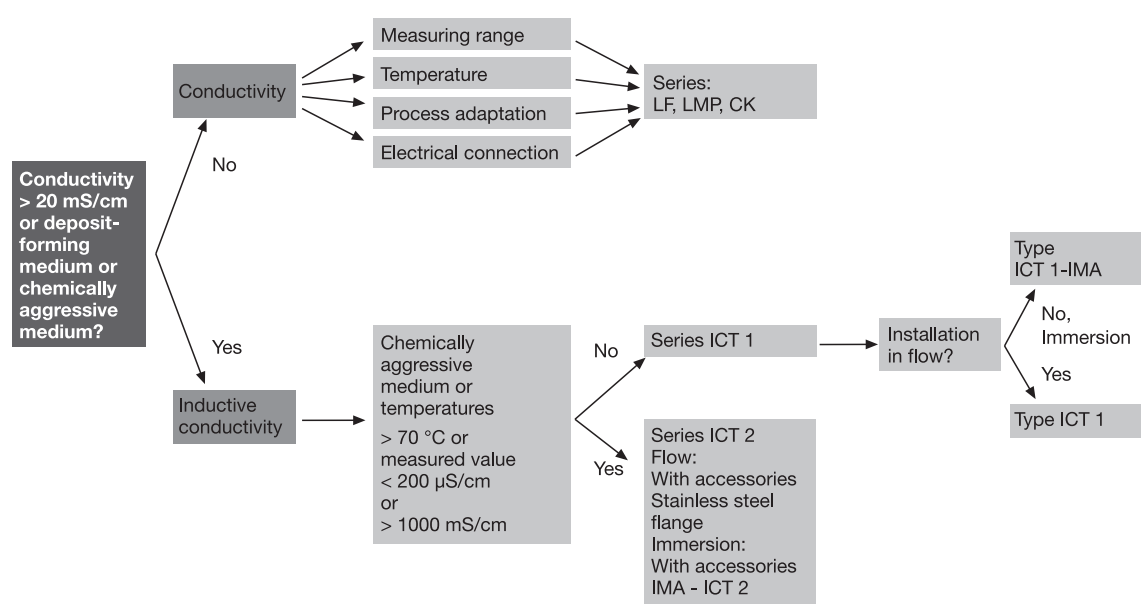
7.0 Overview Of DULCOTEST® Sensors

Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Peracetic acid	CIP, antiseptic food filling process	1–2000 mg/l	D1C	PAA 1-mA-xppm
Hydrogen peroxide	Clear water, fast control	1–2,000 mg/l	PEROX controller	Perox sensor PER-OX-H2.10-P
Hydrogen peroxide	Process, swimming pool water	2–20,000 mg/l	D1C	PER1-mA-xppm

Selection guide - DULCOTEST® Redox Electrodes



Selection guide - DULCOTEST® Conductivity sensors

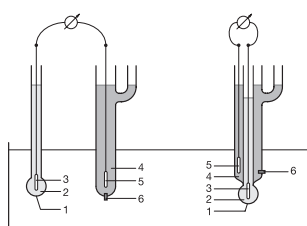


7.1 DULCOTEST® Sensor Technology - Measurement Principles

7.1.1 Three Measurement Principles For Reliable Water Treatment

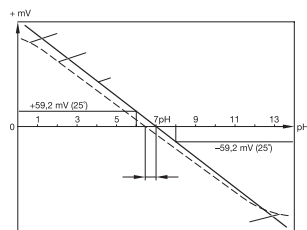
- Potentiometry is used to determine: pH value, ORP and fluoride concentration
- Amperometry is used to determine: chlorine, bromine, chlorine dioxide, ozone, hydrogen peroxide, peracetic acid
- Conductometry is used to determine electrolytic conductivity

7.1.2 Potentiometry - Measures An Electrode's Potential In A Sample Solution



pk_6_001

- 1 Glass membrane
- 2 Internal pH buffer
- 3 Internal derivation
- 4 Electrolyte
- 5 External derivation
- 6 Diaphragms



pk_6_002

- 1 Acid error
- 2 Exponential (in practice)
- 3 Theoretical (nominal slope)
- 4 Zero point deviation (asymmetrical potential)
- 5 Alkali error
- 6 Voltage of probe

As the measurement of the potential of a single electrode is impossible (half-cell), an electrode consisting of two half-cells is used. Their potential difference can be measured in the form of a high impedance voltage - i.e. practically current-free.

An electrode always comprises:

A measuring electrode which reacts as specifically as possible to changes in concentration of a pre-determined reaction participant and a reference electrode which delivers as constant a voltage as possible (voltage does not depend on the reaction participant)

One example of this kind of measurement system is the pH measuring electrode designed as a separate combination probe or combination probe (fig. 1).

pH is the negative logarithm of the hydrogen-ion activity.

Hydrogen-ion concentrations can range over large areas from less than 10⁻¹⁴ g/l to more than 10 g/l (or Mol/l) in aqueous solutions and the exponential written form is unwieldy. The pH scale is therefore defined as:

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

When the concentration is not too high, activity and concentration can be equated.

Thus a concentration of 10⁻¹⁴ equates to a pH value of 14 and a concentration of 10⁰ = 1 a pH value of 0.

The pH value of 7 is described as the neutral point. That means that the active concentrations of H⁺ and OH⁻ ions which are derived from the disassociation of water (H₂O → H⁺ + OH⁻) are equal.

If the hydrogen ions predominate due to the addition of acid (e.g. HCl), the pH value falls below 7. When alkali is added (e.g. NaOH), values rise above 7 and the solution becomes alkaline

Any change to the pH value by 1 corresponds to a change in concentration by a factor of 10, as determined by the logarithmic relationship.

Fig. 2 shows the theoretical voltage progression of pH glass probes. In practice, however, glass electrodes deviate more or less from the theoretical progression.

The electrode system generally demonstrates a zero point deviation (asymmetrical potential) of less than ±pH 0.5. The electrode slope (mV/pH) can also deviate from the theoretical value UN (59.2 mV/pH at 25 °C), particularly with ageing glass electrode.

In the case of very small pH values further deviation can occur in the form of the so-called acid error, while at high pH values the so-called alkaline error (or Na error) should be taken into account

pH measurement amplifiers must be adjusted to the probes used by means of zero point and slope calibrations

For this purpose the zero point calibration is carried out using a buffer solution whose value is pH 7 and the slope test with a buffer in the alkaline or acid regions, pH 2 or 3 values removed from the neutral point.

When pH measurements deviate from pH 7, fluctuating temperatures of the liquid sample may require temperature compensation.

In this case there are three questions to answer:

- 1 By which pH value should measurements be carried out?
 - 2 How great are the temperature fluctuations?
 - 3 What degree of accuracy is required of the measurement?
- Temperature influence without compensation:

At pH 10, a temperature increase of 10 °C triggers a reading error of approx. +pH 0.1. This effect is increased the further the reading deviates from pH 7.

7.1 DULCOTEST® Sensor Technology - Measurement Principles

The measurement of ORP voltage is also a potentiometric measurement

The term "ORP" (Oxidation/Reduction Potential) stands for the simultaneously occurring reduction and oxidation in aqueous solutions. In general, in the case of oxidation, electrons are extracted, whereby an oxidant functions as an electron acceptor. In the case of reduction, however, electrons are resorbed, whereby a reducing agent is effective as an electron donor.

ORP potential is measured using noble metal electrodes, generally platinum. A positive ORP potential is produced in a liquid containing an oxidant (e.g. chlorine) and a negative ORP potential is produced in a reducing agent (e.g. sodium bisulphite).

The level of the ORP voltage provides an indication of the oxidation or reducing strength of a solution. In the case of disinfection, the ORP voltage provides an indication of the germicidal effect of, for example, chlorine or ozone.

ORP voltage may therefore be taken into consideration as a hygiene parameter in water treatment

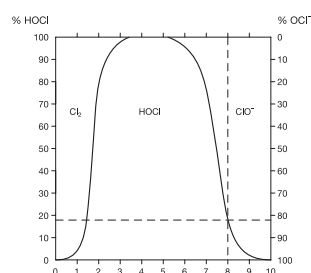
It is important to note the dependence of ORP voltage on the pH value and qualitative assumptions must be based on a constant pH value.

Examples of typical applications for ORP measurement

- 1 Cyanide removal at high pH values through oxidation using gold electrodes.
- 2 Chromate removal at low pH values through reduction using platinum electrodes.
- 3 Monitoring of the disinfecting effect of oxidant metering (chlorine/bromine) using platinum electrodes.

7.1.3

Amperometry - A Current Measurement Used To Determine The Concentration Of Predetermined Dissolved Solids In Aqueous Solutions



pk_6_003
Disassociation curve of the hypochlorous acid (HOCl)

The type of current measurement is concentrated in the nA range (10^{-9} A) or μ A (10^{-6} A). Either open or membrane-capped 2- or 3-electrode cells are used for operational measurements. The amperometric sensor product range allows users to determine concentrations of chlorine, bromine, chlorine dioxide, chlorite, ozone, hydrogen peroxide, peracetic acid and dissolved oxygen.

Our amperometric DULCOTEST® sensors are highly developed membrane-covered 2-electrode cells.

Separating the electrode chamber from the sample liquid by means of a special membrane allows clear metrological predictions to be made and interference factors to be eliminated.

The ProMinent DULCOTEST® 2-electrode probes use gold or platinum working electrodes (cathodes). The counter electrodes (anodes) are made of specially coated silver

In contrast to open, interference-prone sensors, membrane-capped probes are almost totally unaffected by flow rates above a minimum level (approx. 30 l/h). There is therefore no need to maintain constant flow rates.

The pH value has a decisive influence on chlorine measurement

It is important to know the forms in which chlorine occurs in aqueous solutions. Chlorine only occurs as dissolved chlorine gas Cl_2 in water with a very low pH value and above approx. pH 3 it occurs as hypochlorous acid HOCl, which dissociates into hypochlorite if the pH value increases further (see fig. 3).

Hypochlorite has 100 times less disinfecting power than hypochlorous acid. Detection using a chlorine measuring cell is therefore impractical. However, both hypochlorous acid and hypochlorite are categorised as "free chlorine" and as such can be detected using the DPD 1 measuring method, which is generally used as a comparison measurement.

Example:

At pH 8 (see fig. 3) only 20 % of HOCl is present in an effective form, while 80 % occurs in the form of the virtually ineffective OCl^- . If, however, one wants the measuring device to display a value corresponding to the DPD comparison measurement, adjustment can be carried out by means of a sensitivity threshold calibration (slope test).

For the measurement to be valid, the pH value must be kept constant. If not, a new slope test should be carried out. The maximum admissible pH value for measuring cells is pH 8 for inorganic chlorine and pH 9.5 for organic chlorine.

7.1 DULCOTEST® Sensor Technology - Measurement Principles

Temperature exerts a considerable influence on a chlorine measurement. For this reason, the DULCOTEST® chlorine measuring cells incorporate an automatic temperature compensation system

There are no problems in using inorganic chlorine in chlorine measurement (chlorine gas Cl_2 , sodium hypochlorite NaOCl or calcium hypochlorite $\text{Ca}(\text{OCl})_2$), as long as the pH value is constant. Difficulties can arise when using organic chlorine additives (isocyanuric acid). These are easily overcome, however, by using the organic chlorine probe (type CGE).

When organic chlorine stabilisers are added, both hypochlorous acid and chlorine combined with isocyanuric acid are formed. Both species are detected by the organic chlorine measuring cells (CGE).

Measurements according to the DPD 1 method also detect organic chlorine in precisely the same way as the almost ineffective hypochlorite (which occurs at high pH values). DPD measurement can thereby be deceptive, indicating hygienic safety when this is not actually the case.

Typical applications for DULCOTEST® chlorine measuring cells are in swimming pool water (including seawater), drinking water and industrial water

Chlorine measurement can be affected by bromine, iodine, ozone and chlorine dioxide but not dissolved oxygen. The action of the diaphragm of the Type CLE free chlorine sensor is blocked by surfactants. The probe cannot then be used. However, the Type CTE total chlorine sensor can be used in such an application.

A probe can be used for the measurement of chlorine dioxide according to the same principle as for inorganic chlorine measurement. Chlorine dioxide measurement does not depend on the pH value. Its temperature-dependency is compensated. Dissolved oxygen and chlorite do not affect the measurement results. Surfactants are problematic for the CDE sensor type. The CDP type can, however, be used in liquids containing surfactants.

Amperometric measuring cells can also be used to measure bromine and ozone in aqueous solutions.

7.1.4

Advantages Of Amperometric Sensors DULCOTEST® At A Glance

Simple to use

- No zero point calibration necessary
- Sample liquid need not be de-chlorinated with activated carbon filter
- Installation and calibration is very quick

Reliable measurement in real-time

- No cross-sensitivity because of turbidity and colouration
- The DULCOTEST® chlorine measurement can also be used in seawater and brine bath
- The measured value is largely unaffected by flow rate
- online measurement

Minimum maintenance

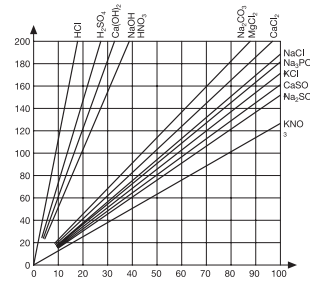
- Maintenance is limited to the 6-12 month replacement of the membrane cap and the electrolyte
- Therefore long term operating costs are low

7.1 DULCOTEST® Sensor Technology - Measurement Principles

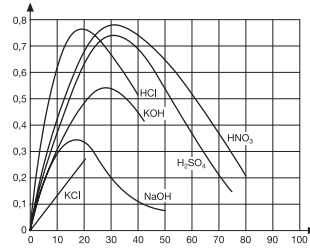
7.1.5 Conductometry – The Measurement Of Electrolytic Conductivity

In contrast to metallic conductivity in which electrical charge is transferred through electrons, electrolytic conductivity is caused by ions, i.e. positively or negatively charged atoms or atom groups which occur after dissolving and dissociation in generally aqueous solutions. Conductivity measuring sensors are differentiated according to the following criteria:

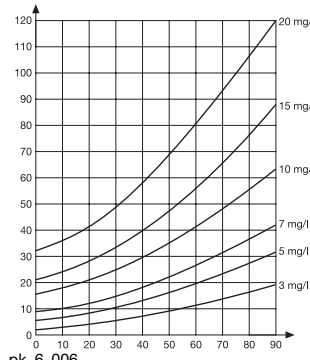
- The cell constant as a differentiating feature**
 An arrangement where the conductivity of an electrolyte is measured in a tube of length $l = 1 \text{ cm}$ and a cross section $q = 1 \text{ cm}^2$, has a cell constant of $k = 1 \text{ cm}^{-1}$. If the length were $l = 10 \text{ cm}$ (or if the area were $q = 0.1 \text{ cm}^2$, the cell constant would be $k = 10 \text{ cm}^{-1}$. If one increases the cross section, however, to $q = 10 \text{ cm}^2$ (decreases l to 0.1 cm), the result would be a cell constant of $k = 0.1 \text{ cm}^{-1}$. It is easy to see that to measure low conductivity levels one should use a conductivity sensor with low cell constants and a sensor with high cell constants for high conductivity levels. The sensitivity of the measurement at low conductivity levels (e.g. $k = 0.1 \text{ cm}^{-1}$) is thereby increased - or lowered at high conductivity levels (e.g. $k = 10 \text{ cm}^{-1}$).
- The material of the sensors**
 As well as selecting the correct cell constant, it is also important to select the suitable electrode material. Stainless steel has been found to be especially suitable in the lower range up to around $500 \mu\text{S/cm}$. In the upper range, however, where stainless steel is less suitable because of the occurrence of polarisation effects, special graphite is above all used. To avoid errors because of polarisation effects when carrying out electrolytic conductivity measurements, alternating current must be used. Frequencies of around 50 Hz are preferred for low conductivity levels while up to approx. 5 kHz are required at higher levels. Long measuring lines can lead to errors both at very low and very high conductivity levels - in the lower range caused by conductivity capacities, in the upper range caused by conductivity resistances. The distance between the sensor and the measurement amplifier should therefore be kept as short as possible.



pk_6_004
Dependence of electrolytic conductivity on the concentration of dissolved acids, alkalis and salt solutions



pk_6_005
Dependence of specific conductivity on the concentration in percentage weight of concentrated acids, alkalis and salt solutions



pk_6_006
Conductivity of aqueous solutions of NaCl depending on the temperature of different concentrations

Each conductivity measurement depends on the temperature
 Different dissolved substances in general have different temperature coefficients α , which leads to a specific temperature progression and which can alter depending on concentration and temperature. (Fig. pk_6_006)

Because conductivity measurements are generally carried out to obtain predictions about substance concentrations, temperature compensation is used to obtain accurate measuring results. It is also used to compensate the measured variable according to an international standard reference temperature of $25 \text{ }^\circ\text{C}$. NTC or PT 100 temperature sensors are used as measuring sensors for temperature compensation, whereby the PT 100 is clearly superior because of linearity and thus accuracy.

Inductive conductivity measurement
 While errors occur with open conductivity measurements because of polarisation effects and deposits on the electrode surfaces, these errors can be avoided with electrodeless inductive conductivity measurements. These sensors do not require regular cleaning and the measuring accuracy is significantly more reliable.

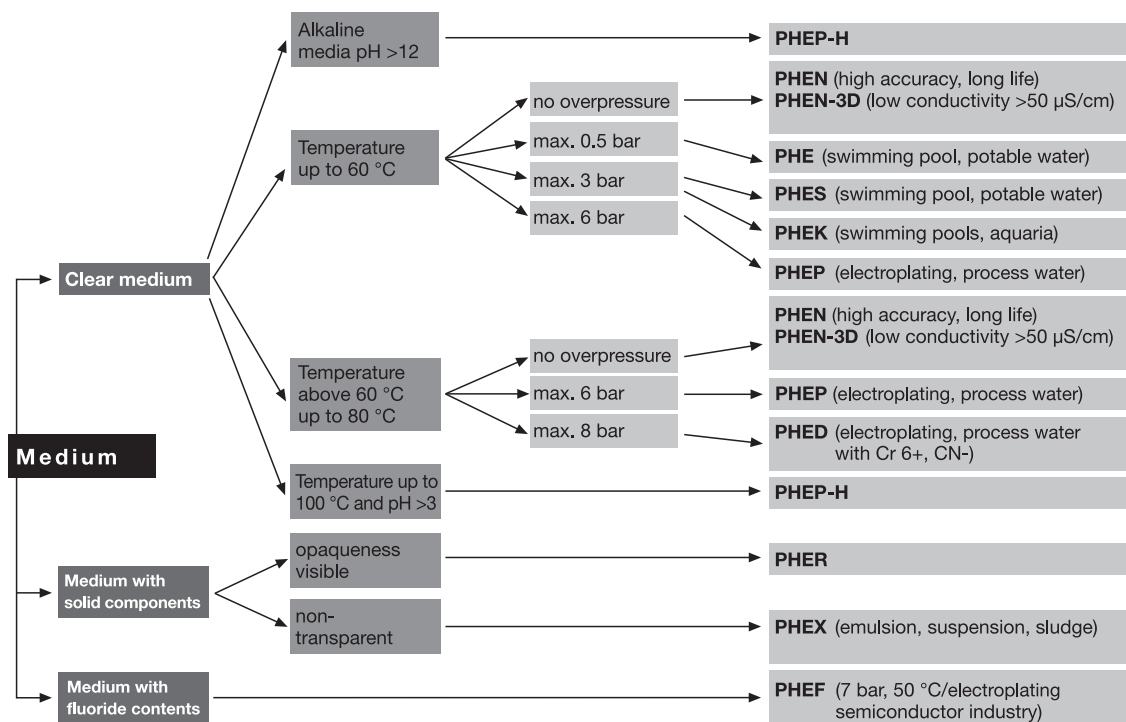
7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

For an optimal functioning of pH and ORP combination sensors, please note the following general guidelines:

- The measuring sensors may never dry out
- The installation angle must be > 15° from the horizontal level (exception type PHEK-L)
- max. flow < 0.8 m/s
- Use suitable measuring lines (see Chapter 6.5.1)
- Measuring lines should be as short as possible
- Use suitable measuring devices/transducers (high-impedances input)
- Calibrate with quality buffer solutions (see Chapter 6.5.2)
- Select the electrode type according to the application
- The storage period should be as short as possible

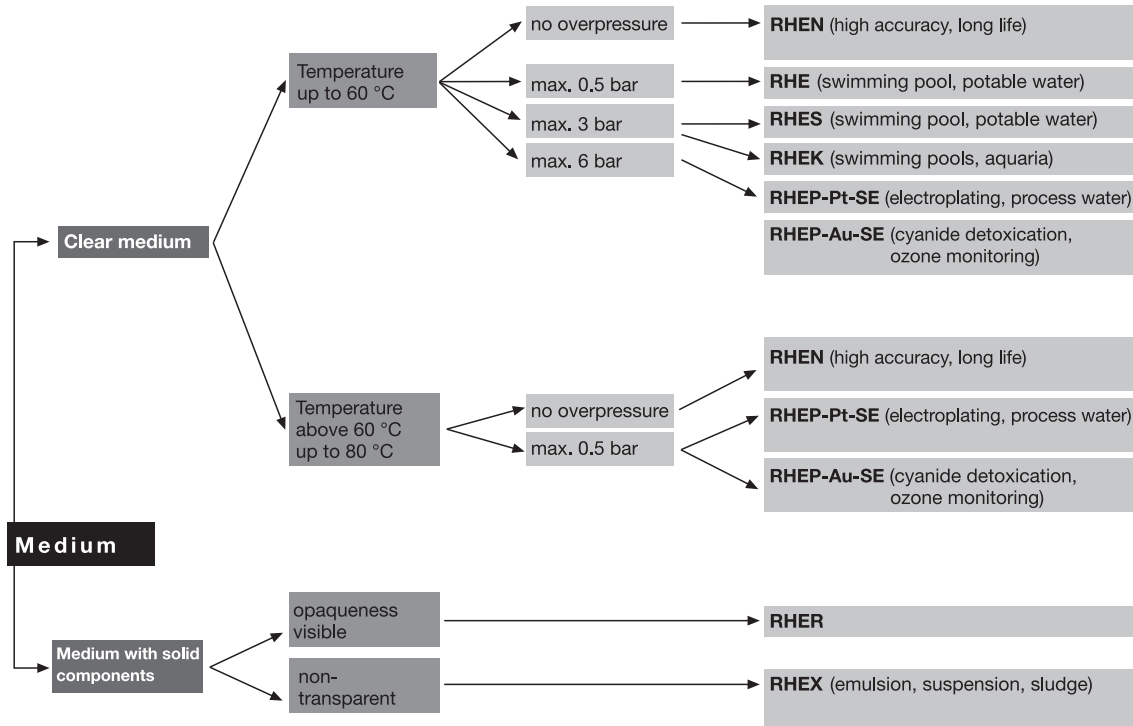
A 6 months warranty is granted on material and manufacturing from date of delivery for all pH/ORP sensors.

Selection guide - DULCOTEST® pH electrodes



7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

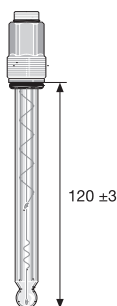
Selection Table For DULCOTEST® Redox Electrodes



7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

7.2.1 pH-Combination Probes With SN6 Or Vario Pin

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



pk_6_016

PHE 112 SE

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	0.5 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13.5
Typical applications	Swimming pool, atmospheric installation, drinking water, lightly contaminated waste water

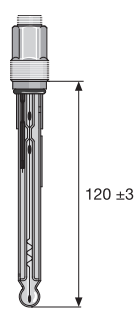
	Installation length	Order no.
PHE 112 SE	120 ± 3mm	305054
PHE 112 SE	225 ± 3mm	150092

PHES 112 SE

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13.5
Typical applications	Swimming pool during pressurisation, drinking water, slightly contaminated industrial and waste water

	Order no.
PHES 112 SE	150702

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

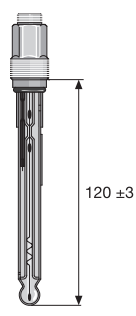


pk_6_019

PHEP 112 SE

pH range	1 ... 12
Temperature	0 ... 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13.5
Mounting hole Ø min.	14.5mm
Typical applications	Swimming pool during pressurisation for higher temperatures and pressures, drinking and industrial water, slightly contaminated waste water, electroplating, chemical industries

Order no.	
PHEP 112 SE	150041

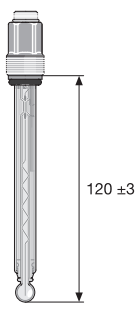


pk_6_019

PHEP-H 314 SE

pH range	3 ... 14 (Note: use below pH 3 shortens the service life)
Temperature	0 ... 100 °C
Max. pressure	6.0 bar up to 25 °C 3.0 bar up to 100 °C
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13.5
Stem diameter min.	12mm
Typical applications	monitoring or control of chemical processes with neutral to highly-alkaline media and temperatures up to 100 °C

Order no.	
PHEP-H 314 SE	1024882



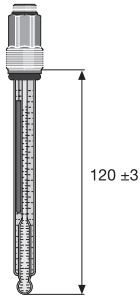
pk_6_018

PHER 112 SE

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
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13,5
Typical applications	municipal and industrial waste water, industrial water, water in chemical industry and paper production, general, for water with suspended solid content.

Order no.	
PHER 112 SE	1001586

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature



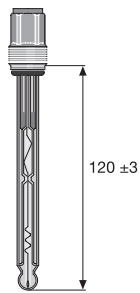
pk_6_017

PHEX 112 SE

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
Diaphragm	Circular gap diaphragm (solid electrolyte)
Electrode shaft	Glass
Thread	PG 13,5
Typical applications	waste water, industrial water, process chemistry, emulsions, suspensions, protein-containing media, sulphide-containing media (nor for chlorine-/fluoride-containing media and at temperature fluctuations), in general for water with a high solid fraction, not suitable for use in clear water.

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

ex HD works

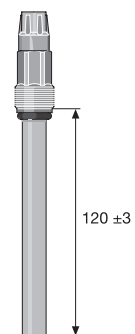


pk_6_022

PHED 112 SE

pH range	1 ... 12
Temperature	0 ... 80 °C
Max. pressure	8.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Double Junction
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	drinking water, industrial water, slightly contaminated waste water, cooling tower water

	Order no.
PHED 112 SE	741036



pk_6_007

HF

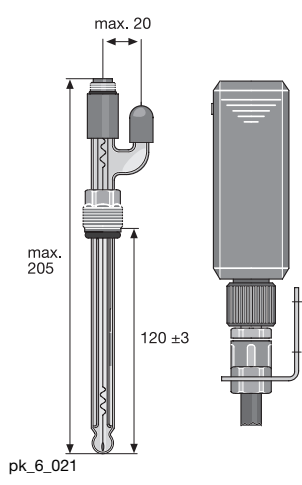
PHEF 012 SE

pH range	0 ... 12
Temperature	0 ... 50 °C
Max. pressure	7.0 bar
Min. conductivity	150 µS/cm
Diaphragm	HDPE ring diaphragm, flat (Double Junction)
Electrode shaft	Epoxy
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	achieves a significantly longer service life in hydrofluoric acidic fluids as compared to standard pH electrodes, e.g. in wastewaters from the chip industry or electroplating applications.

The electrode is protected against dirt by the flat glass membrane and the circumferential flat PE diaphragm.

	Order no.
PHEF 012 SE	1010511

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature



PHEN 112 SE

pH range	1 ... 12
Temperature	0 ... 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	Waste water

Supplied without PE storage container and tubing

	Order no.
PHEN 112 SE	305090

	Order no.
PE storage container with connectors and tubing	305058

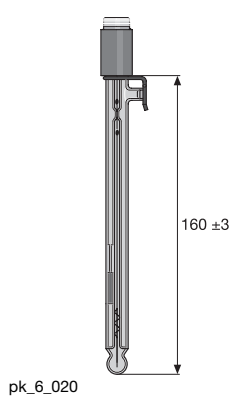
We recommend installation approx. 0.5-1 m above sample fluid level

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

PHEN 112 SE 3D

pH range	1 ... 12
Temperature	0 ... 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	50 µS/cm
Diaphragm	3 ceramic diaphragms
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	waste water, lower conductivity

	Order no.
PHEN 112 SE 3D	150078



PHEN 012 SL

pH range	0 ... 12
Temperature	0 ... 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	160 ± 3 mm
Thread	
Typical applications	Manual measurement in laboratory

	Order no.
PHEN 012 SL	305078

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

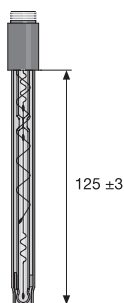
PHEN 012 SL 3D

pH range	0 ... 12
Temperature	0 ... 80 °C
Max. pressure	Atmospheric pressure
Min. conductivity	50 µS/cm
Diaphragm	3 ceramic diaphragms
Electrode shaft	Glass
Installation length	160 ± 3 mm
Thread	
Typical applications	laboratory, lower conductivity

Order no.

PHEN 012 SL 3D

791508



pk_6_023

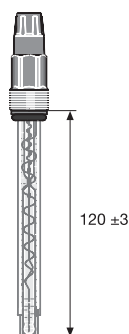
PHEK 12 S

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Glass fiber
Electrode shaft	Polycarbonate
Installation length	125 ± 3 mm
Thread	
Typical applications	Hand-held measurement in swimming pool, potable water

Order no.

pH sensor PHEK-112-S

305051



pk_6_090

PHEK 112 SE

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Polycarbonate
Installation length	120 ± 3 mm
Thread	PG 13.5
Stem diameter min.	12mm
Typical applications	swimming pool at elevated sample water pressures, drinking water, slightly contaminated industrial and waste water, aquaria

Order no.

PHEK 112 SE

1028457

ex HD works

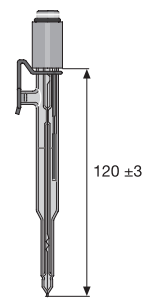
PHEK-L 112 SE

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Polycarbonate
Installation length	120 ± 3 mm
Installation position	vertically to horizontally

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

Thread	PG 13.5
Stem diameter min.	12mm
Typical applications	swimming pool at elevated sample water pressures, drinking water, slightly contaminated industrial and waste water, aquaria. Horizontal installation possible.

	Order no.
PHEK-L 112 SE	1034918



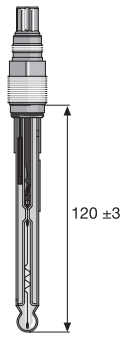
pk_6_025

PHEE 112 S

pH range	1 ... 12
Temperature	0 ... 60 °C
Max. pressure	Atmospheric pressure
Min. conductivity	µS/cm
Diaphragm	3 ceramic diaphragms
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	
Typical applications	pH measurement in foodstuffs, e.g. meat, cheese, non sterilisable

	Order no.
PHEE 112 S	791094

	Capacity ml	Order no.
Cleaning fluid Pepsin/hydrochloric acid	250	791443



pk_6_068

PHEPT 112 VE

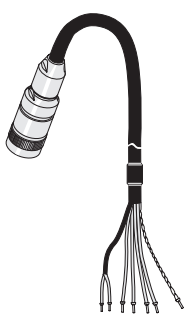
With integrated Pt 100 enclosed in glass shaft and Vario Pin plug with gold plated contacts.

pH range	1 ... 12
Temperature	0 ... 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3mm
Thread	PG 13.5
Typical applications	swimming pool during pressurisation for higher temperatures and pressures, drinking and industrial water, slightly contaminated waste water, electroplating, chemical industries

	Order no.
PHEPT 112 VE	1004571

Accessory signal leads for electrodes with Vario Pin plug

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



pk_6_069

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

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

7.2.2 pH-Combination Probes With Fixed Cable

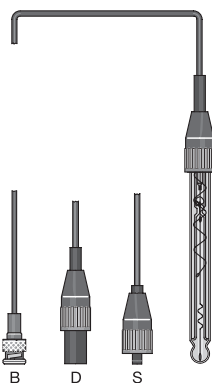
Series	PHE pH-combination probe	
Properties	K with insensitive plastics shaft N refillable KCl electrode D with double diaphragm (double junction)	
Special equipment	T with inbuilt temperature gauge	
pH measuring range	112 pH measurement range: 1...12	
Electrical connection to electrode	F fixed cable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

The technical data correspond to the pH measuring cells with SN6 plug.

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

Type PHE 112 F

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



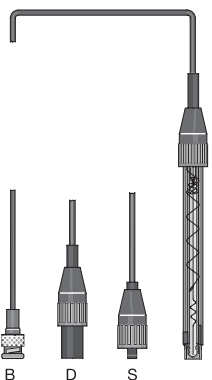
pk_6_024

	Cable length m	Device plug	Order no.
PHE 112 F 301 S	1	SN6	304976
PHE 112 F 501 D	1	DIN	304978
PHE 112 F 301 B	1	BNC	304980
PHE 112 F 303 B	3	BNC	304981

Further types on request.

Type PHEK 112 F

pH combination sensors with polycarbonate plastic stem, glass diaphragm guard, with fixed coaxial cable and device connector, without internal thread.



pk_6_027

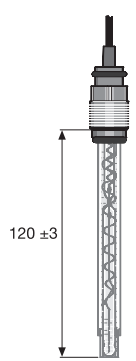
	Cable length m	Device plug	Order no.
PHEK 112 F 301 S	1	SN6	304994
PHEK 112 F 501 D	1	DIN	304995
PHEK 112 F 301 B	1	BNC	304996

Further types on request.

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

Type PHEK 112 FE

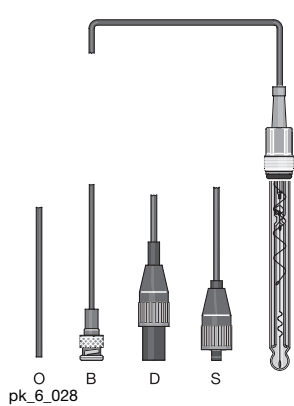
pH combination probe with polycarbonate plastic stem, glass diaphragm guard, fixed coaxial cable and device connector and connection thread



pk_6_090_1

	Order no.
PHEK 112 FE 303 B	1028458

Type PHE 112 FE

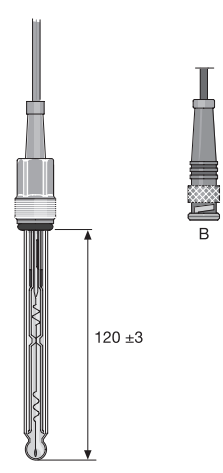


pk_6_028

	Cable length m	Device plug	Order no.
PHE 112 FE 303 S	3	SN6	304984
PHE 112 FE 310 S	10	SN6	304985
PHE 112 FE 503 D	3	DIN	304986
PHE 112 FE 303 B	3	BNC	304988
PHE 112 FE 310 O	10		304990

Further types on request.

Type PHED 112 FE



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

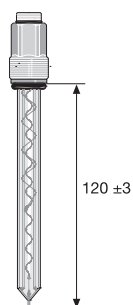
Further types on request.

7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

7.2.3 ORP Combination Probes With SN6 Connector

Series	
RHE	ORP combination probe
Properties	
X	with solid electrolyte and circular gap diaphragm
K	with insensitive plastics shaft
P	pressure tight up to 6 bar
R	with PTFE circular diaphragm
N	refillable KCl electrode
S	swimming pool electrode
	unspecified: standard gel-filled electrode
Special equipment	
L	vertical to horizontal installation
Electrode material	
Pt	Platinum (pin)
Au	Gold (pin)
Electrical connection to electrode	
S	Plug for coax connector SN6
Internal thread	
E	PG 13.5

Selection Table For DULCOTEST® Redox Electrodes see p. → 7-9



pk_6_031

RHE-Pt-SE

Temperature	0 ... 60 °C
Max. pressure	1 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	swimming pool, atmospheric installation, drinking water, lightly contaminated water

Order no.

RHE-Pt-SE	305001
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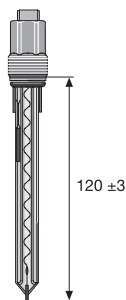
RHES-Pt-SE

Temperature	0 ... 60 °C
Max. pressure	3 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	swimming pool at elevated sample water pressures, drinking water, lightly contaminated service and waste water

Order no.

RHES-Pt-SE	150703
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7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature



pk_6_035

RHEP-Pt-SE

Temperature	0 ... 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Mounting hole Ø min.	15mm
Typical applications	swimming pool during pressurisation for higher temperatures and pressures, drinking and industrial water, slightly contaminated waste water, electroplating, chemical applications, for higher temperatures and pressures. Not suitable for media containing ozone

Order no.

RHEP-Pt-SE	150094
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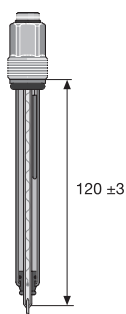
RHEP-Au-SE

with gold pin electrode

Temperature	0 ... 80 °C
Max. pressure	6.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Mounting hole Ø min.	15mm
Typical applications	Cyanide detoxification, ozone monitoring,

Order no.

RHEP-Au-SE	1003875
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pk_6_034

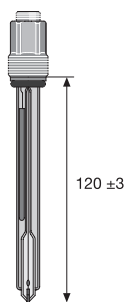
RHER-Pt-SE

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)
Diaphragm	PTFE ring diaphragm
Installation length	120 ± 3mm
Typical applications	municipal and industrial waste water, drinking and industrial water, chemical applications, paper production, food industry. In general for water with noticeable solid fraction.

Order no.

RHER-Pt-SE	1002534
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7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature



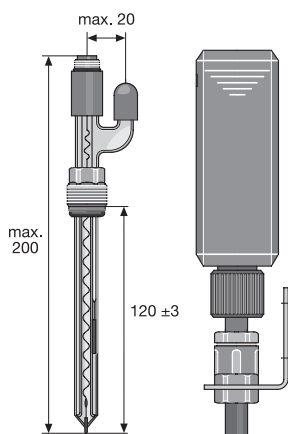
pk_6_033

RHEX-Pt-SE

Temperature	0 ... 100 °C
Max. pressure	16 bar up to 25 °C 6 bar up to 100 °C
Min. conductivity	500 µS/cm
Diaphragm	circular gap (solid electrolyte)
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	Waste water, industrial water, process chemistry, emulsions, suspensions, protein-containing media, sulphide-containing media (nor for chlorine-/fluoride-containing media and at temperature fluctuations). In general for water with a high solid fraction. Not suitable for clear media.

Order no.

RHEX-Pt-SE	305097
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pk_6_032

RHEN-Pt-SE

Temperature	0 ... 80 °C
Max. pressure	Atmospheric pressure operation
Min. conductivity	150 µS/cm
Electrolyte	KCl electrolyte, refillable
Diaphragm	Ceramic
Electrode shaft	Glass
Installation length	120 ± 3 mm
Thread	PG 13,5
Typical applications	Waste water

Order no.

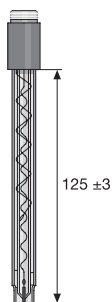
RHEN-Pt-SE	305091
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Supplied without PE storage container and tubing

Accessories

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

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



pk_6_036

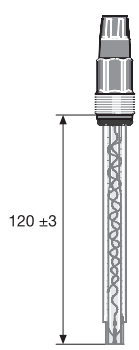
RHEK-Pt-S

Temperature	0 ... 60 °C
Max. pressure	Atmospheric pressure operation
Min. conductivity	150 µS/cm
Diaphragm	Glass fibre
Electrode shaft	Polycarbonate
Thread	PG 13,5
Installation length	125 ± 3 mm
Typical applications	Manual measurements of e.g. swimming pool, potable water etc.

Order no.

RHEK-Pt-S	305052
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7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

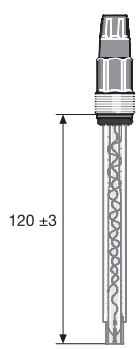


pk_6_091

RHEK-Pt-SE

Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Polycarbonate
Thread	PG 13,5
Installation length	120 ± 3 mm
Typical applications	swimming pool at elevated sample water pressures, drinking water, lightly contaminated waste water

RHEK-Pt-SE	Order no. 1028459
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pk_6_091

RHEK-L Pt-SE

Temperature	0 ... 60 °C
Max. pressure	3.0 bar
Min. conductivity	150 µS/cm
Diaphragm	Ceramic
Electrode shaft	Polycarbonate
Installation length	120 ± 3 mm
Installation position	vertically to horizontally
Thread	PG 13.5
Stem diameter min.	12mm
Typical applications	swimming pool at elevated sample water pressures, drinking water, slightly contaminated waste water

RHEK-L Pt-SE	Order no. 1034919
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7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

7.2.4 ORP Combination Probes With Fixed Cable

Series	RHE	ORP combination probe
Properties	K	Plastics shaft
Electrode material	Pt	Platinum
Electrical connection to electrode	F	Fixed cable electrode
Internal thread	E	internal thread PG 13.5
Cable diameter	3	cable diameter 3 mm
	5	cable diameter 5 mm
Cable length	01	cable length in metres
Electrical connection at device	S	SN6
	D	DIN
	B	BNC

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

Type RHE-Pt-FE

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

	Cable length m	Device plug	Order no.
RHE-Pt-FE 310 B	10	BNC	304993

Type RHE-Pt-F

ORP combination probe with plastic shaft, Pt electrode with cover. Fixed coax cable and device plug, no internal mounting thread.

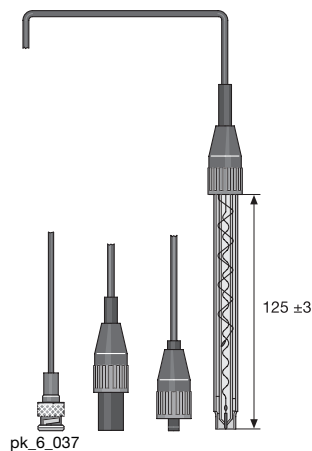
	Cable length m	Device plug	Order no.
RHE-Pt-F 303 B	3	BNC	304983

Type RHEK-Pt-F

ORP combination probe with plastic shaft, Pt electrode with cover. Fixed coax cable and device plug, no internal mounting thread.

	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.



7.2 DULCOTEST® Sensors pH, ORP, Fluoride and Temperature

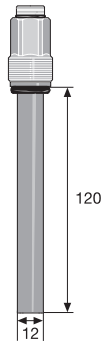
7.2.5 Fluoride Electrode

DULCOTEST® fluoride electrodes are ion-selective electrodes based on the potentiometric measurement principle. They are designed for determining the concentration of fluoride anions in aqueous solutions. These electrodes have been optimised for use in monitoring the fluoridation of potable water in waterworks (measuring range up to 10 ppm FLEP 010 SE). For unpolluted clear waste water, the electrode type FLEP 100 SE with a measuring range up to 100 ppm can be used. The corresponding conditions must be observed.

FLE 010-SE

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

Measured variable	Fluoride ion concentration
Reference method	photometric, see Chap. 8.9.3: Fotometer DT2B
Measurement 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)
Intake flow	10...200 l/h
Intake flow (recommended)	20 l/h
Min. conductivity	100 µS/cm
Response time T95 max.	30 s (for conc. > 0.5 ppm)
Enclosure rating	IP 65
Shelf life	6 months
Installation length	120 mm
Shaft diameter	12.0 mm
Typical applications	monitoring the fluoridation of potable water in waterworks
Measurement and control equipment	D1C
In-line probe housing	DLG IV



pk_6_095

NEW

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

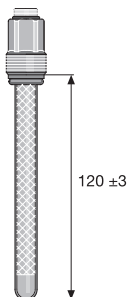
Accessories

	Order no.
Measuring transducer 4-20 mA FPV1	1028280
4-20 mA measurement transducer FP 100 V1	1031331
Signal lead, sold by the meter 2 x 0.25 mm² Ø 4 mm	725122
Reference electrode, REFP-SE	1018458
Temperature sensor, Pt 100	305063
Polishing paste	559810

7.2.6 Temperature Sensors

Temperature	0 ... 100 °C
Max. pressure	10.0 bar
Typical applications	Temperature measurement and pH temperature correction

	Order no.
Temperature sensor, Pt 100	305063
Pt 1000 SE	1002856



pk_6_026

7.3 DULCOTEST® Amperometric Sensors

7.3.1 Amperometric Sensors For Chlorine, Bromine, Chlorine Dioxide, Chlorite, Ozone, Dissolved Oxygen, Peracetic Acid And Hydrogen Peroxide

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

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

Important:

Amperometric probes are not electrically isolated. When installing in external appliances (e.g. PLC), you should electrically isolate the supply voltage and the analogue input signal.

Summary of features:

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

7.3.2 Chlorine Measuring Cells

Chlorine dissolved in water is present in different forms:

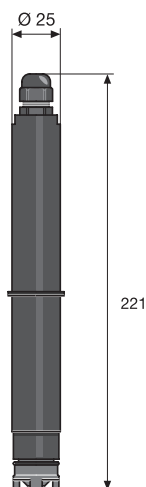
Free (active) chlorine:	Cl ₂ , HOCl (hypochlorous acid), OCl ⁻ (hypochlorite) recommended sensors: Type CLE, reference method: DPD1.
Combined chlorine:	mono, di, trichloramine. The measuring result of the type CLE is deducted from the measuring result of the type CTE. Reference method: DPD4 minus DPD1.
Organic combined chlorine:	Of isocyanuric acid/isocyanurate bound chlorine (total available chlorine) and the resulting free (effective) chlorine; recommended sensor: CGE (analysis: DPD1).
Total chlorine:	Sum of free and combined chlorine; recommended sensor: Type CTE, reference method: DPD 4.
Applications:	Chlorine measurement in drinking, swimming pool, process, industrial water and water of similar quality e.g. seawater/brine with up to 15 % chloride content. For chlorine measurements at high pH values (8...9.5), we recommend the chlorine measuring cells type CGE, CTE or a system for metering of pH buffer solutions in the sample water by-pass (see Chap. 6.5).
Guidelines for device usage:	The measuring cells type CLE may not be used in the presence of isocyanuric acid/chlorine stabilisers! In case of chlorination by electrolysis without separation by a diaphragm, the types CLE 3.1, CTE and CGE do not function properly. The sensors with the suffix -mA are used with the measurement and control devices D1C, D2C and DULCOMARIN®. The sensors with the suffix -4P are used with the earlier WS controllers and for metering pumps with integrated chlorine controllers. DMT-type sensors are used for the DMT transducer. CAN-type sensors are used with the DULCOMARIN® II swimming pool controller.
Note CLE sensors:	The CLE type sensors cannot be used in liquids containing isocyanuric acid/chlorine stabilisers.

7.3 DULCOTEST® Amperometric Sensors

Measurement of free chlorine

CLE 3-mA

Measured variable	free chlorine (hypochlorous acid HOCl)
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with pH correction in D1C)
Temperature range	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
Typical applications	CLE 3-mA-0,5 ppm: Drinking water; CLE 3-mA-2.0/10 ppm, swimming pool, potable, industrial, process water (surfactant free)
Measurement and control equipment	D1C, D2C, DULCOMARIN® (2/10 ppm only)
In-line probe housing	DGM, DLG III



pk_6_039

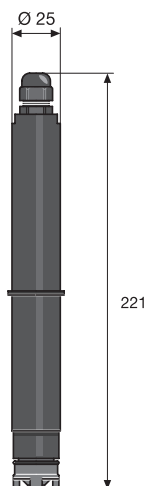
	Measuring range	Order no.
CLE 3-mA-0.5 ppm	0.01...0.5 mg/l	792927
CLE 3-mA-2 ppm	0.02...2.0 mg/l	792920
CLE 3-mA-5 ppm	0.01...5.0 mg/l	1033392
CLE 3-mA-10 ppm	0.10...10.0 mg/l	792919
CLE 3-mA-20 ppm	0.20...20.0 mg/l	1002964
CLE 3-mA-50 ppm	0.50...50.0 mg/l	1020531
CLE 3-mA-100 ppm	1.00...100.0 mg/l	1022786

Chlorine measuring cells with 100 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLG III in-line probe housing.

CLE 3.1-mA

Measured variable	free chlorine (hypochlorous acid HOCl) where there is a high rate of combined chlorine and/or in the case of pH values up to 8.5 (with D1C pH correction)
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with D1C pH correction)
Temperature range	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
Typical applications	swimming pool, industrial and process water with higher proportions of combined chlorine and/or higher pH values to pH 8.5 (surfactant-free)
Measurement and control equipment	D1C, D2C, DULCOMARIN®
In-line probe housing	DGM, DLG III



pk_6_039

	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	0.01...5.0 mg/l	1019398
CLE 3.1-mA-10 ppm	0.10...10.0 mg/l	1018368

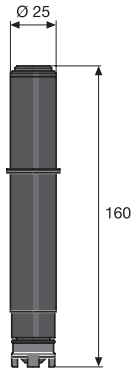
Chlorine measuring cells with 100ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLG III in-line probe housing.

Signal leads see Sensor Accessories, p. → 7-53

MaharFan

7.3 DULCOTEST® Amperometric Sensors



pk_6_042

CLE 2.2-4P

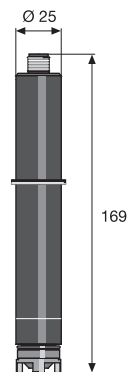
Measured variable	free chlorine, (hypochlorous acid HOCl)
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with D1C pH correction)
Temperature range	5 ... 45 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Power supply	±7,5 V DC (4 P)
Output signal	4...20 mA, 0...0.2 V DC ˜ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications	Swimming pool, drinking water, industrial, process water (surfactant-free)
Measurement and control equipment	D_4a (metering pump with integrated controller), CLWS
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
CLE 2.2-4P	0.10...20.0 mg/l	914958

Chlorine measuring cells with 100 ml electrolyte.

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLG III in-line probe housing.

Signal leads see Sensor Accessories, p. → 7-53



pk_6_038

CLE 3-DMT

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

Measured variable	free chlorine (hypochlorous acid HOCl)
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with D1C pH correction)
Temperature range	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 (5P)
Output signal	uncalibrated, not temperature compensated
Temperature measurement	about the integrated Pt 1000. The temperature compensation is carried out in DMT.
Typical applications	Swimming pool, drinking water, industrial, process water (surfactant-free)
Measurement and control equipment	DMT
In-line probe housing	DGM, DLG III

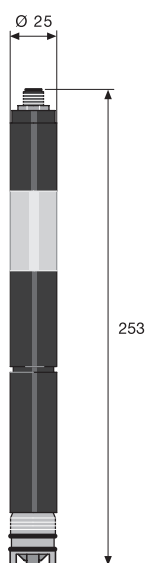
	Measuring range	Order no.
CLE 3-DMT-5 ppm	0.01...5.0 mg/l	1005511
CLE 3-DMT-50 ppm	0.05...50.0 mg/l	1005512

Chlorine measuring cells with 100 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLG III in-line probe housing.

Signal leads see Sensor Accessories, p. → 7-53

7.3 DULCOTEST® Amperometric Sensors



pk_6_096

CLE 3-CAN

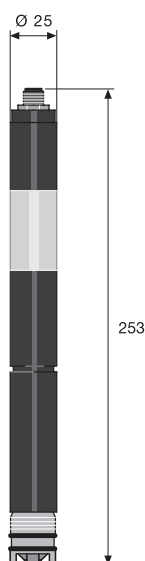
Sensor for connection to a CANopen interface (e.g. DULCOMARIN® II swimming pool controller)

Measured variable	free chlorine (hypochlorous acid HOCl)
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with D1C pH correction)
Temperature range	5 ... 45 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Power supply	Via CAN interface (11 - 30 V)
Output signal	uncalibrated, temperature compensated, electrically isolated
Typical applications	swimming pool, drinking, industrial and process water (surfactant-free) For chlorination via open electrolysis (without diaphragm)
Measurement and control equipment	DULCOMARIN® II
In-line probe housing	DGM, DLG III
Compatibility	CANopen bus systems

	Measuring range	Order no.
CLE 3-CAN-10 ppm	0.01...10.0 mg/l	1023425

Chlorine sensor with 100 ml electrolyte.

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.



pk_6_096

CLE 3.1-CAN

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

Measured variable	free chlorine (hypochlorous acid HOCl) in high proportions of bound chlorine and/or pH-values up to 8.5
Reference method	DPD1
pH range	5.5 ... 8.0 (up to pH 8.5 with pH correction in DULCOMARIN® II)
Temperature range	5 ... 45 °C
Max. pressure	1.0 bar
Intake flow	30...60 l/h (in DGMa or DLG III)
Power supply	Via CAN interface (11 - 30 V)
Output signal	uncalibrated, temperature compensated, electrically isolated
Typical applications	swimming pool, drinking water, industrial and process water with higher percentages of combined chlorine and/or higher pH values up to pH 8.5 (surfactant-free)
Measurement and control equipment	D1C, D2C, DULCOMARIN®
In-line probe housing	DGM, DLG III
Compatibility	CANopen bus systems

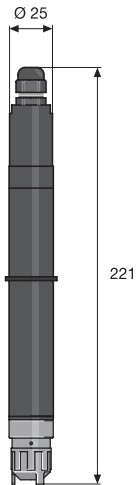
	Measuring range	Order no.
CLE 3.1-CAN-10 ppm	0.01...10.0 mg/l	1023426

Chlorine measuring cells with 100ml electrolyte

You require assembly kit order no. 815079 for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors

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



pk_6_040

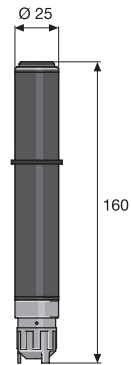
CGE 2-mA

Measured variable	total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine
Reference method	DPD1
pH range	5.5 ... 9.5
Temperature range	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 system)
Output signal	4...20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications	Swimming pools
Measurement and control equipment	D1C, D2C, DULCOMARIN®
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
CGE 2-mA-2 ppm	0.02...2.0 mg/l	792843
CGE 2-mA-10 ppm	0.10...10.0 mg/l	792842

Chlorine measuring cells with 50 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.



pk_6_041

CGE 2-4P

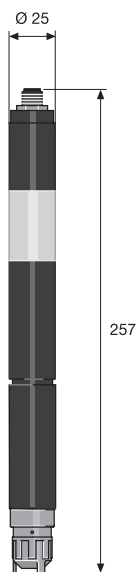
Measured variable	total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine
Reference method	DPD1
pH range	5.5 ... 9.5
Temperature range	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Power supply	±7.5 V DC (4 P)
Output signal	4...20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications	Swimming pools
Measurement and control equipment	D_4a (metering pump with integrated controller)
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
CGE 2-4P-10 ppm	0.10...10.0 mg/l	792838

Chlorine measuring cells with 50 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors



pk_6_084

CGE 2 CAN

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

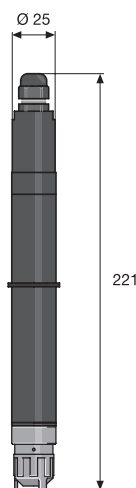
Measured variable	total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine
Reference method	DPD1
pH range	5.5 ... 9.5
Temperature range	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (with DGMa or DLG III)
Supply voltage	Via CAN interface (11 - 30 V)
Output signal	uncalibrated, temperature compensated, electrically isolated
Typical applications	Swimming pools and in water with high pH-value
Measurement and control equipment	D1C, D2C, DULCOMARIN®
In-line probe housing	DGM, DLG III
Compatibility	CANopen bus systems

	Measuring range	Order no.
CGE 2-CAN-10 ppm	0.01...10.0 mg/l	1024420

Chlorine measuring cells with 50 ml electrolyte

A mounting kit (Order No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.

Measured variable total chlorine



pk_6_040

CTE 1-mA

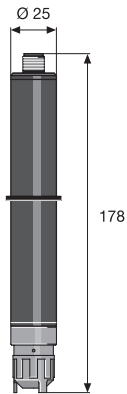
Measured variable	total chlorine
Reference method	DPD4
pH range	5.5 ... 9.5
Temperature range	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Supply voltage	16...24 V DC (two-wire technology)
Output signal	4...20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications	CTE 1-mA-0.5 ppm: Drinking water, cooling water; CTE 1-mA-2/5/10 ppm: drinking water, industrial, process, cooling water in swimming pools in combination with CLE 3.1 to determine combined chlorine
Measurement and control equipment	D1C, D2C, DULCOMARIN® (2/10 ppm only)
In-line probe housing	DGM, DLG III

	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-5 ppm	0.05...5.0 mg/l	1003203
CTE 1-mA-10 ppm	0.10...10.0 mg/l	740684

Chlorine measuring cells with 50 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors



pk_6_015

CTE 1-DMT

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

Measured variable	total chlorine
Reference method	DPD4
pH range	5.5 ... 9.5
Temperature range	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Power supply	3.3 V DC (5P)
Output signal	uncalibrated, not temperature-compensated, not electrically isolated
Typical applications	CTE 1-mA-0.5 ppm: drinking water, cooling water; CTE 1-mA-2/5/10 ppm: drinking water, industrial, process, cooling water in swimming pools in combination with CLE 3.1 to determine combined chlorine.

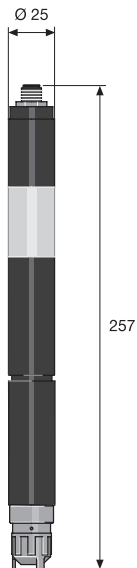
Measurement and control equipment	DMT
In-line probe housing	DGM, DLG III

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

Chlorine measuring cells with 50 ml electrolyte

An assembly set 815079 is required for DLG III for initial installation of chlorine measuring cells.

Signal leads see Sensor Accessories, p. → 7-53



pk_6_084

CTE 1-CAN

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

Measured variable	total chlorine
Reference method	DPD4
pH range	5.5 ... 9.5 (up to pH 8.5 with D1C pH correction)
Temperature range	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
Typical applications	CTE 1-mA-0.5 ppm: drinking water, cooling water; CTE 1-mA-2/5/10 ppm: drinking water, industrial, process, cooling water in swimming pools in combination with CLE 3.1 to determine combined chlorine.

Measurement and control equipment	DULCOMARIN® II
In-line probe housing	DGM, DLG III
Compatibility	CANopen bus systems

	Measuring range	Order no.
CTE 1-CAN-10 ppm	0.01...10.0 mg/l	1023427

Chlorine measuring cells with 100 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine sensors into the DLG III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors

7.3.3 Bromine Measuring Cells

The following bromating agents are used as disinfectants:

Organic bromating agent

- a) DBDMH (1,3-DiBrom-5,5-DiMethyl-Hydantoin) e. g. sold as Albrom 100®
 - b) BCDMH (1-Bromine-3-Chlorine-5,5-DiMethyl-Hydantoin) e.g. sold as Brom-Sticks®
- These bromating agents are solid and are metered as saturated solutions via brominators.

Inorganic free bromine

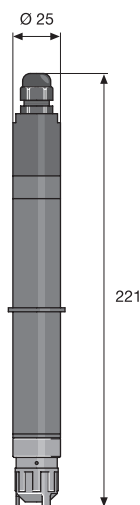
Free bromine is produced via the so-called Acti-Brom process® (Nalco) chlorine bleach + acid + sodium bromide.

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

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

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

Photometric DPD measurement is the recommended method for calibrating the bromine sensor (e.g. with DT 1), calculated and displayed as bromine. If the photometric DPD measurement is used for "chlorine", the measuring value is to be multiplied by the factor 2.25 for conversion into "bromine".



pk_6_074

Bromine measured variable

Measured variable	total available bromine (free and organic bound bromine)
Bromine chemicals	DBDMH (1,3-dibromine 5.5 dimethyl hydantoin) BCDMH (1-bromine-3-chlorine-5.5-dimethyl hydantoin) free bromine (HOBr, OBr ⁻)
Reference method	DBDMH: free bromine: DPD1 BCDMH: DPD4
pH dependence	if pH changes from pH 7 to pH 8, the sensor sensitivity is reduced a) in the case of DBDMH and free bromine by approx. 10 % b) in the case of BCDMH by approx. 25 %
Temperature range	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
Typical applications	swimming pools/whirlpools and cooling water; can also be used in seawater
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG III

Bromine measuring cells with 50 ml electrolyte

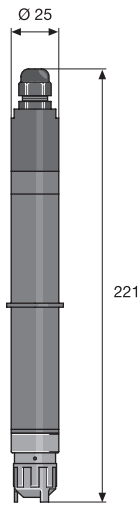
	Messbereich	Order no.
BRE 1-mA-10 ppm	0.20...10.0 mg/l (BCDMH)	1006895
BRE 1-mA-2 ppm	0.04...2.0 mg/l (BCDMH)	1006894
BRE 2-mA-10 ppm	0.20...10.0 mg/l (DBDMH, HOBr)	1020529

Bromine measuring cells with 50 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the bromine sensors into the DLG III in-line probe housing.

Signal leads see Sensor Accessories, p. → 7-53

7.3 DULCOTEST® Amperometric Sensors



pk_6_074

BRE 3-CAN

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

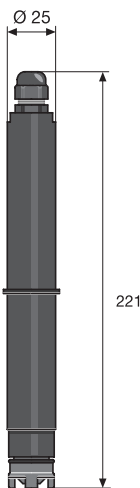
Measured variable	total available bromine (free and organic bound bromine)
Bromine chemicals	DBDMH (1.3-dibromine 5.5 dimethyl hydantoin) BCDMH (1-bromine-3-chlorine-5.5-dimethyl hydantoin) free bromine (HOBr, OBr)
Reference method	DBDMH, free bromine: DPD1 BCDMH: DPD4
pH dependence	if pH changes from pH 7 to pH 8, the sensor sensitivity is reduced a) in the case of DBDMH and free bromine by approx. 10 % b) in the case of BCDMH by approx. 25 %
Temperature range	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
Typical applications	Swimming pools/whirlpools and cooling water; can also be used in seawater
Measurement and control equipment	DULCOMARIN® II
In-line probe housing	DGM, DLG III

	Messbereich	Order no.
BRE 3-CAN-10 ppm	0.02...10.0 mg/l	1029660

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

Signal leads see Sensor Accessories, p. → 7-53

7.3.4 Chlorine Dioxide Measuring Cells



pk_6_039

CDE 2-mA

Measured variable	Chlorine dioxide (ClO ₂)
Reference method	DPD1
pH range	ClO ₂ stability range
Cross sensibility	to chlorine < 2 %
Temperature range	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
Typical applications	uncontaminated drinking water (surfactant-free)
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG III

	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 measuring cells with 100 ml electrolyte

A mounting kit (Order No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors

CDE 3-mA

Measured variable	Chlorine dioxide (ClO ₂)
Reference method	DPD1
pH range	ClO ₂ stability range
Cross sensibility	to chlorine < 2 %
Temperature range	5 ... 60 °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
Typical applications	chlorine dioxide treatment of uncontaminated warm water to combat legionellae
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
CDE 3-mA-0.5 ppm	0.01...0.5 mg/l	1026154

Chlorine dioxide sensors complete with electrolyte, 100 ml.

A mounting kit (Order No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.

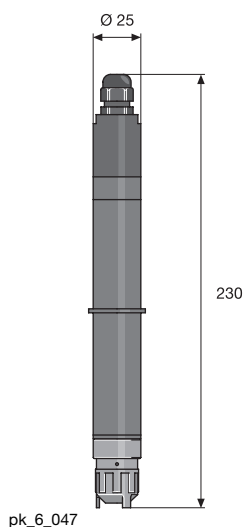
CDP 1-mA

Measured variable	Chlorine dioxide (ClO ₂)
Reference method	DPD1
pH range	5.5 ... 10.5
Temperature range	10 ... 45 °C (short-term periods 55 °C) with external temperature correction via Pt 100 (no internal temperature correction!)
Max. pressure	3.0 bar no surges
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
Typical applications	Process water containing surfactants (bottle washing machines)
Measurement and control equipment	only D1C with autom. temp. correction
In-line probe housing	it is recommended to install the sensor in the in-line probe DLG II with upstream flow monitoring together with a Pt 100 temperature sensor

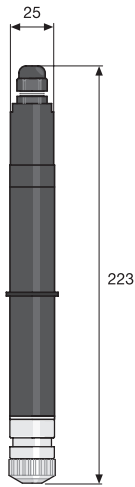
	Measuring range	Order no.
CDP 1-mA-2 ppm	0.02...2.0 mg/l	1002149

Chlorine dioxide measuring cells with 100 ml electrolyte

You require assembly kit (order no. 815079) for the initial installation of the chlorine dioxide sensors into the DLG III in-line probe housing.



7.3 DULCOTEST® Amperometric Sensors



pk_6_083

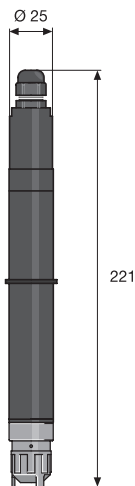
CDR 1-mA

Measured variable	Chlorine dioxide (ClO ₂)
Reference method	DPD1
pH range	1.0 ... 10.0
Temperature range	1 ... 55 °C (short-term period 60 °C)
Max. pressure	3.0 bar (30 °C, in DGMA)
Response time T₉₀	d ₉₀ ~ 3 min.
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
Typical applications	contaminated industrial, process water, containing surfactants, cooling water, irrigation water, slightly contaminated waste water
Measurement and control equipment	D1C
In-line probe housing	DGMa / DLGIII

	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

A mounting kit (Order No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.

7.3.5 Chlorite Sensors



pk_6_040

CLT 1-mA

Measured variable	Chlorite anion (ClO ₂ ⁻)
Reference method	DPD method Chlorite in presence of chlorine dioxide
pH range	6.5 ... 9.5
Temperature range	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
Typical applications	Monitoring of drinking water or similar waters treated with chlorine dioxide. Selective measurement of chlorite and chlorine dioxide, chlorine and chlorate is also possible.
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
CLT 1-mA-0.5 ppm	0.02...0.50 mg/l	1021596
CLT 1-mA-2 ppm	0.10...2.00 mg/l	1021595

Chlorite sensors complete with electrolyte, 50 ml.

You require assembly kit (order no. 815079) for the initial installation of the chlorite sensors into the DLG III in-line probe housing.

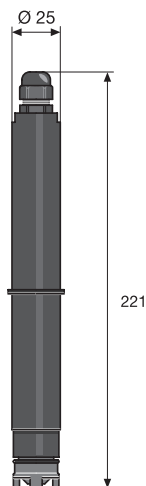
A complete panel-mounted system with D1C-operating languages: E, F, P, I is shown in section 5.1.16.

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

DVGW
recommended

7.3 DULCOTEST® Amperometric Sensors

7.3.6 Ozone Measuring Cells



pk_6_039

OZE 3-mA

Measured variable	Ozone (O ₃)
Reference method	DPD4
pH range	Ozone stability range
Temperature range	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
Typical applications	Swimming pool, drinking water, industrial, process water (surfactant-free)
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG III

	Measuring range	Order no.
OZE 3-mA-2 ppm	0.02...2.00 mg/l	792957

Ozone sensor complete with electrolyte, 100 ml.

You require assembly kit order no. 815079 for the initial installation of the ozone sensors into the DLG III in-line probe housing.

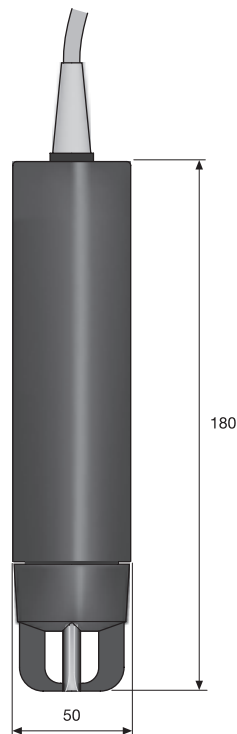
7.3 DULCOTEST® Amperometric Sensors

7.3.7 Sensors For Dissolved Oxygen

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

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

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



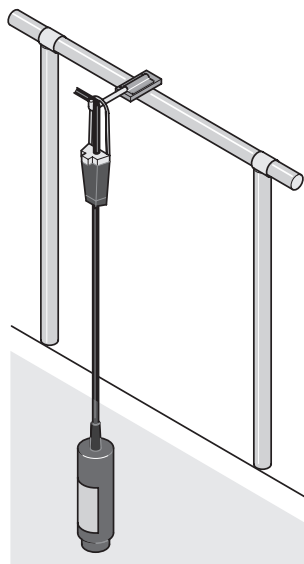
pk_6_050_1

DO 1-mA

Measured variable	Dissolved oxygen
Calibration	of oxygen in air
Measurement accuracy	±0,5 % referred to final value of measuring range
Temperature range	0 ... 50 °C
Max. pressure	1.0 bar
Intake flow	minimum: 0.05 m/s
Enclosure rating	IP 68
Supply voltage	12...30 V DC
Electrical connection	Fixed lead, 10 m
Output signal	4...20 mA ≈ measuring range, calibrated, temperature-compensated, and electrically isolated
Process integration	a) Immersion, suspended on cable with or without cable bracket (see accessories, Chap. 6.5.5) b) Immersion with immersion pipe

Typical applications

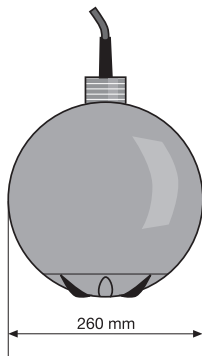
1. Immersion pipe with 50 mm outside diameter and 1-1/4 inch internal thread (provided by the customer). The connection is possible via immersion pipe adapter (see accessories, Chap. 6.5.5).
 2. PVC immersion pipe with 50 mm outside diameter (provided by the customer). The connection is made by adhesion via standard PVC union (provided by the customer).
 - c) In-flow operation on request
- fish and shrimp farming, conditioning of waters of large aquaria in zoological parks, control of the oxygen input in waterworks, appraisal of the biological status of surface waters.



pk_6_011

	Measuring range	Order no.
DO 1-mA-20 ppm	2.00...20.0 mg/l	1020532

7.3 DULCOTEST® Amperometric Sensors

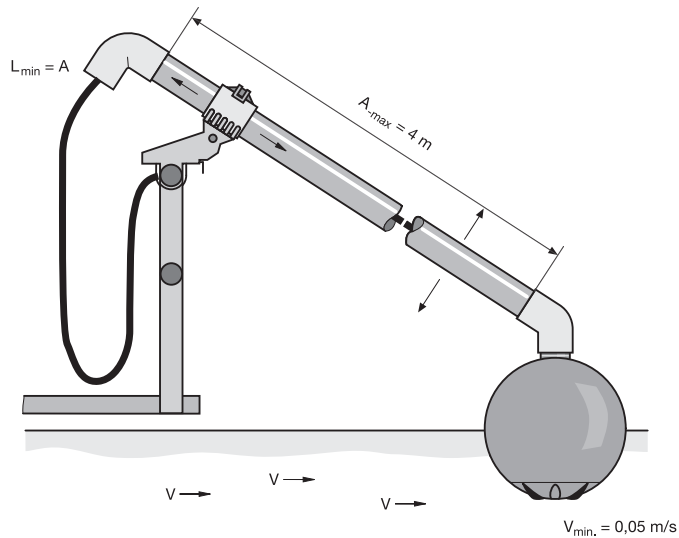


pk_6_051

DO 2-mA

Measured variable	Dissolved oxygen
Calibration	of oxygen in air
Measurement accuracy	±0,5 % referred to final value of measuring range
Temperature range	0 ... 50 °C
Max. pressure	1.0 bar
Intake flow	minimum: 0.05 m/s
Enclosure rating	IP 68
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
Process integration	as float with venturi grooves to increase the flow of sample water for the self-cleaning of the sensor part. Supplied with adapter for connection to PVC-pipes with outside diameter: 50 mm and railing bracket, also for PVC pipes with outside diameter: 50 mm (see accessories section 6.5.5). The customer must provide the straight PVC tube and a 45 ° standard elbow for gluing to PVC pipes (outside diameter 50 mm).
Typical applications	Control of the oxygen input in activated sludge pools (sewage plant) for the purpose of energy conservation.

	Measuring range	Order no.
DO 2-mA-10 ppm	0.10...10.0 mg/l	1020533

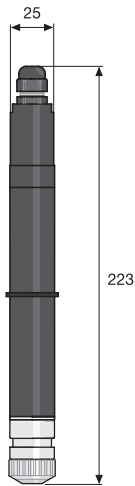


pk_6_012

7.3 DULCOTEST® Amperometric Sensors

7.3.8 Sensor For Peracetic Acid

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



pk_6_083

PAA 1-mA

Measured variable	Peracetic acid
Reference method	titration
pH range	1.0 ... 9.0 (peracetic acid stability range)
Temperature range	1 ... 45 °C
Admissible temperature fluctuation	0.3 °C/min
Response time T₉₀	t ₉₀ ≈ 3 min
Max. pressure	3.0 bar (30 °C, in DGM)
Intake flow	30...60 l/h (in in-line probe 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
Typical applications	Scouring in Cleaning in Place (CIP), rinser, also suitable in the presence of cationic and anionic tensides. The selective measurement of peracetic acid and hydrogen peroxide is possible.
Measurement and control equipment	D1C
In-line probe housing	DGM, DLG

	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

A mounting kit (Order No. 815079) is required for the initial installation of the probe in the DLG III in-line probe housing.

7.3 DULCOTEST® Amperometric Sensors

7.3.9 Sensor for hydrogen peroxide

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

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

The sensors are selected using the following decision table:

Requirement	Type PER1	PEROX
Sensor matrix contaminated by dirt and chemicals	Suitable due to impermeable diaphragm *	More susceptible due to impermeable diaphragm
Electrical interference due to interference potentials in the sample medium	Immune as counter electrode is separated from process	More susceptible as counter electrode is in the medium
Temperature range	Up to 50 °C	Up to 40 °C
Ease of handling during installation and maintenance	Suitable because temperature compensation and measuring transducer are integrated in the sensor	Separate temperature sensor and measuring transducer
Response time for H ₂ O ₂ for fast controlling	Inert T ₉₀ = 6-8 min	Fast: T ₉₀ = 20 s
Fast temperature changes	Inert because of integrated temperature sensor	Fast because of separate temperature sensor
Measuring intervals in the absence of H ₂ O ₂	unsuitable	Suitable because of pulsed polarisation technology
Measuring range can vary from time to time because of size arrangements or is not clear at time of ordering	Selection of a suitable sensor necessary	Suitable because measuring range can be selected manually at the sensor transducer

* susceptible to interference with regard to hydrogen sulphide (H₂S)

PER1

Measured variable	hydrogen peroxide
Calibration	photometrically with hand-held photometer DT3, see Chap. 5.4.4
pH range	2.5 ... 11.0
Temperature range	0 ... 50 °C
Admissible temperature fluctuation	< 0.3 °C/min
Response time T₉₀	approx. 480 sec
Measurement accuracy	≥ 1 ppm or better than ± 5% of measured value
Min. conductivity	0.05 ... 5.00 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
Typical applications	swimming pool, treatment of contaminated waste waters, treatment of process media from production
Measurement and control equipment	D1Ca ... H7
In-line probe housing	DGM, DLG

	Measuring range	Order no.
PER 1-mA-50 ppm	0.50...50.0 mg/l	1030511
PER 1-mA-200 ppm	2.00...200.0 mg/l	1022509
PER 1-mA-2000 ppm	20.00...2,000.0 mg/l	1022510
		Order no.
Fotometer DT3		1023143

A mounting kit (Order No. 815079) is required for the initial installation of the probe in the DLG III in-line probe housing.

MaharFan

7.3 DULCOTEST® Amperometric Sensors

PEROX

Measured variable	hydrogen peroxide
Calibration	photometrically with hand-held photometer DT3, see Chap. 5.4.4
Measurement range	1... 20/10 ... 200/100 ... 2000
pH range	2.5 ... 10.0
Temperature range	0 ... 40 °C
Admissible temperature fluctuation	< 1 °K/min (for external temp. measurement) see operating instructions
Response time T₉₀	approx. 20 sec
Measurement accuracy	better than 2 % referred to range full scale value
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
Typical applications	treatment of clear and chemically uncontaminated waters, controls with necessary short response times
Measurement and control equipment	D1Ca ... H1
In-line probe housing	DGM, DLG

Order no.

Perox sensor PEROX-H2.10-P	792976
Perox transducer PEROX-micro-H1.20-mA	741129

Order no.

Fotometer DT3	1023143
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7.4 DULCOTEST® Conductivity Sensors

7.4.1 Conductivity Sensors

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

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

Summary of features:

- Simple to install
- Reliable measuring
- Simple to maintain

Overview table, conductivity sensors

Type	Measurement range	Cell constant k cm ⁻¹	Max. pressure bar	Medium temperature max. °C	Shaft material	Temperature compensation	Process integration	Electrical connection
LMP 001 → 7-43	0.01...50 µS/cm	0.01 ±5 %	16	70	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 001-HT → 7-43	0.01...50 µS/cm	0.01 ±5 %	16	120	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01 → 7-44	0.1...500 µS/cm	0.10 ±5 %	16	70	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01-HT → 7-45	0.1...500 µS/cm	0.10 ±5 %	16	120	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 01-TA → 7-44	0.1...500 µS/cm	0.10 ±5 %	16	70	PP	Pt 100	Immersion, including immersible inline probe housing, 1 m + 5 m cable	5 m fixed cable
LF 1 FE → 7-45	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy		PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable (2 x 0.5 mm ²)
LFT 1FE → 7-45	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable (2 x 0.5 mm ²)
LFTK 1 FE → 7-46	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	5 m fixed cable (2 x 0.5 mm ²)
LF 1 DE → 7-46	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy		PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFT 1 DE → 7-46	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 100	PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFTK 1 DE → 7-47	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 1000	PG 13.5, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LF 1 1/2" → 7-47	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy		1/2 inch male thread, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFT 1 1/2" → 7-47	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 100	1/2 inch male thread, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
LFTK 1 1/2" → 7-48	0.01...20 mS/cm	1.00 ±5 %	16	80	Epoxy	Pt 1000	1/2 inch male thread, flow (length: 120 mm) or immersion	DIN 4 pin angle plug
CK 1 → 7-48	0.01...20 mS/cm	1.00 ±5 %	16	150	PES		Flow, 1" outer thread	DIN 4 pin angle plug
CKPt 1 → 7-48	0.01...20 mS/cm	1.00 ±5 %	16	150	PES	Pt 100	Flow, 1" outer thread	DIN 4 pin angle plug
LM 1 → 7-49	0.10...20 mS/cm	1.00 ±5 %	16	70	PP		Flow, 3/4" outer thread	DIN 4 pin angle plug
LM 1-TA → 7-49	0.10...20 mS/cm	1.00 ±5 %	16	70	PP		Immersion, including immersible inline probe housing, 1 m + 5 m cable	5 m fixed cable

7.4 DULCOTEST® Conductivity Sensors

Type	Measurement range	Cell constant k cm ⁻¹	Max. pressure bar	Medium temperature max. °C	Shaft material	Temperature compensation	Process integration	Electrical connection
LMP 1 → 7-49	0.10...20 mS/cm	1.00 ±5 %	16	70	PP	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 1-HT → 7-50	0.10...20 mS/cm	1.00 ±5 %	16	120	PVDF	Pt 100	Flow, 3/4" outer thread	DIN 4 pin angle plug
LMP 1-TA → 7-50	0.10...20 mS/cm	1.00 ±5 %	16	70	PP	Pt 100	Immersion, including immersible in-line probe housing 1 m + 5 m cable	5 m fixed cable
LF 204 → 8-73	0.00...500 mS/cm	0.47 ±1.5 %	2				Manual immersion	
ICT 1 → 7-51	0.20...1,000 mS/cm	8.50 ±5 %	8	70	PP	Pt 100	Flow DN 50	7 m fixed cable
ICT 1-IMA → 7-52	0.20...1,000 mS/cm	8.50 ±5 %	8	70	PP	Pt 100	Immersion including in-line probe housing 1 m	7 m fixed cable
ICT 2 → 7-52	0.02...2,000 mS/cm	1.98	16	125	PFA	Pt 100, class A, completely extrusion-coated	Installation with SS flange, immersion with immersion pipe fixed cable (Accessories)	5 m fixed cable

General information:

- 1 We offer the DMT transducer to convert the measuring signal into a temperature-compensated 4-20 mA signal (see Chap. 8).
- 2 Connection configuration for DIN 4P angle plug:
 - Electrodes: earth and 2
 - Pt 100/1000: 1 and 3
- 3 A PG 13.5 / 1" adapter set (order no. 1002190) is required when installing into in-line probe housing DLG III (1" aperture).

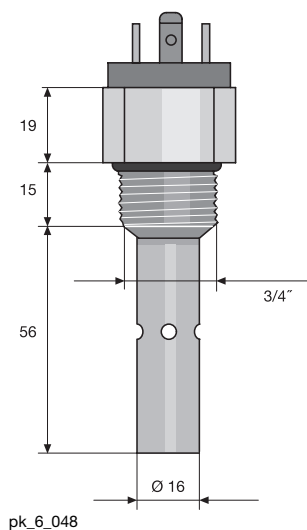
7.4 DULCOTEST® Conductivity Sensors

7.4.2 2-Electrode Conductivity Sensors

LMP 001

Conductivity sensor with Pt 100 temperature compensation and 0.01 cm⁻¹ cell constant

Measurement range	0.01...50 µS/cm
Cell constant k	0.01 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	stainless steel 1.4571
Shaft material	PP
Thread	3/4"
Installation length	71mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Clean water applications, monitoring ion exchangers and reverse osmosis systems



Order no.

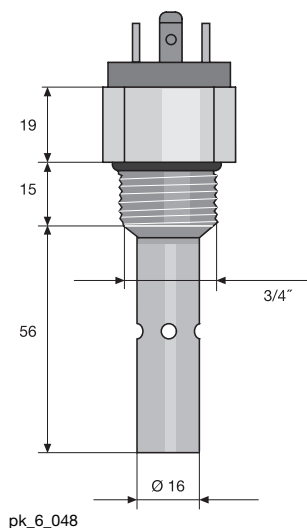
LMP 001	1020508
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

LMP 001-HT

Conductivity sensor with Pt 100 temperature compensation and 0.01 cm⁻¹ cell constant for higher temperatures

Measurement range	0.01...50 µS/cm
Cell constant k	0.01 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	120 °C
Max. pressure	16.0 bar up to 100 °C
Electrode material	stainless steel 1.4571
Shaft material	PVDF
Thread	3/4"
Installation length	71mm
Electrical connection	DIN 4 pin angle plug
Typical applications	General applications at higher temperatures, clean water applications, condensate.

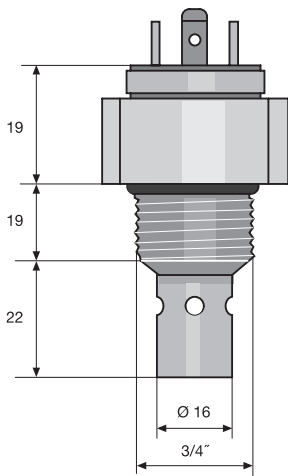


Order no.

LMP 001-HT	1020509
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

7.4 DULCOTEST® Conductivity Sensors



pk_6_049

LMP 01

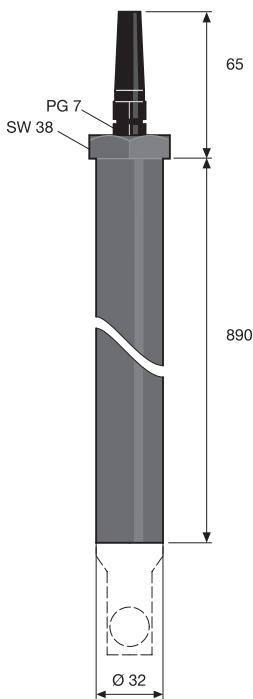
Conductivity sensor with Pt 100 temperature compensation and 0.1 cm⁻¹ cell constant. LMP 01 is fitted with a 4 pin plug and a 3/4 inch male thread.

Measurement range	0.1...500 µS/cm
Cell constant k	0.1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	stainless steel 1.4571
Shaft material	PP
Thread	3/4"
Installation length	46mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Monitoring ion exchangers, reverse osmosis systems and desalination systems.

Order no.

LMP 01	1020510
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_053

LMP 01-TA

Conductivity sensor with Pt 100 temperature compensation and 0.1 cm⁻¹ cell constant. LMP 01-TA is fitted with 5 m fixed cable and integrated into the immersion assembly TA-LM via a M 28 thread (see Chap. 6.5).

Measurement range	0.1...500 µS/cm
Cell constant k	0.1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	stainless steel 1.4571
Shaft material	PP
Thread	M 28 x 1.5 for immersion assembly TA-LM
Installation length	46mm
Electrical connection	5 m fixed cable
Typical applications	Monitoring ion exchangers, reverse osmosis systems and desalination systems.

Order no.

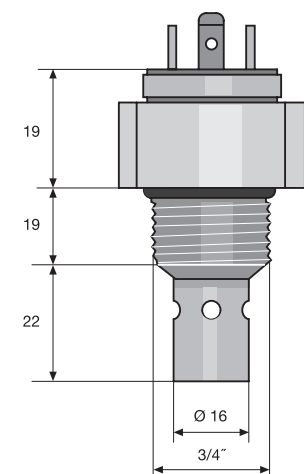
LMP 01-TA	1020512	
LMP 01-FE	spare sensor for LMP 01-TA with 5 m fixed cable	1020626

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

7.4 DULCOTEST® Conductivity Sensors

LMP 01-HT

Conductivity sensor with Pt 100 temperature compensation and 0.1 cm⁻¹ cell constant for higher temperatures



pk_6_049

Measurement range	0.1...500 µS/cm
Cell constant k	0.1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	120 °C
Max. pressure	16.0 bar up to 100 °C
Electrode material	stainless steel 1.4571
Shaft material	PVDF
Thread	3/4"
Installation length	46mm
Electrical connection	DIN 4 pin angle plug
Typical applications	General applications at higher temperatures,

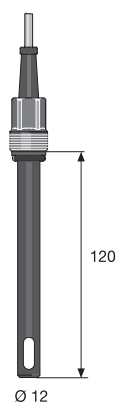
Order no.

LMP 01-HT

1020511

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

LF 1 FE



pk_6_085

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	5 m fixed cable (2 x 0.5 mm ²)
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF series are not wholly suitable for the measurement of cleaning solutions containing surfactants or liquids containing solvents.

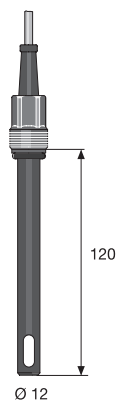
Order no.

LF 1 FE

741152

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

LFT 1FE



pk_6_085

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	5 m fixed cable (2 x 0.5 mm ²)
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents

Order no.

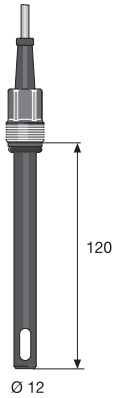
LFT 1 FE

1001374

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

ManarFan

7.4 DULCOTEST® Conductivity Sensors



pk_6_085

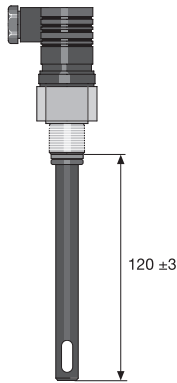
LFTK 1 FE

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 1000
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	5 m fixed cable (2 x 0.5 mm ²)
Typical applications	Potable, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents

Order no.

LFTK 1 FE	1002821
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_086

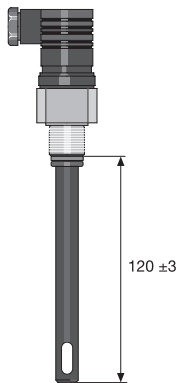
LF 1 DE

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 1000
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

Order no.

LF 1 DE	1001375
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_086

LFT 1 DE

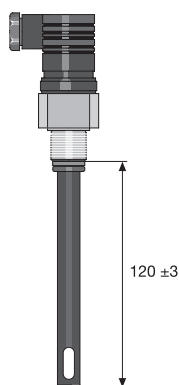
Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

Order no.

LFT 1 DE	1001376
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

7.4 DULCOTEST® Conductivity Sensors



pk_6_086

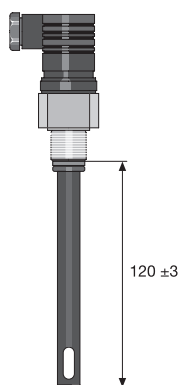
LFTK 1 DE

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ± 5 %
Temperature compensation	Pt 1000
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	PG 13.5
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

Order no.

LFTK 1 DE	1002822
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_086

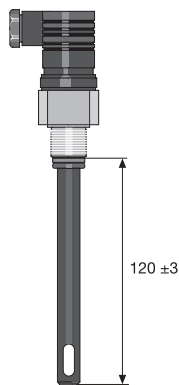
LF 1 1/2"

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ± 5 %
Temperature compensation	
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	1/2"
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

Order no.

LF 1 1/2"	1001377
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_086

LFT 1 1/2"

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ± 5 %
Temperature compensation	Pt 100
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	1/2"
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

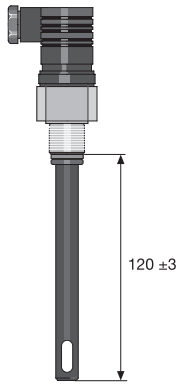
Order no.

LFT 1 1/2"	1001378
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Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



7.4 DULCOTEST® Conductivity Sensors



pk_6_086

LFTK 1 1/2"

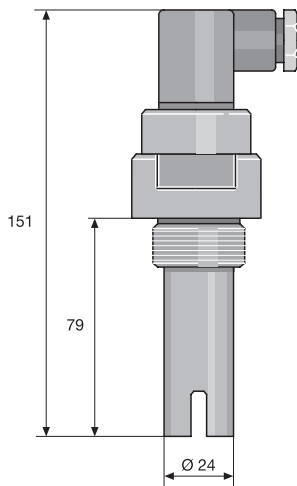
Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 1000
Fluid temperature	0...80 °C
Max. pressure	16.0 bar
Electrode material	special graphite
Shaft material	Epoxy
Thread	1/2"
Installation length	120 ± 3mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial water. The measuring cells in the LF... series are not wholly suitable for taking measurements in cleaning solutions containing surfactants or liquids containing solvents.

Order no.

LFTK 1 1/2"

1002823

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)



pk_6_046

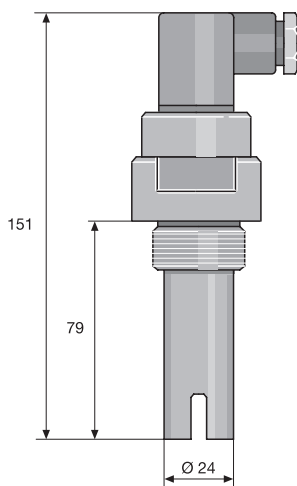
CK 1

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	
Fluid temperature	0...150 °C
Max. pressure	16.0 bar up to 20 °C
Electrode material	special graphite
Shaft material	PES
Thread	R 1"
Installation length	79mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Cooling, industrial, process water, tank and pipe, cleaning systems in breweries, dairies, media separation.

Order no.

CK 1

305605



pk_6_046

CKPt 1

Measurement range	0.01...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	0...150 °C
Max. pressure	16.0 bar up to 20 °C
Electrode material	special graphite
Shaft material	PES
Thread	R 1"
Installation length	79mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Cooling, industrial, process water, tank and pipe cleaning systems in breweries and dairies, separation of media.

Order no.

CKPt 1

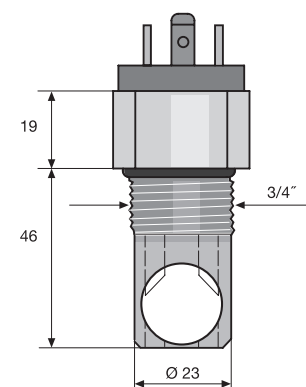
305606

7.4 DULCOTEST® Conductivity Sensors

LM 1

Conductivity sensor is fitted with a DIN 4 pin angle plug.

Measurement range	0.1...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	graphite
Shaft material	PP
Thread	3/4"
Installation length	46 mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial, process water, media separation



pk_6_052

Order no.

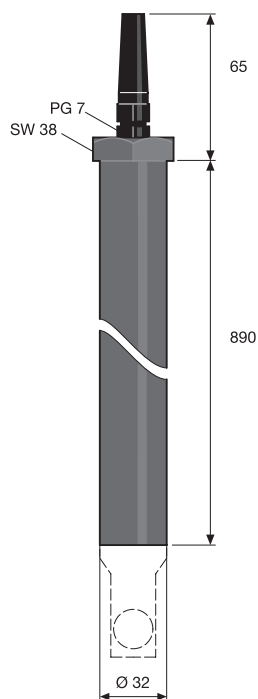
LM 1

740433

LM 1-TA

Conductivity sensor has a 5 m fixed cable and fits inside the immersion assembly TA-LM (see Chap. 8.5).

Measurement range	0.1...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	graphite
Shaft material	PP
Thread	M 28 x 1.5 for TA-LM in-line probe housing
Installation length	1,000 mm
Electrical connection	5 m fixed cable
Typical applications	Drinking, cooling, industrial, process water, media separation



pk_6_053

Order no.

LM 1-TA

1020528

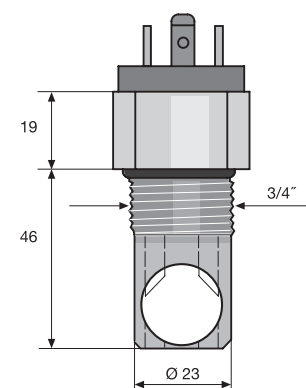
LM 1-FE

spare sensor for LM 1-TA with 5 m fixed cable 1020627

LMP 1

Conductivity sensor with DIN 4 pin plug and Pt 100 for temperature compensation.

Measurement range	0.1...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	graphite
Shaft material	PP
Thread	3/4"
Installation length	46 mm
Electrical connection	DIN 4 pin angle plug
Typical applications	Drinking, cooling, industrial, process water, media separation



pk_6_052

Order no.

LMP 1

1020513

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

7.4 DULCOTEST® Conductivity Sensors

LMP 1-TA

The conductivity sensor has a 5 m fixed cable and Pt 100 for temperature compensation fits inside the immersion assembly TA-LM (see Chap. 8.5).

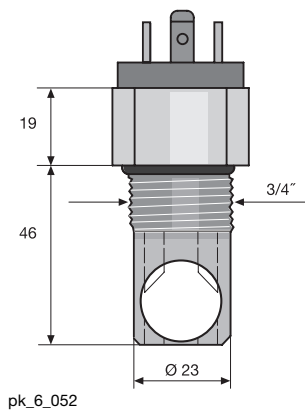
Measurement range	0.1...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	70 °C
Max. pressure	16.0 bar up to 50 °C
Electrode material	graphite
Shaft material	PP
Thread	M 28 x 1.5 for TA-LM in line probe housing
Installation length	
Electrical connection	5 m fixed cable
Typical applications	Drinking, cooling, industrial, process water, media separation

	Order no.
LMP 1-TA	1020525
LMP 1-FE	Spare sensor for LMP 1-TA 1020727

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

LMP 1-HT

Conductivity sensor for higher temperatures is fitted with a DIN 4 pin plug.



Measurement range	0.1...20 mS/cm
Cell constant k	1 cm ⁻¹ ±5 %
Temperature compensation	Pt 100
Fluid temperature	120 °C
Max. pressure	16.0 bar up to 100 °C
Electrode material	graphite
Shaft material	PVDF
Thread	3/4"
Installation length	46mm
Electrical connection	DIN 4 pin angle plug
Typical applications	General applications at higher temperatures industrial, process water, media separation, CIP in breweries and dairies

	Order no.
LMP 1-HT	1020524

Please observe the general notes on p. → 7-41 (Overview table, conductivity sensors)

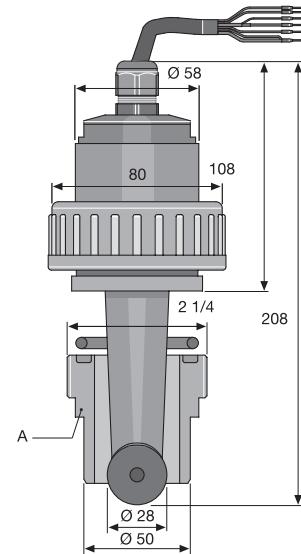
7.4 DULCOTEST® Conductivity Sensors

7.4.3 Inductive Conductivity Sensors

Electrode-free inductive conductivity sensors are used to measure the electrolytic conductivity over a wide measurement range in heavily soiled and/or aggressive media and offer a particularly low maintenance operating method. The sensors are particularly suitable for the measurement of high conductivity levels since there is no electrode polarisation. The inductive conductivity probes are operated with the D1Ca xx L6 ... controller. The controller includes the test and calibration kit (1026958).

ICT 1

Economical inductive conductivity sensors for all soiled water types and for high conductivity levels. The ICT 1 sensor is designed for in-flow measurement and is installed in DN40 pipes (optionally PVC or PP).



pk_6_087
Adhesive joints PVC, Fusion joints PP,
DN 40

Measurement range	0.2...1,000 mS/cm
Cell constant k	8.5 cm ⁻¹ ±5 %
Measuring accuracy	< 1 % referred to final value of measuring range
Temperature compensation	Pt 100
Process chemical temperature	0...70 °C
Max. pressure	8.0 bar up to 40 °C 70.0 bar up to 1 °C
Material	Sensor: PP, Seals: FPM
Electrical connection	7 m fixed cable
Enclosure rating	IP 65
Measurement and control equipment	D1C for inductive conductivity (see section 7.1.6)
Typical applications	All types of soiled water, desalination control in cooling towers, control of electroplating baths, Cleaning in Place (CIP), product monitoring

Assembly

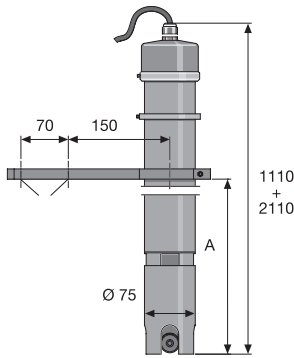
With union nut, 2 1/4 imperial internal thread, DN 40, PVC incl. DN40. Adhesive joints with 2 1/4 imperial external thread for installation in DN 40 standard PVC pipes (included in delivery scope). The corresponding fusion joints for installation in standard PP pipes are available as accessories (see Chap. 8.5.5)

Order no.

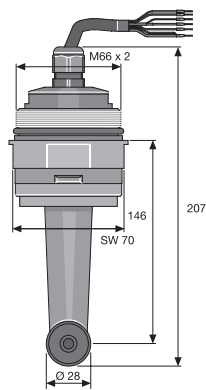
ICT 1

1023244

7.4 DULCOTEST® Conductivity Sensors



pk_6_088
A = min. 155 mm / max. 1 m or 2 m



pk_6_089

ICT 1-IMA

Economical inductive conductivity sensors for all soiled water types and high conductivity levels. The immersion sensors ICT 1-IMA-1 m and ICT 1-IMA-2 m comprise the ICT 1-IM sensor and the ready-fitted IMA-ICT 1 immersion pipe in the length 1 m or 2 m.

Measurement range	0.2...1,000 mS/cm
Cell constant k	8.5 cm ⁻¹ ±5 %
Measuring accuracy	< 1 % referred to final value of measuring range
Temperature compensation	Pt 100
Process chemical temperature	0...70 °C
Max. pressure	8.0 bar up to 40 °C 70.0 bar up to 1 °C
Material	Sensor: PP, Seals: FPM
Electrical connection	7 m fixed cable
Enclosure rating	IP 65
Measurement and control equipment	D1C for inductive conductivity (see section 7.1.6)
Typical applications	All types of soiled water, desalination control in cooling towers, control of electroplating baths, Cleaning in Place (CIP), product monitoring

Assembly

Complete immersion sensor with immersion pipe 1 m or immersion pipe 2 m. The assembly accessories for the immersion assembly IPHa 3-PP (see Chap. 8.5.4) can also be used for the immersion sensor.

		Order no.
ICT 1-IMA 1 m	-	1023349
ICT 1-IMA 2 m	-	1023351
ICT 1-IM	spare sensor for ICT 1-IMA-1 m and ICT 1-IMA-2 m	1023245

ICT 2

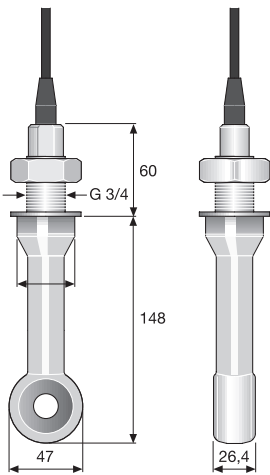
High-performance sensor for aggressive media, maximum conductivity and high temperatures. Available for installation in tanks, pipes or the immersion assembly IMA-ICT 2.

Measurement 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
Enclosure rating	IP 67
Measurement and control equipment	D1C
Typical applications	Production processes in the chemical industry, phase separation of product mixtures, determination of concentrations of aggressive chemicals.

Assembly

Installation in pipes, tanks (on the side): G 3/4 stainless steel thread (1.4571). or flange-mounted: with accessories: stainless steel flange ANSI 2 imperial 300 lbs, SS 316L (can be adapted to DIN counter-flange DN 50 PN 16) (see Chap. 8.5.5).

		Order no.
ICT 2		1023352



pk_6_082

7.5 Sensor Technology Accessories

7.5.1

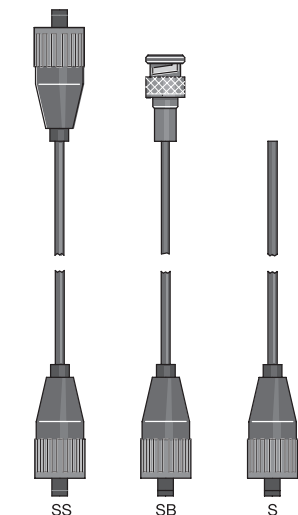
Sensor Accessories

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.

Signal leads for pH/ORP measurement

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

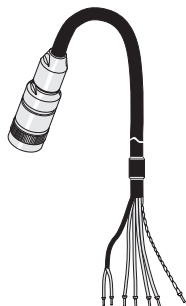


pk_6_054

Type	Description	Order no.
2 x SN6	Coaxial cable Ø 5 mm, 0.8 m - SS	305077
	Coaxial cable Ø 5 mm, 2.0 m - SS	304955
	Coaxial cable Ø 5 mm, 5.0 m - SS	304956
	Coaxial cable Ø 5 mm, 10.0 m - SS	304957
SN6 - open end	Coaxial cable Ø 5 mm, 2.0 m - S	305030
	Coaxial cable Ø 5 mm, 5.0 m - S	305039
	Coaxial cable Ø 5 mm, 10.0 m - S	305040
	Coaxial cable Ø 5 mm, 20.0 m - S	304952
SN6 - BNC	Coaxial cable Ø 3 mm, 10.0 m - SB	305099
SN6 - DIN	Coaxial cable Ø 5 mm, 0.8 m - SD	305098
SN6 - DIN	Coaxial cable Ø 5 mm, 2.0 m - SD	304810

Signal leads for electrodes with Vario Pin plug

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

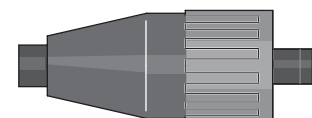


pk_6_069

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

SN6 coax connector

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



pk_6_056

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

LK coax signal cable

For pH and ORP measurements.



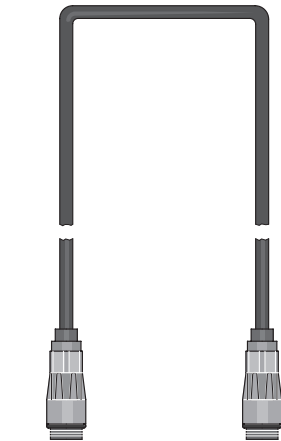
pk_6_055

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

Please specify length with order.



7.5 Sensor Technology Accessories



pk_6_057

Signal leads for -4P type chlorine measuring cells

The signal lead is required for connecting sensors ...-4P to the measuring device/controller D_4a..

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

	Length m	Order no.
signal leads for -4P type chlorine measuring cells	2	818455
signal leads for -4P type chlorine measuring cells	5	818456
signal leads for -4P type chlorine measuring cells	10	818470



pk_1_085

Signal leads for DMT type chlorine measuring cells

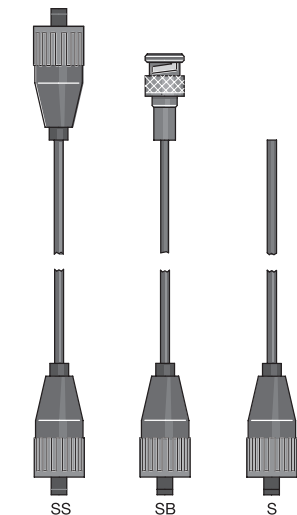
The signal lead is required for connection of DMT type measuring cells to the DMT transducer.

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

Cable accessories for CAN-type chlorine sensors

	Order no.
T-distributor M12 5 pole CAN	1022155
Termination resistance M12 coupling	1022154
Termination resistance 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 (by the metre)	1022160
Plug-CAN M12 5 pole Screw terminal	1022156
Coupling-CAN M12 5 pole Screw terminal	1022157

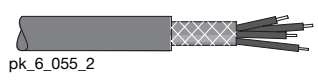
Signal leads for Pt 100/Pt 1000 (2 x 0.5 mm²)



pk_6_054

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

7.5 Sensor Technology Accessories



pk_6_055_2

LKT signal lead for conductivity measuring cells

4-core, shielded, Ø 6.2 mm

Note	Order no.
Please specify length with order.	723712

Two-wire signal lead (2 x 0,25 mm²; Ø 4 mm)

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

Note	Order no.
Please specify length with order.	725122

Connector cable

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

	Length m	Order no.
Connector cable	5	818438

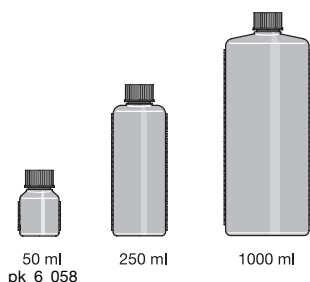
Test and calibration kit for inductive conductivity

	Order no.
Test and calibration kit	1026958

7.5 Sensor Technology Accessories

7.5.2 Consumable Items For Sensors

pH quality buffer solutions

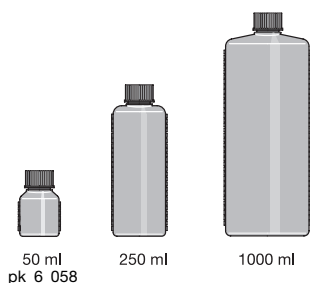


Accuracy \pm pH 0.02 (\pm 0.05 at pH 10). The shelf life depends upon frequency of use and the amount of chemical drag-in.

Alkaline buffer solutions can react with CO₂ if left open. This will affect their values, therefore close after use. Buffer solutions should be replaced after a maximum of three months after opening. The solution contains a biocide to prevent bacteria forming.

	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	50	506254
Buffer pH 9.0	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 \pm 5 mV. Shelf life depends upon frequency of use and the strength of the chemicals in sample solutions.

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

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

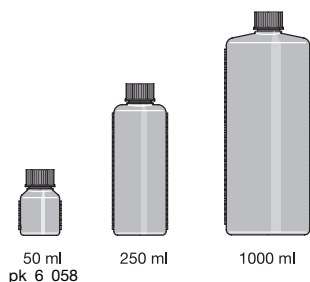
	Capacity ml	Order no.
ORP buffer 465 mV	50	506240
ORP buffer 465 mV	250	791439
ORP buffer 465 mV	1,000	506241
ORP buffer 220 mV	50	506244
ORP buffer 220 mV	1,000	506245

DPD-reagents for calibration of amperometric sensors s. p. → 8-70

7.5 Sensor Technology Accessories

3 molar KCl solutions

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

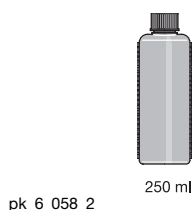


	Capacity ml	Order no.
KCl solution, 3 molar	50	505533
KCl solution, 3 molar	250	791440
KCl solution, 3 molar	1,000	791441
KCl solution, 3 molar, AgCl saturated	250	791442
KCl solution, 3 molar, AgCl saturated	1,000	505534

Cleaning solutions

Pepsin/hydrochloric acid cleaning solutions:

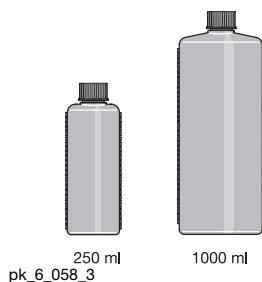
For cleaning pH electrode diaphragms contaminated with protein.



Capacity	Order no.
250 ml	791443

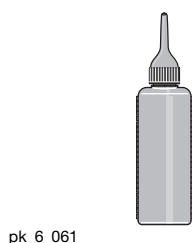
Conductivity calibration solution

For the accurate calibration of conductivity sensors.



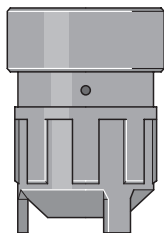
	Capacity ml	Order no.
Conductivity calibration 1413 μS/cm	250	1027655
Conductivity calibration 1413 μS/cm	1,000	1027656
Conductivity calibration 12.88 mS/cm	250	1027657
Conductivity calibration 12.88 mS/cm	1,000	1027658

Electrolyte for amperometric sensors



	Capacity ml	Order no.
CLE all chlorine measuring cells electrolyte	100	506270
CDM 1 and CDE 3 type chlorine dioxide measuring cells electrolyte	100	506271
CDE 2 chlorine dioxide measuring cells electrolyte	100	506272
OZE ozone measuring cells electrolyte	100	506273
Electrolyte for measuring cells types CGE/CTE/BRE	50	792892
Electrolyte for chlorine dioxide measuring cells type CDP	100	1002712
Electrolyte for peracetic acid sensors, type PAA 1	100	1023896
Electrolyte for chlorine probes, Type CLT 1	50	1022015
Electrolyte for hydrogen peroxide probes Type PER 1	50	1025774

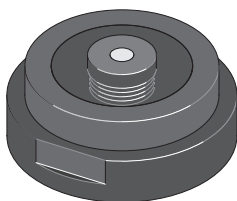
7.5 Sensor Technology Accessories



pk_6_075

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
Membrane cap for CGE/CTE 1 (2/5/10 ppm) and BRE 1		792862
Membrane cap for CTE 1 (0.5 ppm)		741274
Membrane cap for CDP 1		1002710
Diaphragm cap for CDE 3		1026578
Membrane cap for PAA 1		1023895
Membrane cap for CLT 1		1021824
Diaphragm cap for PER 1		1025776
Diaphragm cap for H2.10 P		792978
Accessory set for CGE 2/CTE 1 (2/5/10 ppm) and BRE 1 (2 membrane caps + 50 ml electrolyte)		740048
Accessory set CTE 1 (0.5 ppm) (2 membrane caps + 50 ml electrolyte)		741277
Accessory set for CDP 1 (2 diaphragm caps + electrolyte)	100	1002744
Accessory kit CLT 1 (2 diaphragm caps + electrolyte)	100	1022100
Accessory kit PAA 1 (2 diaphragm caps + electrolyte)	100	1024022
Accessory kit PER 1 (2 diaphragm cap + electrolyte)	50	1025881
Accessory kit CDE 3		1026361



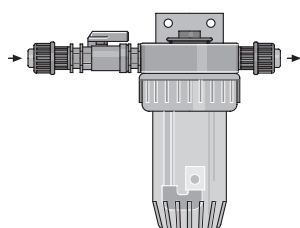
pk_6_062

Spare parts for dissolved oxygen sensors

	Measuring range	Order no.
Sensor insert for DO 1-mA-20 ppm Membrane thickness 125 µm, measurement range 0-20 mg/l	2.00...20.0 mg/l	1020534
Sensor insert for DO 2-mA-10 ppm Membrane thickness 50 µm, measurement range 0-10 mg/l	0.10...10.0 mg/l	1020535
Bracket for the sensor insert for DO 1-mA-20 ppm (with membrane protection for fish farming)		1020540
Bracket for the sensor insert for DO 2-mA-10 ppm		1020541

7.5 Sensor Technology Accessories

7.5.3 Probe Housings



pk_6_063

DLG III type in-line probe housing

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

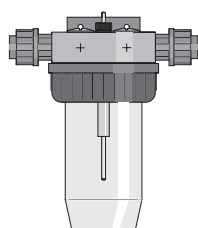
The DLG III is fitted with a plastic ball valve on the input side for stopping and adjusting the sample water flow.

Material Material: Rigid PVC
Transparent housing cup: Polyamide
Ball valve material: Rigid PVC

Max. pressure 1.0 bar

Max. temperature 55 °C

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



pk_6_070

DLG IV type in-line probe housing

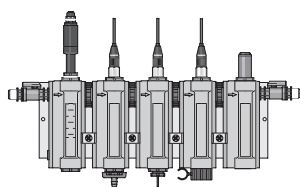
To take 4 electrodes (pH, ORP, Pt 100, conductivity) with PG 13.5 threaded connector, with integrated stainless steel pin as liquid reference potential. Bracket for wall mounting.

Material Material: Hard PVC or PPTransparent 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



pk_6_066

DGM modular in-line probe housing

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

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

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

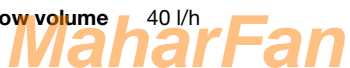
Material All modules: Transparent PVC
Seals: FPM
Calibration cup: PP
Mounting panel: PVC white

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

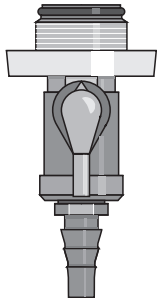
Recommended Flow volume 40 l/h



7.5 Sensor Technology Accessories

Flow sensor	Reed contact max. switch power 3 W max. switch voltage 175 V max. switch current 0.25 A max. operating current 1.2 A max. contact resistance 150 mΩ
Switch hysteresis	20 %
Enclosure rating	IP 65
Typical applications	Potable, swimming pool water or water of similar quality with no suspended solids
Assembly	Max. 5 modules pre-assembled onto baseboard: more than 5 modules, pre-assembled onto baseboard as custom version, priced accordingly.

FPM = fluororubber



pk_6_071

Sampling cock 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 and DGMA with connector, 5 m.

	Order no.
Connector cable	818438

Isolation ball valve for DGM

to isolate the bypass from the process flow

	Order no.
Isolation valve	1010380

Mounting kit for sensor/DGM

for mounting amperometric sensors with R 10 connection

	Order no.
Mounting kit for sensor/DGM	791818

7.5 Sensor Technology Accessories

Identcode Ordering System For In-Line Probe Housing Modules

DGM	Series	Series Version
	A	
		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 No PG 13.5 modules
		1 One PG 13.5 modules
		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 FPM A
		Hydraulic connectors
		0 8 x 5 hose
		1 PVC DN 10 threaded connector
		Version
		0 With ProMinent® logo
		1 Without ProMinent® logo
		2 With ProMinent® logo, without mounting plate
		3 Without ProMinent® logo, without mounting plate

Accessories included:

- Wall mounting for Pg 13.5 module: calibration cup, Pg 13.5 probe assembly set

The Identcode DGM A 3 2 1 T 0 0 0 describes a fully assembled combination of flow monitor with sensor, two Pg 13.5 modules (e.g. for pH and ORP probes) and a 25 mm module (e.g. for chlorine probe CLE 3). Fitted with 8 x 5 hose connector.

Recommended accessories

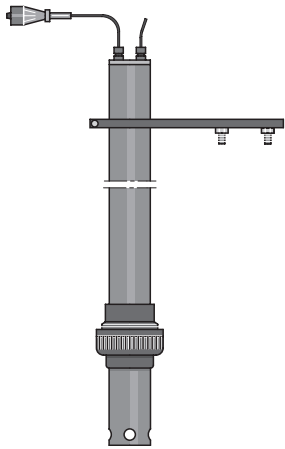
	Order no.
for potential equalizer plug	791663
Flow sensor for flow expansion module (optional)	791635
additional calibration cup	791229
PG 13.5 sampling tap	for 13.5 module 1004737
25 mm sampling tap	for 25 mm module 1004739

- max. 7 modules possible on a mounting plate
- more on request

FPM = fluororubber

7.5 Sensor Technology Accessories

7.5.4 Immersion Probe Housings



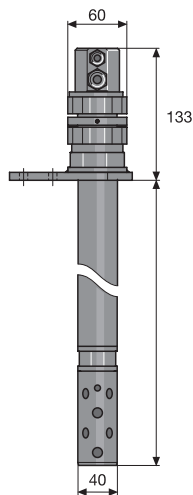
pk_6_064

PVC immersion assembly, type ETS 1 P

To take one conductivity, Pt 100, pH or ORP electrode, with SN6 plug and PG 13.5 threaded connector (with integrated stainless steel pin as liquid reference potential).

Measuring cell connector (inner)	SN6 connector
Signal lead connector	Coax SN6 male connector
Material	Rigid PVC
Type of fitting	Clamping flange with mounting plate
Immersion depth	Variable (max. 1m)
Max. temperature	55 °C

	Order no.
ETS 1 P	914950



pk_6_080

PP immersion assembly type IPHa 1-PP

To hold **one** electrode (e.g. pH, ORP) with PG 13.5 internal thread, standard length 120 mm. The inside diameter is designed to accept pH or ORP transducer. Also incorporates a stainless steel pin for fluid reference potential. The outside diameter is 40 mm. Immersion depths 1 or 2 m available but the customer can shorten the immersion lance/cut to length on site. The assembly head contains two threaded cable connectors. 3-7 mm signal leads can be connected to the probe housing. Signal leads are not included in the delivery

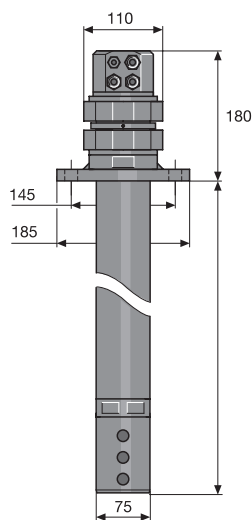
Material	Probe housing material: PP Seal material: FPM
Max. temperature	80 °C
Pressure	Atmospheric pressure installation
Immersion depth	max. 1, or 2 m; variable
Immersion lance diameter	40mm

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

Other materials available on request.

FPM = fluororubber

7.5 Sensor Technology Accessories



pk_6_081

Fixed flange	DN 40	DN65
Pitch circle	110 mm	145 mm
Screws	4 x M16	4 x M16
Thickness d ₂	18 mm	18 mm
Diameter	150 mm	185 mm

PP immersion assembly type IPHa 3-PP

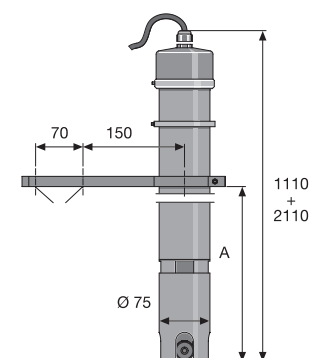
To accept a max. three electrodes (e.g. pH, ORP, temperature) with PG 13.5 internal thread, standard length 120 mm. The inside diameter is designed to accept up to three pH, temperature and ORP transducers at the same time. Also incorporates a stainless steel pin for fluid reference potential. The outside diameter is 75 mm. Immersion depths 1 or 2 m available but the customer can shorten the immersion lance on site. The probe-housing head contains four threaded cable connectors. 3-7 mm signal leads can be connected to the probe housing. Signal leads are not included in the delivery. Technical specification as for IPHa 1 but immersion lance diameter is 75 mm.

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

Other materials available on request.

Accessories for fittings type IPHa

	Order no.
Immersion pipe mounting for IPHa 1-PP	1008624
Immersion pipe mounting for IPHa 3-PP	1008625
Clamped threaded connector with fixed flange DN 40 according to DIN 2642 for IPHa 1-PP	1008626
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 1-PP	1008628
Clamped threaded connector for welding connection for IPHa 3-PP	1008629
Protective (weatherproofed) cover for assembly head for IPHa 1-PP	1008630
Protective (weatherproofed) cover for assembly head for IPHa 3-PP	1008631
Water-retaining basin for IPHa 1-PP	1008632
Water-retaining basin for IPHa 3-PP	1008633
Weatherproof cover PP	1023368



pk_6_088

A = min. 155 mm / max. 1 m or 2 m

Immersion assembly type IMA-ICT 1

To hold an inductive conductivity sensor, type ICT 1.

Material	Fittings: PP Seal: FPM
Max. temperature	70 °C
Pressure	atmospheric pressure
Immersion lance diameter	75mm

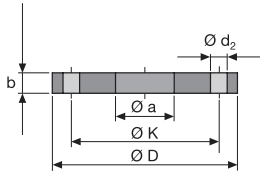
	Order no.
IMA-ICT 1 - 1 m	1023366
IMA-ICT 1 - 2 m	1023367

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

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

	Order no.
Weatherproof cover PP	1023368

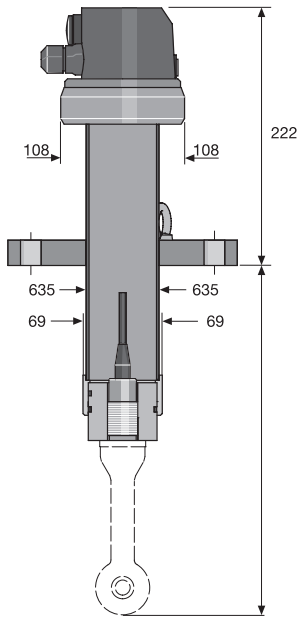
7.5 Sensor Technology Accessories



Immersion assembly Type IMA-ICT 2

To hold an inductive conductivity sensor, type ICT 2.

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



Order no.

IMA-ICT 2	1023353
------------------	----------------

Adaptation to processes through flange installation in tank from top.

pk_6_094

Flange:	DN 80/PN 16
Ø D	200
Ø K	160
Ø d ₂	8 x 18
b	20
Ø a	63.5
Screws	M 16

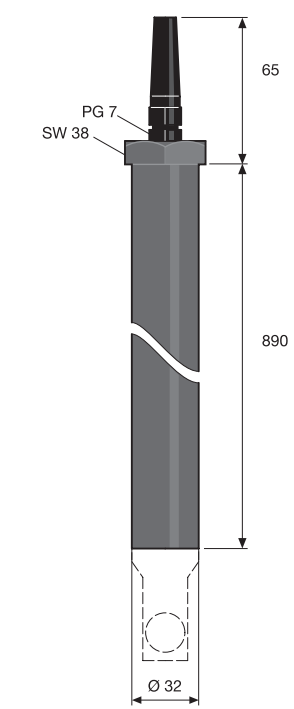
7.5 Sensor Technology Accessories

Immersion assembly Type TA-LM

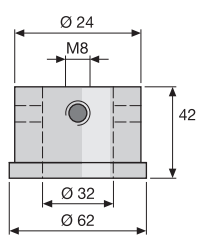
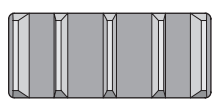
to hold a conductivity sensor type LM and LMP with M 28-thread for side fixture with circlips (2 x included as standard) or with union nut/headed bush/male screw gland in a tank cover from the top.
 Union nut and male screw gland are provided by the customer (standard parts).

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

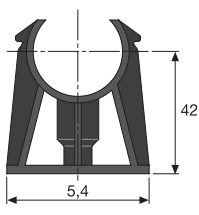
	Length mm	Order no.
TA-LM	890	1020632
Headed bush d50		1020634
Extension tube 1000	910	1020633



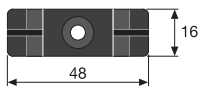
pk_6_053



pk_6_078



pk_6_079



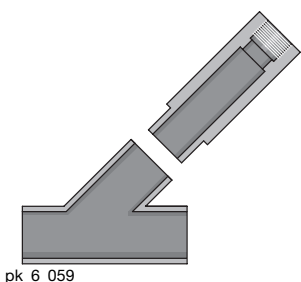
7.5 Sensor Technology Accessories

7.5.5 Immersion Probe Housings/Adaptors

PVC adapter set (T-piece and adapter)

For direct installation of conductivity, Pt 100, pH and ORP measuring cells into pipework with PG 13.5 thread:

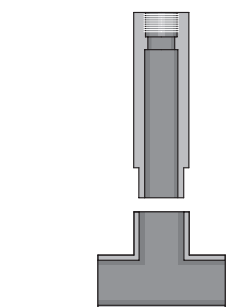
	Order no.
90° T-piece DN 20	1001493
90° T-piece DN 25	1001494
45° T-piece DN 20	1001491
45° T-piece DN 25	1001492



pk_6_059

PVC adapter kit for sensor types LM...

For direct installation of LM ... conductivity sensors with male thread 3/4 for in-flow measurement.

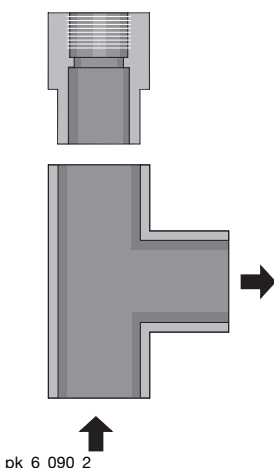


pk_6_060

For LM(P) 001 conductivity sensors

The sensors are in fitted into the insert of the T-joint.

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

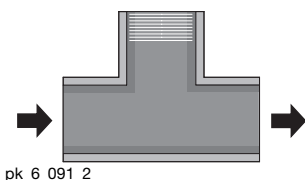


pk_6_090_2

For LM(P) 01 conductivity sensors

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

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

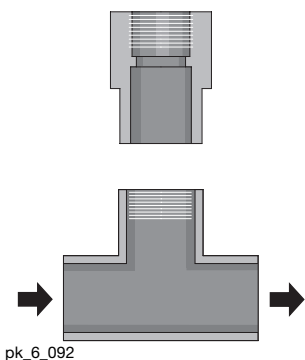


pk_6_091_2

For LM(P) 1 conductivity sensors

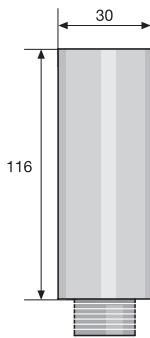
The sensors are in fitted in the outlet of the T-joint.

	Material	Order no.
90° T-joint DN 25	PVC	356410
Staight solvent union DN 25 - 3/4"	PVC	1020616



pk_6_092

7.5 Sensor Technology Accessories



pk_6_065

Adapter PP, PG 13.5

For direct installation of conductivity, Pt 100, pH, ORP electrodes with PG 13.5 male thread in e.g. pipes, tanks:

max. temp: 80 °C (no pressure)

Sealing ring, EPDM

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

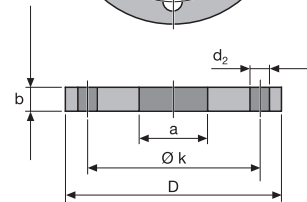
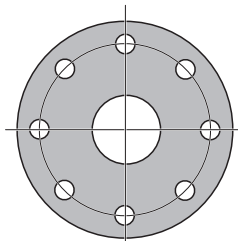
Adapter, stainless steel. PG 13.5

For direct installation of conductivity, Pt 100, pH, ORP electrodes with PG 13.5 male thread in e.g. pipes, tanks:

max. temp: 180 °C (no pressure)

Sealing ring, FPM

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



pk_6_093

Fitting kit for Type ICT 2 probes

For direct installation of the inductive conductivity measuring cell ICT 2 in pipes and tanks.

	Order no.
Fitting kit for Type ICT 2 probes	1023364

Kit consists of

- stainless steel flange ANSI 20 300 lbs, SS 316L (adaptable to DIN counterflange, DN 50 PN 16)
- 3/4" nut, stainless steel

process wetted parts:

- 2" sealing washer, PTFE
- spacer, PTFE
- seal

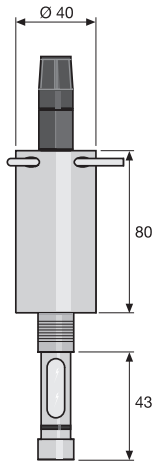
Fixed flange	ANSI 2"	DN 50
SS 316L	300 lbs	PN 16
Pitch circle	127	125
Screws	M 16	M 16
Thickness	22.2	18
Diameter	165.1	165

Welding socket for T-piece (PP) Type ICT 1

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

	Order no.
Welding socket G 2 1/4 inch DN40 PP incl. O-ring FPM	1023371

7.5 Sensor Technology Accessories



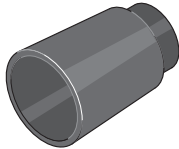
pk_6_013

Sliding retractable probe holder for pH, ORP electrodes WA-PH 1

To hold one pH electrode with PG 13.5 male thread and length between 110-125 mm for installation in tanks or pipe work (Fig. 2). The electrode can be removed for calibration and cleaning without draining the tanks and/or interrupting the process flow.

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

WA-PH 1	Order no. 1020631
----------------	-----------------------------

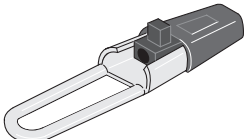


pk_6_072

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

PVC adapter for connection of the DO 1-mA-20 ppm dissolved oxygen sensor to an immersion pipe with 1-1/4 inch internal thread (see section. 6.3.6).

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



pk_6_073

Mounting bracket for cable of dissolved oxygen sensor DO 1-mA-20 ppm

The stainless steel and polyamide cable bracket is used to guide and fix the sensor cable inside the DO 1-mA-20 ppm dissolved oxygen sensor.

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

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

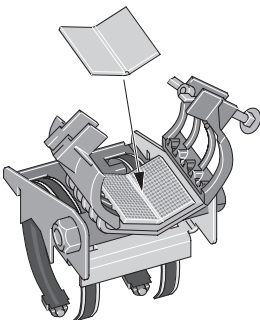
The PVC adapter is a spare part for the DO 2-mA-10 ppm dissolved oxygen sensor (see section 6.3.6). The DO 2-mA-10 dissolved oxygen sensor can be adapted to fit metric or an imperial tubing by fitting half of the adapter with 1-1/2 inch outside diameter, the other half with 50 mm outside diameter and at both ends with 1-1/4 inch internally threaded tube attached by means of a corresponding 45° standard angle piece (provided by the customer).

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

Railing bracket for plastic pipes

Stainless steel and plastic bracket for fixing of plastic tubes with 50 mm outside diameter to rails (e.g. on pools in sewage plants). Spare part for "dissolved oxygen" sensor: DO 2-mA-10 ppm (see Chap. 8.3.7).

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



pk_6_010

7.6 Application Examples

For application examples for measuring and control systems, see Chapter 8.6.

7.6 Application Examples

8 Measuring And Control Technology

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8.0 Overview Measuring And Control Technology

8.0.1

Product Overview Measuring And Control Technology



pk_5_055

DULCOMETER® D1C and DULCOMETER® D2C

The DULCOMETER® D1C and D2C controllers form the core of the comprehensive range of ProMinent controllers and measurement transducers. They are reliable, are used in universal applications and can control many different measured variables.

DULCOMETER® D1Cb

- Equipped to meet the most important standard requirements in water treatment applications
- All measured variable and languages resident in the controller as standard
- Subsequent function enabling options simplify storage

DULCOMETER® D1Ca

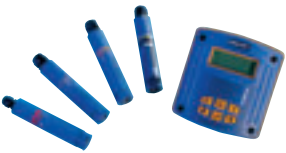
- Used universally for 14 different measured variables
- Optimised process flows ensured by special functions such as disturbance variable compensation, pH compensation for chlorine, base load metering and many limit value functions
- Special "Cool-Control" version tailored to the specific requirements of cooling tower conditioning applications

DULCOMETER® D2Ca

- Efficient solution for simultaneous control/measurement of: pH/ORP, pH/chlorine, pH/pH, chlorine/chlorine and pH/chlorine dioxide
- Optimised process flows ensured by special functions such as base load metering and many limit value functions

DULCOMETER® DMT Measurement Transducer DULCOTEST® Transducer

DULCOMETER® measuring transducers of the type DMT are compact 2-wire measuring transducers for the measured variables pH, ORP, chlorine, conductive conductivity, and temperature. They convert the primary sensor signal into a standard 4-20 mA signal and provide a disturbance-free connection of the sensor to controls at a distance (e.g. PLC) or DULCOMETER® controllers.



pk_5_056

Measuring transducer DULCOMETER® DMTa

- With display of the measured value for its control at the location of the sensor
- With calibrating function of the sensor close to it
- Version for connection to PROFIBUS® DP

Measuring transducer DULCOTEST® PHV1, RH V1, Pt 100 V1

- For pH, ORP, and temperature
- Space-saving connection to sensor
- Reasonably priced measuring transducer without display and calibration function

DULCOMARIN® II Swimming Pool Controller

DULCOMARIN® II for efficient swimming pool control. The first bus system for effective networking of swimming pool facilities. Simple operation via large illuminated colour display. For the control of up to 16 filtration cycles.



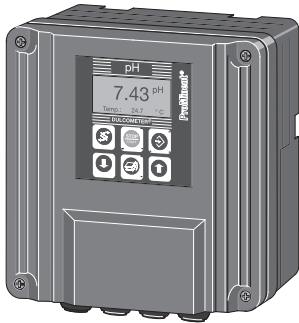
pk_5_057

- Videographic recorder/data logger integrated as standard to reduce costs
- An optionally installed web server provides visualisation via PC without the need for special software
- Simple integration in visualisation system for building installations via optional OPC® interface

8.0 Overview Measuring And Control Technology

8.0.2 Selection Guide DULCOMETER®

D1Cb single-channel controller

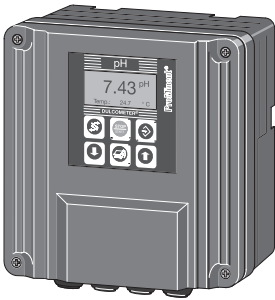


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Application	Measured variables	Functions
<ul style="list-style-type: none"> ■ Waste water treatment ■ Cooling water treatment ■ Drinking water treatment ■ Neutralisation 	<ul style="list-style-type: none"> ■ pH, ORP, conductivity, chlorine, chlorine dioxide, chlorite, bromine ■ Ozone, hydrogen peroxide, dissolved oxygen ■ Peracetic acid, fluoride, temperature, mA in general 	<ul style="list-style-type: none"> ■ Menu-driven operation in 15 languages ■ 2-way controlling ■ Metering pump control ■ Alarm relay ■ 2 limit value relays ■ 1 analogue output (measured value/controller output) ■ Sensor monitoring ■ subsequent function extension

See page → 8-6

Single-channel controller D1Ca



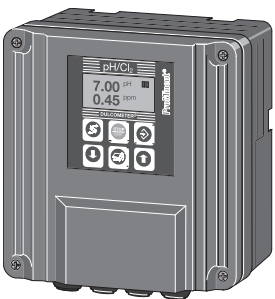
Application	Measured variables	Functions
<ul style="list-style-type: none"> ■ Waste water treatment ■ Cooling water treatment ■ Drinking water treatment ■ Neutralisation 	<ul style="list-style-type: none"> ■ pH, ORP, conductivity, chlorine, chlorine dioxide, chlorite, bromine ■ Ozone, hydrogen peroxide, dissolved oxygen ■ Peracetic acid, fluoride, temperature, mA in general 	<ul style="list-style-type: none"> ■ Menu-driven operation in 15 languages ■ 2-way controlling ■ Metering pump control ■ Alarm relay ■ 2 limit value relays ■ 2 analogue outputs (measured value/controller output) ■ Disturbance processing

See page → 8-10



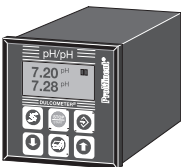
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Two-channel controller D2Ca



Application	Measured variables	Functions
<ul style="list-style-type: none"> ■ Waste water treatment ■ Cooling water treatment ■ Drinking water treatment ■ Neutralisation ■ Swimming pool water treatment 	<ul style="list-style-type: none"> ■ pH/ORP, pH/chlorine, pH/chlorine dioxide, pH/pH, chlorine/chlorine 	<ul style="list-style-type: none"> ■ Menu-driven operation in 8 languages ■ 2-unidirectional controller ■ Metering pump control ■ Alarm relay ■ 2 limit value relays ■ 2 analogue outputs (measured value/controller output)

See page → 8-24



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8.0 Overview Measuring And Control Technology

Multi-channel controller DULCOMARIN® II and Disinfection Controller

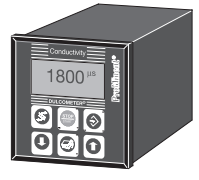


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Application	Measured variables	Functions
<ul style="list-style-type: none"> Swimming pool water treatment Drinking water treatment Water treatment in general 	<ul style="list-style-type: none"> pH, ORP, free chlorine, total available chlorine, combined chlorine, temperature. Via mA: Turbidity, fluoride, ammonia, UV intensity, flow rate 	<ul style="list-style-type: none"> Menu-driven operation in 6 languages Large colour display up to 16 filtration circuits / water systems Integrated data logger/screen recorder: Web server / OPC Server via LAN/Ethernet

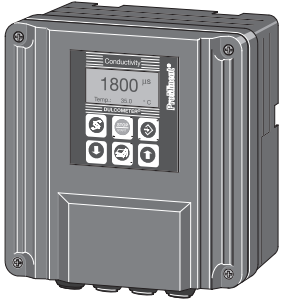
See page → 8-27

Cool Control



Application	Measured variables	Functions
<ul style="list-style-type: none"> Cooling tower control 	<ul style="list-style-type: none"> Conductivity (inductive and conductive) 	<ul style="list-style-type: none"> Menu-driven operation in 6 languages Control of 2 biocide pumps and 1 inhibitor Forced desalination Desalination lock

See page → 8-59



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ProMcon



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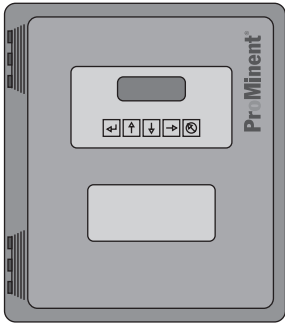
Application	Measured variables	Functions
<ul style="list-style-type: none"> Cooling tower control 	<ul style="list-style-type: none"> Conductivity (conductive) 	<ul style="list-style-type: none"> Menu-driven operation in 6 languages Control of 2 biocide pumps and 1 inhibitor pump Forced desalination Desalination lock or 2. measured variable (pH, chlorine, or bromine) Switching between summer/winter

See page → 8-58

NEW

8.0 Overview Measuring And Control Technology

MultiFlex M10



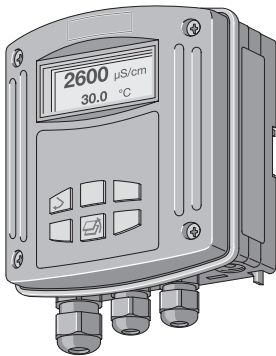
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Application	Measured variables	Functions
<ul style="list-style-type: none"> ■ Cooling tower control ■ Boiler control 	<ul style="list-style-type: none"> ■ Conductivity pH, chlorine, bromine 	<ul style="list-style-type: none"> ■ Menu-driven operation ■ Control of up to 4 cooling towers ■ Control of 2 biocide pumps and 1 inhibitor pump for each cooling tower ■ Forced desalination ■ Desalination lock ■ Integrated Web server for configuration ■ optional modem ■ optional operating and configuration software Trackster®

See page → 8-62

NEW

2-wire measuring transducer DMTa



pk_5_001

Application	Measured variables	Functions
<ul style="list-style-type: none"> ■ Chemical and process engineering ■ Food and beverages industry ■ Chemical industry ■ Pharmaceutical industry ■ Water treatment ■ Waste water treatment ■ Power plant engineering 	<ul style="list-style-type: none"> ■ pH, ORP, chlorine, temperature, conductivity 	<ul style="list-style-type: none"> ■ Menu-driven operation in 6 languages ■ Sensor monitoring ■ Autoranging for conductivity ■ Switching within the measured variables pH, ORP, temperature, and chlorine

See page → 8-64

8.1 DULCOMETER® Measuring And Control Technology

8.1.1 DULCOMETER® Measuring And Control Units

DULCOMETER® measuring and control units combine maximum process safety with a broad application spectrum. Different measured variables can be accurately determined. Depending on the application, the control behaviour of the DULCOMETER® measuring and control units are adapted to fit the relevant application. Different designs facilitate a flexible use.

Advantages at a glance:

- high measuring reliability, e.g. thanks to symmetrical input for pH/ORP
- high measuring accuracy, e.g. thanks high-impedance input for pH/ORP
- minimum disturbance, e.g. thanks to alternating current disturbance suppression
- two-wire technology for disturbance-resistant measurement
- highly versatile thanks to many options as well as different designs

DULCOMETER® measuring and control units, DULCOTEST® sensors with ProMinent® metering pumps - the complete control cycle, measuring-controlling-metering and recording, everything from one single source, optimally matched.

Which controller for which purpose?

Function	Controller type	
	D1Cb	D1Ca
Only measuring	Yes	Yes
Monitoring of limit values	Yes	Yes
PID 2-way controller	Yes	Yes
Send measuring signal to PLC via analogue signal	1 mA output	2 mA outputs
Temperature compensation	Yes	Yes
pH compensation for chlorine	No	Yes
Feedforward control (influence of flow)	No	Yes
Sensor monitoring	Yes	No
Calibration logbook	Yes	No
Error logbook	Yes	No
Digital input for pause control	Yes	Yes
Mounting types	Wall mounting	Wall and control panel mounting
Subsequent function extension via enable code	Yes	No

8.2 DULCOMETER® Single-Channel Basic Measuring And Control Unit, Type D1Cb, For All Measured

8.2.1 Basic Single-Channel Controller, Type D1Cb, For All Measured Variables

NEW

- flexible upgradability thanks to subsequent release option for functions via enable code (s. D1Ub upgrade Identcode Chap. 8.2.3)
- equipped for the most important basic requirements in water treatment
- large, illuminated graphic display
- operator guidance with full text menu in 14 languages integrated in the controller
- automatic puffer detection for pH

Standard configuration

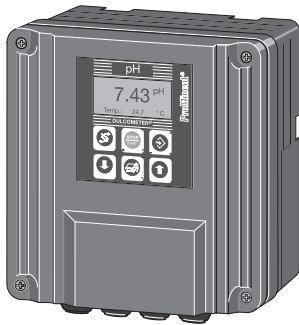
The following functions are included in the D1Cb controller (the measured variables depend on the type of connection of the measured variable)

- all 15 operator languages in the memory
- type of connection mV: changeover between pH and ORP
- type of connection standard signal: all 8 amperometric measured variables such as chlorine, chlorine dioxide ect. and pH, ORP and conductivity via mA in memory
- 2 power relays for limit value monitoring or timer function
- metering time monitoring with deactivation of the controller output
- extended range voltage supply: 90-253 V, 50/60 Hz
- mA sensor input protected against short-circuit and polarisation reversal

Applications

- Waste water treatment
- Cooling water treatment
- Drinking water treatment
- Neutralisation

8.2 DULCOMETER® Single-Channel Basic Measuring And Control Unit, Type D1Cb, For All Measured



P_DM_0016_SW

Technical data

Measurement range

Type of connection mV:
 pH 0.00 ... 14.00
 ORP - 1000 ... +1000 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, sensor PER1: 2.0...200.0/20...2,000 ppm
 Hydrogen peroxide, sensor PEROX: 0...20/200/2,000 ppp, 1 vol. %
 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
 Temperature: 0...100°C

Resolution

pH: 0.01 pH
 ORP: 1 mV
 Amperometry (chlorine etc.): 0.001/0.01 ppm, 0.01 vol. %

Accuracy

0.5 % of measuring range

Measurement input

SN6 (input resistance > 0.5 x 10¹² Ω)

Correction variable

Temperature via Pt 100/Pt1000

Correction range

0 ... 100 °C

Disturbance signals

-

Control characteristic

P/PID control

Control

Two-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
 (limit value or pulse length)
 1 x 0/4 ... 20 mA

Alarm relay

250 V ~3 A, 700 VA changeover contact

Electrical connection

90 - 253 V, 50/60 Hz

Ambient temperature

Wall mounting: -5 ... 50 °C

Enclosure rating

Wall mounting: IP 65

Dimensions

Wall mounting: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation

792908

A complete measurement station comes with:

- Measuring transducer/controller D1Cb (see Identcode)
- Fitting: DGMa..., DLG III ..., immersed fitting
- pH sensor (corresponding to Identcode)
- ORP sensor (corresponding to Identcode)
- Chlorine, chlorine dioxide, chlorite, bromine, dissolved oxygen sensor
- Transducer for pH or ORP (corresponding to Identcode)
- Sensor cable

Available from April 2009

8.2 DULCOMETER® Single-Channel Basic Measuring And Control Unit, Type D1Cb, For All Measured

8.2.2 Identcode Ordering System – Basic Single Channel Controller

DULCOMETER® Controller D1Cb Series

D1Cb	Installation	W	Wall mounting (IP 65)
	Version	00	With ProMinent logo
	Power supply	6	90...253 V, 48/63 Hz (extended voltage range power supply unit)
	Approvals	01	CE-Symbol
	Hardware add-on I	0	None
	Hardware add-on II	0	none
		1	RC protection for power relays
	External connection	0	None
	Software defaults	V	Software pre-set
	Measured variable presetting	0	universal
		A	Peracetic acid
		B	Bromine
		C	Chlorine
		D	Chlorine dioxide
		F	Fluoride
		H	Hydrogen peroxide
		I	Chlorite
		P	pH
		R	ORP
		S	0/4...20 mA Standard signal, general
		T	Temperature
		X	Dissolved oxygen
		Z	Ozone
		L	conductivity
	Measured variable connection	1	Standard signal 0/4-20 mA, all measured variables
		5	mV input for pH/ORP via screen terminal
	Correction variable	0	None
		2	Temperature Pt 100 via terminal (for pH and conductivity)
		4	Manual temperature entry (for pH and conductivity)
	Control input	0	None
		1	Pause
		2	Pause or disturbance flow rate via frequency
	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
		NL	Dutch
		PL	Polish
		RU	Russian
		TH	Thai
		HU	Hungarian
		IT	Italian
		DK	Danish
		FI	Finish
		GR	Greek

8.2 DULCOMETER® Single-Channel Basic Measuring And Control Unit, Type D1Cb, For All Measured

NEW

If for software defaults **U**= no defaults is selected, the measured variables pH or ORP can be specified during commissioning.

The connection of the measured variable is 5 = mV input for pH/ORP via shield clamp. For all other options, the basic settings (first option) are selected.

A subsequent release is possible any time using an enable code. See Chapter 8.2.3.

8.2.3 Identcode Ordering System D1Ub, Subsequent Function Extension For D1Cb

DULCOMETER® D1Cb Software Upgrade

D1Ub	Software defaults
	Software pre-set
	Default - measured variable
	0 Universal
	A PES
	B Bromine
	C Chlorine
	D Chlorine dioxide
	F Fluoride
	H H ₂ O ₂
	I Chlorite
	P pH
	R ORP
	S 0/4-20 mA standard signal, general
	T Temperature
	X O ₂
	Z O ₃
	L Conductivity
	Connection of measured variable
	1 Standard signal 0/4-20 mA, all measured variables
	5 mV input for ph/ORP via shield clamp
	Correction variable
	0 none
	2 Temperature Pt100 via terminal (for pH and conductivity)
	4 Manual temperature entry (for pH and conductivity)
	Control input
	0 none
	1 Pause
	2 Pause or disturbance flow rate via frequency
	Signal output
	0 none
	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 controlling
	2 PID controlling
	Language
	00 no default

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

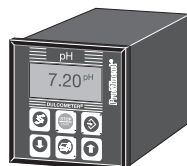
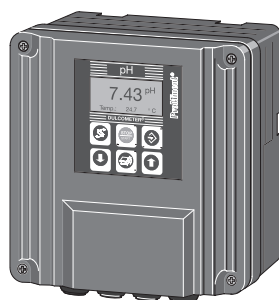
8.3.1 Measured Variables, pH And ORP Single Channel Controller, Type D1Ca

- A range of fully expanded options means optimised adaptation to process requirements
- Large clear graphic display of measurement and correction signals
- Full text user guidance
- Automatic buffer recognition
- Monitors limit values as standard and limits dosing times
- Disturbance free two-wire probe connector
- 2 electrically isolated 0/4-20 mA signal outputs
- A range of wall and control panel mounted versions
- 2 timers on limit valve relays

Applications:

- waste water treatment
- cooling water treatment
- potable water treatment
- neutralisation
- process control in the chemical industry, food industry, paper manufacture, pharmaceutical industry .

Technical data



pk_5_002

Measurement range	pH 0.00...14.00 ORP - 1000...+1000 mV
Resolution	pH 0.01/1 mV
Accuracy	0.5 % from measurement value
Measurement input	SN6 (Input resistance > 10 ¹² Ω) Terminal mV (Input resistance > 5 x 10 ¹¹ Ω) Terminal - standard signal 0/4...20 mA
Correction variable	Temperature via Pt 100 (pH version only)
Correction range	0 ... 100 °C
Disturbance signals	Adder/multiplier
Control characteristic	P/PID control
Control	Bidirectional control
Signal current output	2 x electrically isolated 0/4-20 mA max. load 600 Ω (400 Ω 2nd output) Adjustable range and direction (measurement, correction and control variable)
Control outputs	2 reed contacts (pulse rate, for pump control) 2 relays (pulse length, 3P or limit value, timer) 2 x 0/4...20 mA
Alarm relay	250 V~3 A, 700 VA changeover contact
Electrical connection	24 V ~-/100 V~/115 V~/200 V~/230 V~ ±10 %
Ambient temperature	Control panel version: 0...50 °C (0...45 °C with fully expanded units) Wall mounted: -5...50 °C (-5...40 °C with fully expanded units)
Enclosure rating	Control panel version: IP 54 Wall mounted: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation	792908
--	--------

A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- pH sensor (dependent on Identcode)
- Redox sensor (dependent on Identcode)
- Transducer for pH and/or redox (dependent on Identcode)
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; pH-Combination Probes With SN6 Or Vario Pin see p. → 7-10; ORP Combination Probes With Fixed Cable see p. → 7-22; Measurement Transmitter 4...20 mA (Two Wire) see p. → 8-71; Sensor Accessories see p. → 7-53)

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.2 Identcode Ordering System For pH And ORP Single Channel Controller

DULCOMETER® Controller D1Ca Series

D1Ca	Installation
D	Controll panel version 96 x 96 mm (IP 54)
W	Wall mounted (IP 65)
Power supply	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
2	200 V, 50/60 Hz (control panel version only)
3	100 V, 50/60 Hz (control panel version only)
4	24 V, AC/DC
Measured variable	
P	pH 0-14
R	ORP - 1000...+1000 mV
Measured variable connection	
1	0/4-20 mA standard signal terminal (signal transmitter see chapter 7.5.1)
2	SN6 plug
5	mV terminal
Correction variable (temperature)	
0	None
2	Temperature for P, via terminal (Pt 100)
3	Temperature for P, via 0/4-20 mA standard signal (signal transmitter see chapter 7.5.1)
4	Manual temperature input for P
Disturbance variable	
0	None
1	Flow as 0/4-20 mA standard signal
2	Flow as frequency 0-500Hz
3	Flow as frequency 0-10 Hz
Control input	
0	None
1	Pause
Signal output	
0	None
1	0/4-20 mA measured value
2	0/4-20 mA control variable
3	0/4-20 mA correction variable
4	2 programmable 0/4-20 mA standard signal outputs
Relay control	
G	Alarm, timer relay and 2 limit values relay
M	Alarm and 2 solenoid valve relay (pulse length control)
R	Alarm relay and servo motor with feedback signal (3P)
Pump control	
0	None
2	2 pumps
Control characteristic	
0	None
1	Proportional control
2	PID control
Protocol output	
0	None
Language	
A	Swedish (E, P, U)
B	Portuguese (E, F, S)
C	Chinese (E)
D	German (E, F, N)
E	English (D, F, N)
F	French (D, E, N)
G	Czech (D, E, J)
I	Italian (D, E, S)
U	Hungarian (A, E, P)
T	Thai (E)
S	Spanish (B, E, F)
R	Russian (E, P, G)
P	Polish (A, E, U)
N	Dutch (D, E, F)
K	Korean (E)

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.3

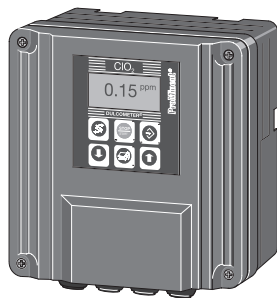
Measured Variables Chlorine, Chlorine Dioxide, Chlorite, Bromine, Ozone, Dissolved Oxygen, Single-Channel Controller, Type D1Ca

- A range of fully expanded options means optimised adaptation to process requirements
- Large clear graphic display of measured and correction variable
- Full text user guidance
- Monitors limit values as standard and limits dosing times
- Disturbance free 2-wire probe connector
- 2 electrically isolated 0/4-20 mA signal outputs
- A range of wall and panel mounted versions
- 2 timers on limit valve relays

Applications:

- drinking water treatment
- cooling water treatment
- potable water treatment
- process control (disinfection) in the chemical industry, food industry, paper manufacture, pharmaceutical industry....

Technical data



pk_5_004

Measurement range	Cl ₂ : 0.00...0.500/2.00/5.00/10.0/20.0/50.0/100.0 ppm ClO ₂ : 0.00...0.500/2.00/10.0/20.0 ppm Br ₂ : 0.02...2.00/0.1...10.0 ppm O ₃ : 0.00...2.00 ppm Dissolved oxygen 0.1...10/0.1...20 ppm Chlorite: 0.02...0.50/0.1...2 ppm
Resolution	0.001/0.01 ppm/l/0.1 %
Accuracy	0.5 % from measurement range
Measurement input	Standard signal terminal 0/4...20 mA
Correction variable	pH (Cl ₂ version only) Temperature via Pt 100 (only for ClO ₂ CDP sensor)
Correction range temp.	10 ... 45 °C (only for ClO ₂)
Correction range pH	7.0 ... 8.5 pH (only for Cl ₂)
Disturbance signals	Additive/multiplicative
Control characteristic	P/PID control
Control	Bidirectional control
Signal current output	2 x electrically isolated 0/4-20 mA max. load 600 Ω (400 Ω 2nd output) Adjustable range and direction (measured, correction and control variable)
Control outputs	2 reed contacts (pulse rate, for pump control) 2 relays (pulse length, 3P or limit value) 2 x 0/4...20 mA
Alarm relay	250 V ~3 A, 700 VA changeover contact
Electrical connection	24 V ~-/100 V~/115 V~/200 V~/230 V~ ±10 %
Ambient temperature	Control panel version 0...50 °C (0...45 °C with fully expanded units) Wall mounted: -5...50 °C (-5...40 °C with fully expanded units)
Enclosure rating	Control panel installation: IP 54 Wall mounting: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation

792908

A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- In line probe housing: DGMa..., DLG III ...,
- Chlorine, chlorine dioxide, chlorite-, bromine-, dissolved oxygen sensor
- Sensor cable

(for further informations: Probe Housings see p. → 7-59; DULCOTEST® Amperometric Sensors see p. → 7-24; Sensor Accessories see p. → 7-53)

MaharFan

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.4 Identcode Ordering System Cl₂, ClO₂, O₃, Br₂, Dissolved Oxygen Single Channel Controller

DULCOMETER® Controller D1Ca Series

D1Ca	Installation
D	Control panel version 96 x 96 mm (IP 54)
W	Wall mounted (IP 65)
Power supply	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
2	200 V, 50/60 Hz (control panel version only)
3	100 V, 50/60 Hz (control panel version only)
4	24 V, AC/DC
Measured variable	
B	Bromine (0-10 ppm)
C	Chlorine (0-0.5/2/5/10/20/50/100 ppm)
D	Chlorine dioxide (0-0.5/2/10/20 ppm)
I	Chlorite (0-0.5/2 ppm)
X	Dissolved oxygen (0.1-10/20 ppm)
Z	Ozone (0-2 ppm)
Measured variable connection	
1	0/4-20 mA standard signal terminal
Correction variable (temperature)	
0	None
1	pH for chlorine via standard signal (0/4-20 mA)
2	Temperature via terminal (Pt 100) only for ClO ₂ with CDP 1 sensor
3	Temperature via standard signal 0/4-20 mA only for ClO ₂ with CDP 1 sensor
4	Manual temperature entry with CDP 1 sensor
Disturbance variable	
0	None
1	Flow as 0/4-20 mA standard signal
2	Flow as frequency 0-500 Hz
3	Flow as frequency 0-10 Hz
Control input	
0	None
1	Pause
Signal output	
0	None
1	0/4-20 mA measured value
2	0/4-20 mA control variable
3	0/4-20 mA correction variable
4	2 programmable standard 0/4-20 mA signal outputs
Relay control	
G	Alarm, timer and 2 limit values relay
M	Alarm and 2 solenoid valve relay (pulse length control)
R	Alarm relay and servo motor with feedback signal (3P)
Pump control	
0	None
2	2 pumps
Control characteristic	
0	None
1	Proportional control
2	PID control
Protocol output	
0	None
Language	
A	Swedish (E, P, U)
B	Portuguese (E, F, S)
C	Chinese (E)
D	German (E, F, N)
E	English (D, F, N)
F	French (D, E, N)
G	Czech (D, E, J)
I	Italian (D, E, S)
U	Hungarian (A, E, P)
T	Thai (E)
S	Spanish (B, E, F)
R	Russian* (E, P, G)
P	Polish (A, E, U)
N	Dutch (D, E, F)
K	Korean (E)

* not for measured values: D, Z, X und I

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

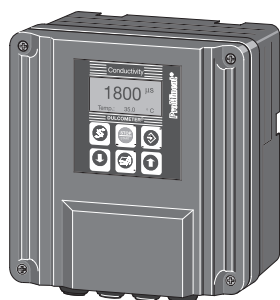
8.3.5 Measured Variable, Conductivity Single Channel Controller, Type D1Ca

- A range of fully expanded elements means optimised adaptation to process requirements
- Large clear graphic display of measured and correction variable
- Full text user guidance
- 2 parameter sets for inductive conductivity
- Connectors for 2 and 4 electrode measuring cells or inductive measuring cells
- Monitors limit values as standard and limits dosing times
- Disturbance free 2-wire probe connector
- 2 electrically isolated 0/4-20 mA signal outputs
- A range of wall and control panel mounted versions

Applications:

- cooling water treatment
- reverse osmosis
- ion exchange
- process control in the chemical industry, food industry, paper manufacture, pharmaceutical industry...

Technical data



pk_5_006

Measurement range	0...20/200/2000 µS/cm, 0...20/200 mS/cm measured variable L3 0...20/50/200/500/2000/5000 µS/cm, 0...20/200/1000 mS/cm measured variable L1 0...200/0...2000 µS/cm, 0...20/200/2000 mS/cm measured variable L6
Cell constant	0.006...12.0 (dependant on measurement range)
Resolution	0.0625 % of input range
Accuracy	0.5 % from measurement range
Measurement frequency	56 Hz ... 2.7 kHz
Measurement input	L1: Terminal standard signal 0/4...20 mA (inductive or conductive sensor with transmitter) L3: Terminal (conductive 2-electrode and 4-electrode sensors) L6: Terminal, inductive with ICT 1 or ICT 2 sensors
Correction variable	Temperature via Pt 100
Correction range	0 ... 100 °C
Control characteristic	P/PID control
Control	bidirectional control
Signal current output	2 x electrically isolated 0/4-20 mA max. load 600 Ω (400 Ω 2nd output) Adjustable measured, correction and control variable
Control outputs	2 reed contacts (pulse rate, for pump control) 2 relays (pulse length, 3P or limit values with open/close time delay) 2 x 0/4...20 mA
Alarm relay	250 V ~3 A, 700 VA changeover contact
Electrical connection	24 V ~=/100 V~/115 V~/200 V~/230 V~ ±10 %
Ambient temperature	Control panel version: 0...50 °C (0...45 °C with fully expanded unit) Wall mounted: -5...50 °C (-5...40 °C with fully expanded unit)
Enclosure rating	Control panel installation: IP 54 Wall mounting: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation

792908

A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Conductivity sensor
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; DULCOTEST® Conductivity Sensors see p. → 7-41; Sensor Accessories see p. → 7-53)

MaharFan

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.6 Identcode Ordering System For Conductivity Single Channel Controller

DULCOMETER® Controller D1Ca Series

D1Ca	Installation	
D	Control panel version 96 x 96 mm (IP 54)	
W	Wall mounted (IP 54)	
	Power supply	
0	230 V, 50/60 Hz	
1	115 V, 50/60 Hz	
2	200 V, 50/60 Hz (control panel version only)	
3	100 V, 50/60 Hz (control panel version only)	
4	24 V, AC/DC	
	Measured variable	
L	Conductivity	
	Measured variable connection	
1	Terminal, standard signal 0/4-20 mA e.g. conductivity transmitter	
3	Conductive conductivity sensor terminal	
6	Terminal inductive conductivity sensors	
	Correction variable (temperature)	
0	None	
2	Temperature via terminal (Pt 100 of LF measuring sensor LFT, LMP, ICT)	
3	Temperature via 0/4-20 mA standard signal	
4	Manual temperature input	
	Disturbance variable	
0	None	
1	Flow as 0/20 mA standard signal	
2	Flow as frequency 0-500 Hz	
3	Flow as frequency 0-10 Hz	
4	Flow as 0/4-20 mA, standard signal, parameter set switching (Limits)*	
5	Parameter set switching (Limits)*	
	Control input	
0	None	
1	Pause	
	Signal output	
0	None	
1	0/4-20 mA measured value	
2	0/4-20 mA control variable	
3	0/4-20 mA correction variable	
4	2 programmable standard 0/4-20 mA signal outputs	
	Relay control	
G	Alarm, timer and 2 limit values relay	
M	Alarm and 2 solenoid valve relay (pulse length control)	
R	Alarm relay and servo motor with feedback signal (3P)	
	Pump control	
0	None	
2	2 pumps	
	Control characteristic	
0	None	
1	Proportional control	
2	PID control	
	Protocol output	
0	None	
	Language	
A	Swedish (E, P, U)	
B	Portuguese (E, F, S)	
C	Chinese (E)	
D	German (E, F, N)	
E	English (D, F, N)	
F	French (D, E, N)	
G	Czech (D, E, J)	
I	Italian (D, E, S)	
U	Hungarian (A, E, P)	
T	Thai (E)	
S	Spanish (B, E, F)	
P	Polish (A, E, U)	
N	Dutch (D, E, F)	
K	Korean (E)	

* only for measured variable L6

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

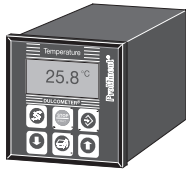
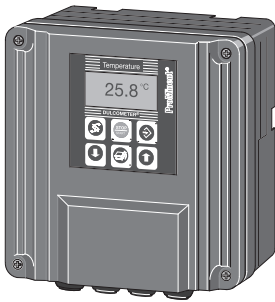
8.3.7 Measured Variable, Temperature, Standard Signal Single Channel Controller, Type D1Ca

- A range of fully expanded elements means optimised adaptation to process requirements
- Large clear graphic display of measured variable
- Pressure, flow, liquid level, turbidity, humidity units (mA-devices)
- full text user guidance
- Monitors limit values as standard and limits dosing times
- Probes connected via disturbance resistant two-wire connector
- 2 electrically isolated 0/4-20 mA signal outputs
- A range of wall and control panel mounted versions
- 2 timers on limit value relays

Applications:

- process control in the chemical industry
- food industry
- paper manufacture
- pharmaceutical industry...

Technical data



pk_5_008

Measurement range	Temp. 0 ... 100 °C/32-212 °F Standard 0/4 ... 20 mA signal
Resolution	0.1 °C/0,1 °F/0.01 mA
Accuracy	0.5 % from measurement range
Measurement input	Pt 100 temperature terminal 0/4- 20 mA standard signal terminal
Disturbance signals	Additive/multiplicative
Control characteristic	P/PID control
Control	Bidirectional control
Signal current output	2 x electrically isolated 0/4-20 mA max. load 600 Ω (400 Ω 2nd output) Adjustable measured, correction and control variables
Control outputs	2 reed contacts (pulse rate, for pump control) 2 relays (pulse length, 3P or limit value with open/close delay) 2 x 0/4...20 mA
Alarm relay	250 V ~3 A, 700 VA changeover contact
Electrical connection	24 V ~=/100 V~/115 V~/200 V~/230 V~
Ambient temperature	Control panel version: 0...50 °C (0...45 °C if fully expanded unit) Wall mounted: -5...50 °C (-5...40 °C if fully expanded unit)
Enclosure rating	Control panel version: IP 54 Wall mounted: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

	Order no.
Mounting kit for control panel installation	792908

A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Pt 100 temperature sensor or on-site standard signal
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; Temperature Sensors see p. → 7-23; Sensor Accessories see p. → 7-53)

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.8 Identcode Ordering System For Temperature, Standard Signal Single Channel Controller

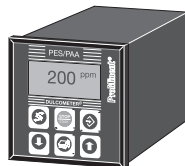
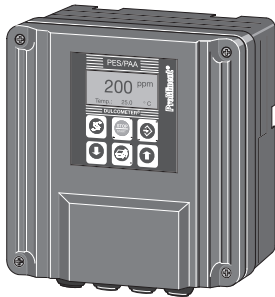
DULCOMETER® Controller D1Ca Series

D1Ca	Installation	
D	Control panel version 96 x 96 mm (IP 54)	
W	Wall mounted (IP 54)	
	Power supply	
0	230 V, 50/60Hz	
1	115 V, 50/60 Hz	
2	200 V, 50/60 Hz (control panel version only)	
3	100 V, 50/60 Hz (control panel version only)	
4	24 V, AC/DC	
	Measured variable	
S	Standard signal (0/4-20 mA)	
T	Temperature (0-100 °C)	
	Measured variable connection	
1	0/4-20 mA standard signal terminal	
4	Pt100 terminal for temperature	
	Correction variable (temperature)	
0	None	
	Disturbance variable	
0	None	
1	Flow as 0/4-20 mA standard signal	
2	Flow as frequency 0-500 Hz	
3	Flow as frequency 0-10 Hz	
	Control input	
0	None	
1	Pause	
	Signal output	
0	None	
1	0/4-20 mA measured value	
2	0/4-20 mA control variable	
3	0/4-20 mA correction variable	
4	2 programmable 0/4-20 mA standard signal outputs	
	Relay control	
G	Alarm, timer and 2 limit values relay	
M	Alarm and 2 solenoid valve relay (pulse length control)	
R	Alarm relay and servo motor with feedback signal (3P)	
	Pump control	
0	None	
2	2 pumps	
	Control characteristic	
0	None	
1	Proportional control	
2	PID control	
	Protocol output	
0	None	
	Language	
A	Swedish (E, P, U)	
B	Portuguese (E, F, S)	
C	Chinese (E)	
D	German (E, F, N)	
E	English (D, F, N)	
F	French (D, E, N)	
G	Czech (D, E, J)	
I	Italian (D, E, S)	
U	Hungarian (A, E, P)	
T	Thai (E)	
S	Spanish (B, E, F)	
P	Polish (A, E, U)	
N	Dutch (D, E, F)	
K	Korean (E)	

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.9

Measured Variable H₂O₂ And Peracetic Acid Single-Channel Controller, Type D1Ca



pk_5_010

- Optimised adaptation to process requirements through different expansion levels
- Large, easy-to-read graphic display for measured variables
- Plain text user guidance
- Limit value monitoring as standard and dosing time limit
- Interference immunity through 2-wire probe connection
- 2 electrically-isolated 0/4...20 mA signal outputs
- Various versions for wall and control panel mounting
- 2 timers for limit value relay

H₂O₂ applications:

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

Peracetic acid applications:

- Disinfectant in the food and beverages sector
- Disinfectant in the cosmetics, pharmaceutical and medicine sectors
- CIP processes

The measurement can even be used where surfactants (tensides) are present.

The H₂O₂ sensors are selected using the decision table in Chap. Sensor for hydrogen peroxide

Technical data

Hydrogen peroxide H₂O₂:

Sensor type	PER 1	PEROX
Ranges	2.0...200.0 mg/l 20...2.000 mg/l different sensors	1...20/10...200/100...2000 mg/l selectable

Peracetic acid applications:

Sensor type	PAA 1
Range	0...20/200/2000 mg/l 0...1 Vol. % different sensors

Additional technical data on the sensors: Sensor for hydrogen peroxide see p. → 7-39; Sensor For Peracetic Acid see p. → 7-38

Resolution	0.01 ppm
Accuracy	0.5 % of range
Measurement input	0/4 ... 20 mA standard signal terminal
Disturbance signals	Additive/multiplicative
Control characteristic	P/PID control
Control	Bidirectional control
Signal current output	2 x 0/4-20 mA electrically isolated max. load 600 Ω (400 Ω 2nd output) adjustable measured variable range
Control outputs	2 reed contacts (pulse frequency for pump control) 2 relays (pulse length, 3P or limit value) 2 x 0/4 ... 20 mA
Alarm relay	250 V ~3 A, 700 VA changeover contact
Electrical connection	24 V ~/100 V~/115 V~/200 V~/230 V~

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8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

Ambient temperature	Control panel version: 0 ... 50 °C (0 ... 45 °C with fully expanded unit) Wall mounted: -5 ... 50 °C (-5 ... 40 °C with fully expanded unit)
Enclosure rating	Control panel version: IP 54 Wall mounted: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

	Order no.
Mounting kit for control panel installation	792908

A complete channel consists of:

- Transmitter /controller D1Ca (see Identcode)
- Housing: DGMa..., DLG III...
- H₂O₂ sensor or
- Peracetic acid sensor
- Transducer for H₂O₂ PEROX sensor
- Sensor cable

(for further information: Immersion Probe Housings see p. → 7-62; Sensor for hydrogen peroxide see p. → 7-39; Sensor For Peracetic Acid see p. → 7-38; Measurement Transmitter 4...20 mA (Two Wire) see p. → 8-71; Sensor Accessories see p. → 7-53)

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.10

Identcode Ordering System For H₂O₂ And Peracetic Acid Single Channel Controller

DULCOMETER® controller D1Ca range

D1Ca	Installation
D	Control panel version 96 x 96 mm (IP 54)
W	Wall mounted (IP 54)
Power supply	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
2	200 V, 50/60 Hz (control panel version only)
3	100 V, 50/60 Hz (control panel version only)
4	24 V, AC/DC
Measured variable	
A	Peracetic acid
H	Hydrogen peroxide
Measured variable connection	
1	0/4-20 mA standard signal terminal for sensors with PEROX micro-transducer
7	0/4-20 mA standard signal terminal for PAA 1 and PER 1 sensors
Correction variable (temperature)	
0	None
2	Temperature Pt100 via terminal*
3	Temperature via 0/4-20 mA standard signal (DULCOTEST® transducer)*
4	Manual temperature input*
-	* only with measured variable connection option 1
Disturbance variable	
0	None
1	Flow as 0/4-20 mA standard signal
2	Flow as frequency 0-500 Hz
3	Flow as frequency 0-10 Hz
Control input	
0	None
1	Pause
Signal output	
0	None
1	0/4-20 mA standard signal measured value
2	0/4-20 mA standard signal control variable
3	0/4-20 mA standard signal correction variable
4	2 0/4-20 mA standard signal outputs, freely programmable, only in conjunction with measured variable connection "7"
Relay control	
G	Alarm, timer and 2 limit values relay
M	Alarm and 2 solenoid valve relay (pulse length control)
R	Alarm relay and servo motor with feedback signal (3P)
Pump control	
0	None
2	2 pumps
Control characteristic	
0	None
1	Proportional control
2	PID control
Protocol output	
0	None
Language	
D	German (E, F, N)
E	English (D, F, N)
F	French (D, E, N)
I	Italian (D, F, S)
N	Dutch (D, E, F)

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

8.3.11 Sensors For Hydrogen Peroxide

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

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

The sensors are selected using the following decision table:

Requirement	Type PER1	PEROX
Sensor matrix contaminated by dirt or chemicals	Suitable due to impermeable diaphragm	More susceptible due to permeable diaphragm
Electrical interference due to interference potentials in the sample medium	Immune as counter electrode is separated from process	More susceptible as counter electrode is in the medium
Temperature range	Up to 50 °C	Up to 40 °C
Ease of handling during installation and maintenance	Suitable because temperature compensation and measuring transducer are integrated in the sensor	Separate temperature sensor and measuring transducer
Response time for H ₂ O ₂ for fast controlling	Inert T ₉₀ = 6-8 min	Fast: T ₉₀ = 20 s
Fast temperature changes	Inert because of integrated temperature sensor	Fast because of separate temperature sensor
Long process cycles without presence of H ₂ O ₂	unsuitable	Suitable because of pulsed polarisation technology
Measuring range can vary from time to time because of size arrangements or is not clear at time of ordering	Selection of a suitable sensor necessary	Suitable because measuring range can be selected manually at the sensor transducer
Price of the measuring station	lower	higher

Operating conditions

Requirement	Type PER1	PEROX
Measured variable	Hydrogen peroxide	Hydrogen peroxide
Calibration	Photometrically with DT3 hand-held photometer DT3, see Chap. 5.4.4	Photometrically with DT3 hand-held photometer DT3, see Chap. 5.4.4
Measuring ranges	0 ... 20/200/2,000 mg/l 0 ... 1 Vol. % different sensors	1 ... 20/10 ... 200/100 ... 2,000 mg/l switchable
pH range	2,5...11	2,5...10
Temperature	0 ... 50 °C	0 ... 40 °C (at > 1,000 ppm 0 ... 30 °C)
Permissible temperature changes	< 0.3 K/min	< 1 K/min (for external temperature measurement) see operating instructions
Response time sensor	T ₉₀ approx. 480 sec	T ₉₀ approx. 20 sec
Reproducible measuring accuracy	1 ppm or better than ± 5 % of measuring value	better 2 % referred to final value of measuring range
Min. conductivity	0.05 ... 5.00 mS/cm	for measuring range 20 mg/l: 5 µS/cm measuring range 200 mg/l: 200 µS/cm up to 1,000 mg/l: 500 µS/cm up to 2,000 mg/l: 1 mS/cm
Sample water flow rate	20 ... 100 l/h in DGMA	recommended 60 l/h
Max. operating pressure	0 ... 1 bar	2 bar
Supply voltage	16 ... 24 V DC (two-wire technology)	16 ... 24 V DC (three-wire technology)
Output signal	4 ... 20 mA, temperature-compensated, uncalibrated, not electrically isolated	4 ... 20 mA, temperature-compensated, uncalibrated, not electrically isolated
Typical application	Swimming pool, treatment of contaminated waste waters, treatment of process media from production	Treatment of clear and chemically uncontaminated waters, controlling with required short response times
Measuring and control unit	D1Ca...H 7	D1Ca...H 1
Fittings	DGM, DLG	DGM, DLG

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

Accessories

	Order no.
Perox sensor PEROX-H2.10-P	792976
Perox transducer PEROX-micro-H1.20-mA	741129
PER 1-mA-200 ppm	1022509
PER 1-mA-2000 ppm	1022510

Example Configurations

Example of a H₂O₂ measuring point PEROX as components

Item	Name	Order no.
1	H ₂ O ₂ -controller D1Ca##H1...(complete Identcode see Chap. 8.3.7)	
2.1	Perox sensor PEROX-H2.10-P(see Chap. 7.3.8)	792976
2.2	Temperature sensor, Pt 100 Temperature sensor	305063
3	Perox transducer PEROX-micro-H1.20-mA three switchable measuring ranges 20/200/2,000 mg/l (see Chap. 7.3.8)	741129
4	Polishing paste (90 g tube)	559810
5	Magnetic stirring rod 15x6 PTFE (magnetic "fish")	790917
7	Magnetic stirrer 100 ... 240 V	790915
6	Test lead, 3-core (3 x 0.25 mm ² , 5 mm diam.), state length	791948
7	SN6 - open ended (Cable PT 100 with D1C, 5 m)	1003208
8	DLG III A with PVC hose connectors (Type DGMa3#1T010, see Chap. 7.5.3)	914955
8.1	Alternatively for water containing impurities: DLG IV PVC with for slots for sensors, connection: DN 10 (see Chap. 7.5.3)	1005332
9	Photometer DT3, compl. in case (see Chap. 8.9.3)	1023143

Example of a H₂O₂ measuring point PER1 as components

Item	Name	Order no.
1	H ₂ O ₂ -controller D1Ca##H7... (complete Identcode see Chap. 8.3.7)	
2	PER 1-mA-200 ppm(see Chap. 7.3.8)	1022509
2.1	Alternatively: PER 1-mA-2000 ppm(see Chap. 7.3.8)	1022510
3	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
4	DLG III A with PVC hose connectors (Type DGMa3#1T010, see Chap. 7.5.3)	914955
4.1	Alternatively for water containing impurities: DLG III B with PVC adhesive connectors, for installation of two sensors PG 13.5 and one amperometric sensor, connection DN 10 (see Chap. 7.5.3)	914956
4.1.1	Assembly kit for fitting amperometric sensors in DLG III B (see Chap. 7.5.3)	815079
5	Photometer DT3, compl. in case (see Chap. 8.9.3)	1023143

8.3 DULCOMETER® Single-Channel Measuring And Control Unit, Type D1Ca

Example of a peracetic acid measuring point PAA 1 as components

Item	Name	Order no.
1	PAA controller D1Ca## A7 ...(complete Identcode see Chap. 8.3.7)	
2.1	PAA 1-mA-200 ppm (see Chap. 7.3.7)	1022506
2.1	Alternatively: PAA 1-mA-2000 ppm (see Chap. 7.3.7)	1022507
3	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
4	DLG III A with PVC hose connectors(Type DGMa3#1T010, see Chap. 7.5.3)	914955
4.1	Alternatively for water containing impurities: DLG III B with PVC adhesive connectors, for installation of two sensors PG 13.5 and one amperometric sensor, connection DN 10 (see Chap. 7.5.3)	914956
4.1.1	Assembly kit for fitting amperometric sensorsin DLG III B (see Chap. 7.5.3)	815079

8.4 DULCOMETER® Two-Channel Measuring And Control Unit, Type D2Ca

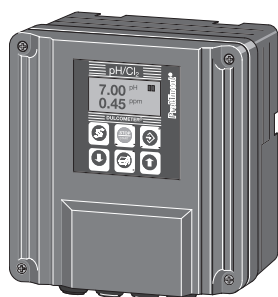
8.4.1 Combined Controller for pH/Chlorine, pH/ORP, Chlorine/Chlorine, pH/Chlorine Dioxide and pH/pH, Two-Channel Controller, Type D2Ca

- different configurations means optimised adaptation to process requirements
- large, clear graphic display for the measured values
- full text user guidance
- limit value monitoring with controller output deactivation as standard
- disturbance-free two-wire sensor connector
- 2 signal outputs 0/4 ... 20mA, electrically isolated
- different designs for wall and control panel mounting
- 2 digital inputs for pause and error sample water
- differential pH measurement (sensor monitoring)
- differential chlorine measurement
- control output to minimise combined chlorine

Applications:

- Waste water treatment
- Cooling water treatment
- Drinking water treatment
- Neutralisation
- Swimming pool water treatment
- All applications which have to be equipped with a redundant pH measurement for safety reasons.

Technical data



pk_5_015

Measurement range	pH 0.00 ... 14.00 Redox 0 ... +1000 mV Chlorine 0 ... 0.5/2/10/20/50/100 ppm Chlorine dioxide 0.00 ... 0.500/2.00/10.0/20.0 ppm
Resolution	0.01 pH/1 mV/0.001 ppm/0.01 ppm
Accuracy	0.5 % from measurement range
Measurement input	SN6 (input resistance > 10 ¹² Ω) measured variable 1: mV terminal (input resistance > 5 x 10 ¹¹ Ω) or Standard 4 ... 20 mA signal terminal measured variable 2: Standard 4 ... 20 mA signal terminal
Correction variable	Temperature via Pt 100 (pH only)
Correction range temp.	0 ... 100 °C
Control characteristic	P/PID control
Control	unidirectional (pH/redox and pH/chlorine)
Signal current output	2 x electrically isolated 0/4-20 mA max. load 600 Ω (400 Ω 2nd output) Adjustable range and direction (measured, correction and control variable)
Control outputs	2 reed contacts (pulse frequency, pump actuation) 2 relays (pump impulse, 3P or limit value) 2 x 0/4 ... 20 mA
Control input	Voltage free (electrically isolated) – pause error, water sample (or superchlorination or basic load chlorine)
Alarm relay	250 V ~/3 A, 700 VA changeover contact
Electrical connection	24 V ~~/115 V~/230 V~
Ambient temperature	Control panel version: 0 ... 45 °C Wall mounted: -5 ... 40 °C
Enclosure rating	Control panel version: IP 54 Wall mounted: IP 65
Dimensions	Control panel version: 96 x 96 x 140 mm (WxHxD) Wall mounted: 189 x 200 x 76 mm (WxHxD)

Note:

The versions pH/pH and chlorine/chlorine include only a two-way controller. Measured variable 2 can only be used for monitoring tasks or to calculate the difference.

8.4 DULCOMETER® Two-Channel Measuring And Control Unit, Type D2Ca

A complete measuring station comprises the following:

- D2Ca measuring transducer /controller (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Chlorine sensor
- Chlorine dioxide
- Assembly set for chlorine/chlorine dioxide sensor
- pH sensor
- Redox sensor
- Transducer for pH and/or redox (dependent on Identcode)
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; Chlorine Measuring Cells see p. → 7-24; Chlorine Dioxide Measuring Cells see p. → 7-32; pH-Combination Probes With SN6 Or Vario Pin see p. → 7-10; ORP Combination Probes With Fixed Cable see p. → 7-22; Measurement Transmitter 4...20 mA (Two Wire) see p. → 8-71; Sensor Accessories see p. → 7-53)

8.4 DULCOMETER® Two-Channel Measuring And Control Unit, Type D2Ca

8.4.2 Identcode Ordering System Two Channel Controller

DULCOMETER® Controller D2Ca range

D2Ca	Installation
D	Control panel version 96 x 96 mm (IP 54)
W	Wall mounted (IP 65)
Power supply	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
4	24 V, AC/DC
Measured variable	
PC	pH/chlorine (0-14 pH; 0-0.5/2/5/10/20/50/100 ppm)
PR	ph/Redox (0-14 pH; 0-1000 mV)
PP	pH/pH (0-14 pH) ¹
CC	Chlorine/Chlorine (0-0.5/2/5/10/20/50/100 ppm)
PD	pH/Chlorine dioxide (0-0.5/2/10/20 ppm)
Measured variable connection	
1	Standard 0/4-20 mA terminal (measuring transducer, see section 7.5.1 or 7.2.1)
2	SN6 plug
5	mV terminal
Correction variable (temperature compensation for pH)	
0	None
2	Temperature for P via terminal (Pt 100) for pH only
4	Manual temperature input for P for pH only
Disturbance variable	
0	None
Signal output	
0	None
4	2 programmable 0/4-20 mA standard signal outputs
Relay control	
G	Alarm and 2 limit values relay
M	Alarm and 2 solenoid valve relay (pulse length control)
Control characteristic	
1	Proportional control
2	PID control
Protocol output	
0	None
Language	
D	German
E	English
F	French
I	Italian (only PC and PR)
S	Spanish
A	Swedish
N	Dutch
P	Polish (only PC and PR)

Note:

¹ The versions pH/pH and chlorine/chlorine include only a two-way controller. Measured variable 2 can only be used for monitoring tasks.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment



pk_5_045

NEW

The multi-channel measuring and control system DULCOMARIN® II is characterised by the following features:

- 5.7", 1/4 VGA colour display for easy operation
- integrated data logger with screen recorder: directly view the measuring data at the controller
- SD card and card reader for PC included: simply transfer measuring data to the PC as standard
- Control of up to 16 drinking water systems or filtration circuits in swimming pools
- CAN bus system: simple wiring and subsequent upgradability
- Visualisation*: easy with embedded Web server* and standard Web browser
- LAN interface*: easy connection to PC or PC network or Internet
- Intelligent sensors: with CANopen bus, save the sensor data and are always within the optimal measuring range thanks to auto ranging
- Intelligent metering pumps: with CANopen bus, inform about the operating parameters such as e.g.: chemicals levels and output in the metering range of 0.74 l/h to 1,030 l/h
- Standby metering pump for disinfectant (automatic switching in case of low level and pump failure)

Area of application drinking water (and general applications)

- Using a power input module (I module), the following measuring parameters can be measured via 0/4...20 mA and displayed. These values are also available on the data logger/screen recorder, the Web and OPC server:
 - Flow rate (as disturbance for pH and chlorine control)
 - UV intensity
 - Conductivity
 - Chlorine dioxide
 - Chlorite
 - Ammonia
 - Fluoride (via D1Ca)
 - Pt100 resistance thermometer via transducer
- Display and controlling of free chlorine and total available chlorine
- OPC server*: easy connection to superordinated visualisation systems

*optional

Area of application swimming pool

- Combined chlorine: is safely minimised via controller output and corresponding systems
- OPC server*: easy connection to superordinated visualisation systems
- Controlling of pool temperature via standard temperature controller
- High chlorination or off-peak reduction by contact via second parameter set
- The decentral modular DULCOMARIN® II system is designed for use in public swimming pools in accordance with DIN 19643. Depending on requirements, the system can be supplied as compact system DULCOMARIN® II compact or as decentral modular system DULCOMARIN® II DULCO®-Net.

The areas of application are determined in the Identcode

Each drinking water measurement system or each filtration circuit includes its own calibration option at site for all measured variables.

The examples shown below are suitable for applications in drinking water treatment and swimming pool systems.

What does the operating mode Eco!Mode mean?

For each controlled measured variable, there exists a menu in DULCOMARIN® II where the control parameters (setpoint, proportional action coefficient etc.) are specified. The Eco!Mode facilitates the activation of alternative control parameters for each controlled measured variable via a digital input at the M module. The alternative control parameters can e.g. be used in reduced operation to optimally adapt the control parameter to this operating mode or to activate increased setpoints for chlorine in case of high chlorination. The Eco!Mode remains active as long as the digital input is activated.

What is a Web server?

A Web server is a software application which is executed in the DULCOMARIN® II.

The Web server provides Web pages with information about the measurement, controlling, sensor calibration and controller configuration to a PC with Web browser (e.g. Microsoft® Internet explorer).

The Web server facilitates a simple visualisation of the DULCOMARIN® II without having to install a special visualisation software on the PC. The Web server is independent of the PC operating system.

The DULCOMARIN® II is connected to a PC via a LAN/Ethernet interface. The connection can be made

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8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

directly, via a network or via the Internet. The required cables for a direct PC or network connection are included in the option.

Commercially available standard network components can be used for cabling, router, WLAN Access Points etc.

Through the Web server, the same information are accessible as provided by the DULCOMARIN® II itself, as e.g. changing of setpoints of all control variables, deactivating various controllers and entering of pool/system names. An exception are the controller settings and the bus configuration which can only be made directly at the controller itself.

What does OPC mean?

OPC means Openness, Productivity, Collaboration (formerly OLE for Process Control) and characterises a uniform and manufacturer-independent software interface. OPC Data Access (OPC DA) is based on the Windows technology COM (Component Object Model) and DCOM (Distributed Component Object Model). OPC XML is based on the Internet standards XML, SOAP, and HTTP.

OPC is used in areas where sensors, controllers, and controls of various manufacturers form a common, flexible network. Without OPC, two devices required exact knowledge of the communication options of the other device to be able to exchange data. Extensions and replacement are thus correspondingly difficult. With OPC, an OPC-compliant driver for each device has to be written only once. Ideally, this driver is already provided by the manufacturer. An OPC driver can be integrated easily in any major control and monitoring system.

ProMinent provides such an OPC server/driver for the multi-channel measuring and control system DULCOMARIN® II.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.1

Multi-Channel Measuring And Control System DULCOMARIN® II compact

The multi-channel measuring and control system DULCOMARIN® II is suitable to control 1 to 16 filtration circuits or drinking water systems. The following bus modules are available for the control:

M module (measurement and controlling):

- Measurement and control of the pH value
- Measurement and display (optional control) of the ORP
- Measurement and display of the temperature of the sample water
- Sample water monitoring
- Measurement of free chlorine
- Measurement of combined chlorine (optional, calculated from total chlorine and free chlorine)

Chlorine sensors:

- Measurement of free chlorine and temperature
- Measurement of total available chlorine and temperature
- Measurement of combined chlorine as differential chlorine measurement

A module (controlling of metering pumps, analogue outputs):

- 3 frequency outputs to control metering pumps for pH correction, disinfection and flocculant metering
- 3 contact inputs to process pump alarm relays or tank fill level monitoring
- 4 freely programmable analogue outputs 0/4 ... 20 mA for pH, ORP, free chlorine, combined chlorine or temperature

P module (controlling of peristaltic pumps, power supply of bus modules):

- Power relay pulse length control for pH value (e.g. controlling of peristaltic pump)
- Power relay pulse length control of disinfectant (e.g. controlling of chlorine electrolysis plant)
- Power relay limit value output to minimise combined chlorine
- Alarm relay
- Power supply of bus modules

N module (power supply of bus modules):

- Power supply of bus modules with no further function

R module (controlling of chlorine gas metering units):

- Controlling of a chlorine gas metering unit and processing of a position feedback potentiometer (0 ... 10 kΩ) (only possible as external module)

Metering pumps with CANopen interface of the type Beta®, delta®, Sigma/ 1, Sigma/ 2, and Sigma/ 3

- Direct connection to the bus
- When using Beta/4aCANopen metering pumps, the A module is not required (provided no current outputs are required).

I module (current input module)

- 2 current inputs active/passive (e.g. to connect 2-wire measuring transducers)
- 1 current inputs passive (e.g. to connect a magnetically-inductive flow meter)
- 2 digital inputs for sample water alarm and pause control

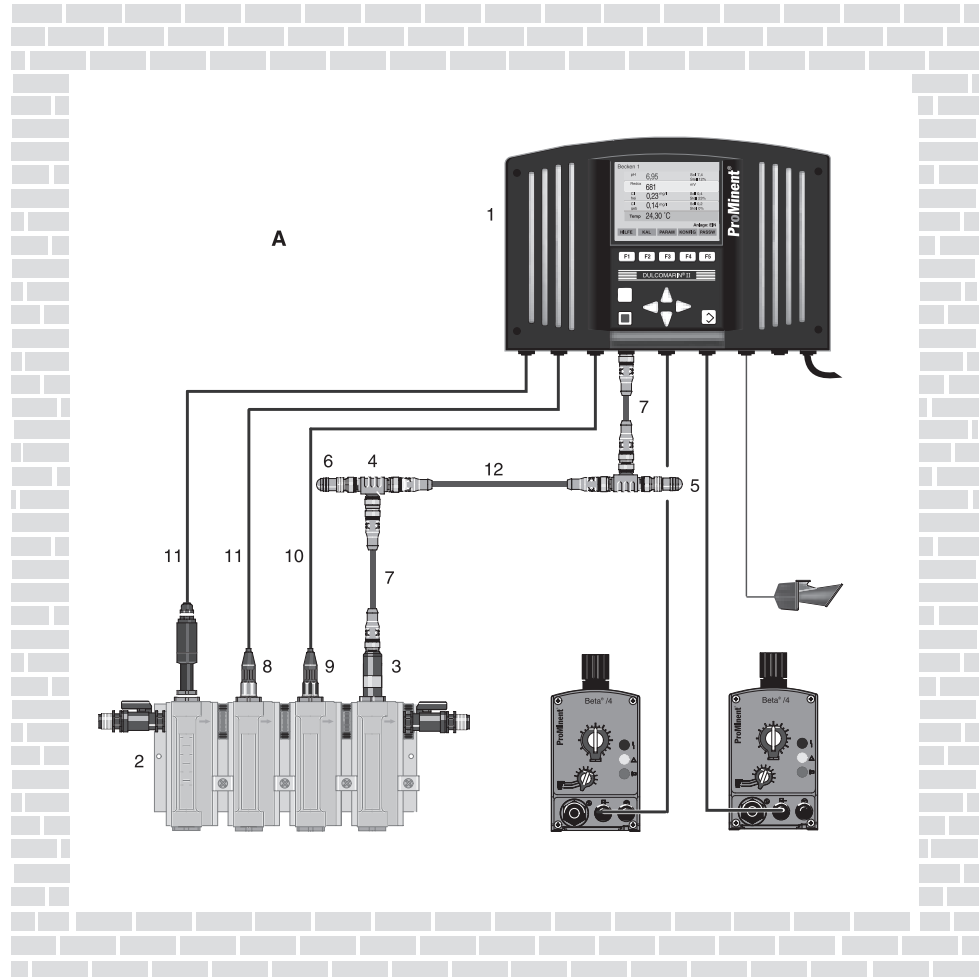
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8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

Example 1

The example of a measuring and control system for pH, ORP, free chlorine and temperature shown for a filter circuit consists of the following components (without chemical fluid handling):

A Systems room



pk_5_020

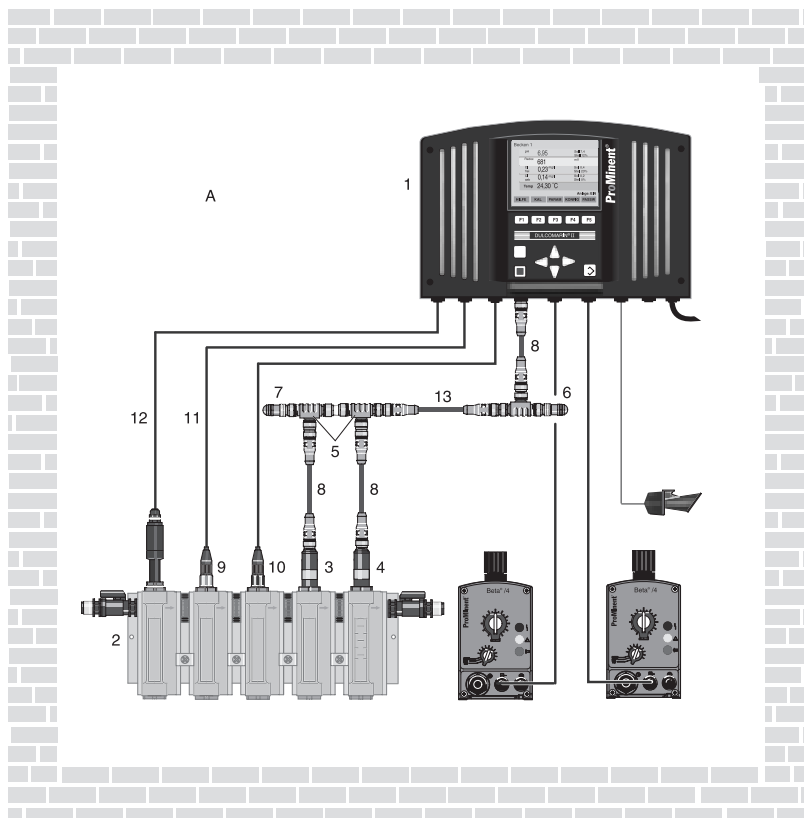
Item	Number	Name	Order no.
1	1	DULCOMARIN® II central unit with measurement and actuation modules DXCa W 0 0 1 M A P S EN 01	
2	1	DULCOTEST® in-line probe housing DGMa 3 2 1 T 0 0 0	
3	1	Chlorine measuring cell CLE 3-CAN-10 ppm	1023425
4	3	T-distributor M12 5 pol. CAN	included in delivery
5	1	Termination resistance M12 connector	included in delivery
6	1	Termination resistance M12 plug	included in delivery
7	3	Connection cable - CAN M12 5 way 0.5 m	included in delivery
8	1	pH-electrode PHES 112 SE	150702
9	1	ORP electrode RHES-Pt-SE	150703
10	2	Cable combination coax 2 m- SN6 - pre-assembled	1024106
11	2 m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
12		Connection cable CAN	as required

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

Example 2

The example of a measuring and control system for pH, ORP, free and combined chlorine and temperature shown for a filter circuit consists of the following components (without chemical fluid handling):

A Systems room



pk_5_020_1

Item	Number	Name	Order no.
1	1	DULCOMARIN® II central unit with measurement and actuation modules DXCa W 0 0 1 M A P S EN 01	
2	1	DULCOTEST® in-line probe housing DGMa 3 2 2 T 0 0 0	
3	1	Chlorine measuring cell CTE 1-CAN-10 ppm	1023427
4	1	Chlorine measuring cell CLE 3.1-CAN-10 ppm	1023426
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	pH-electrode PHES 112 SE	150702
10	1	ORP electrode RHES-Pt-SE	150703
11	2	Cable combination coax 2 m- SN6 - pre-assembled	1024106
12	2 m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
13	1	Connection cable CAN	as required

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.2 Identcode Ordering System DULCOMARIN® II compact

DULCOMARIN® II DXCa range

DXCa		Installation	
W		W	Wall mounting (IP 65)
S		S	Control cabinet (IP 54)
		Version	
0		0	With controls
D		D	Area of application drinking water/disinfection
		Communication interfaces	
0		0	None
5		5	Embedded web server, LAN including 5 m LAN patch cable 1:1, LAN coupling, 5 m crossover cable ¹⁾
6		6	OPC server + embedded web server, LAN including 5m LAN patch cable 1:1, LAN coupling, 5m crossover cable ¹⁾
		Options	
0		0	none
1		1	Videographic recorder with data logger including SD card and USB card reader for PC
		Module 1	
M		M	M-module, measurement module for pH, ORP, temperature
A		A	A module, control module: 3 pump and 4 analogue outputs
I		I	I module, current input module, 3 mA, 2 digital inputs
		Module 2	
0		0	Not used
A		A	A module, control module: 3 pump and 4 analogue outputs
M		M	M module, measuring module pH, ORP, temperature
I		I	I module, current input module, 3 mA, 2 digital inputs
		Module 3	
P		P	P-module, mains power module, 1 alarm relay, 3 solenoid valve relays
N		N	N-module, mains power module without relay
		Application	
S		S	Swimming pool
D		D	Drinking water/disinfection
		Language default	
DE		DE	German
EN		EN	English
ES		ES	Spanish
FR		FR	French
IT		IT	Italian
PL		PL	Polish
NL		NL	Dutch?
CZ		CZ	Czech
		Approvals	
01		01	CE mark

The Identcode describes the **DULCOMARIN® II compact** controller.

- ¹⁾ The supplied cable is intended for the connection to a hub, switch, router, or Intranet. For a direct connection of the DULCOMARIN® II to a PC/MAC, the supplied LAN coupling and the cross-over cable cat. 5 are required. The maximum LAN cable length is approx. 100 m. To operate the Web server on a PC we recommend using Microsoft® Internet Explorer 5 or higher as browser. The following components are supplied in the DXCa package:
 1 T-distributor, 1 connecting cable CAN,
 1 termination resistor coupling and
 1 termination resistor plug,
 1 SC card, 1 card reader for PC.

For the area of application D = drinking water/disinfection, drinking water/disinfection must be selected for version D= area of application.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.3 Multi-Channel Measuring And Control System DULCOMARIN® II DULCO®-Net

The multi-channel measuring and control system DULCOMARIN® II DULCO®-Net in the maximum configuration can control 16 drinking water systems/filtration circuits, i.e. the required external modules for 16 pools can be connected to the central unit and operated. The following options are given

Measurement and controlling of:

Up to 16 times:

- pH value
- ORP
- free chlorine
- combined chlorine (calculated)
- Temperature of the sample water

Additionally in the drinking water application (via I module):

- Flow rate (as disturbance for pH and chlorine control)
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride (via D1Ca)
- Pt100 resistance thermometer via transducer

Other inputs and outputs:

Up to 16 times:

- 3 frequency outputs to control metering pumps for pH correction, disinfection and flocculant metering
- 3 contact inputs to process pump alarm relays or tank fill level monitoring
- 4 freely programmable analogue outputs 0/4 ... 20 mA (for pH, ORP, free chlorine, combined chlorine or temperature)
- 3 power relays pulse length control of pH value, of the disinfectant and minimisation of combined chlorine (e.g. controlling of a peristaltic pump and chlorine electrolysis plant and UV plant)
- Controlling of a chlorine gas metering unit
- 3 Beta®/4 CANopen metering pumps

Developed by Bosch and known from the automotive industry, the very fail safe CAN bus with CANopen protocol is used to transfer data between the different bus modules. The maximum length of the main bus train is 400 metres.

For connecting any bus module (M module, A module, P module, N Module, Beta®/4 CANopen metering pumps and CAN chlorine sensors), a T-distributor is used which connects the units with the main bus train via a spur line.

T-distributor and spur line are included in the modules' delivery scope.

All bus modules are supplied with 24 V operating voltage via the CAN bus (except Beta®/4 CANopen metering pumps, P modules, N modules. These require a separate power supply).

For this reason, additional P or N modules that supply operating voltage for the bus modules on the bus are required depending on the size of the installation (number of filtration circuits to be controlled). The central unit always includes a power supply unit (N or P module).

How many additional N or P modules do you require?

Number filtration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The DULCOMARIN® II compact and DULCO®-Net can be upgraded subsequently by simply connecting bus modules.



8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

Which components are included in a DULCOMARIN® II DULCO®-Net system?

A DULCOMARIN® II DULCO®-Net system consists of one:

- Central unit DXCa with controls

and the individual combination of the following components:

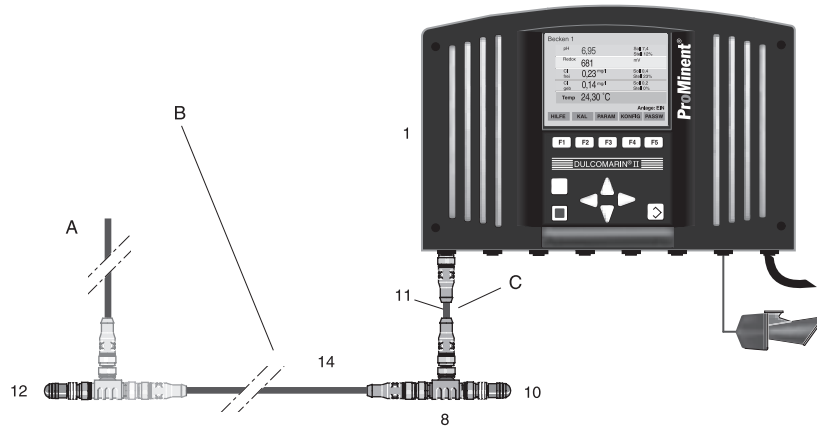
- M module, DXMaM (measurement and controlling)
- A module, DXMaA (controlling of metering pumps, analogue outputs)
- P module, (module in DXCa housing to supply power to modules and alarm relays, power relays to control e.g. peristaltic pumps)
- N Module, DXMaN (power supply of external modules with no further function)
- R module, DXMaR (controlling of chlorine gas metering units with position feedback processing)
- I module (processing of sensor signals above 0/4...20 mA)

The maximum main bus length is 400 m!

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.4 The Central Unit

- A Stub cable
- B Main BUS cable
- C Stub cable



pk_5_041_2

The central unit can be installed at any place, e.g. in the control room. It serves as I/O unit (view measuring data, parameterise and configure individual modules). It includes the following functions: standard screen recorder/data logger function, interfaces*, embedded Web server*, and power supply. As an option, the central unit can also include a M and an A module if the central unit is also located in the control room. The central unit is connected to other units via the main bus train.

For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

The main bus train must be fitted with termination resistors at either end.

These components are included in the delivery scope.

The central unit in the above example consists of the following components:

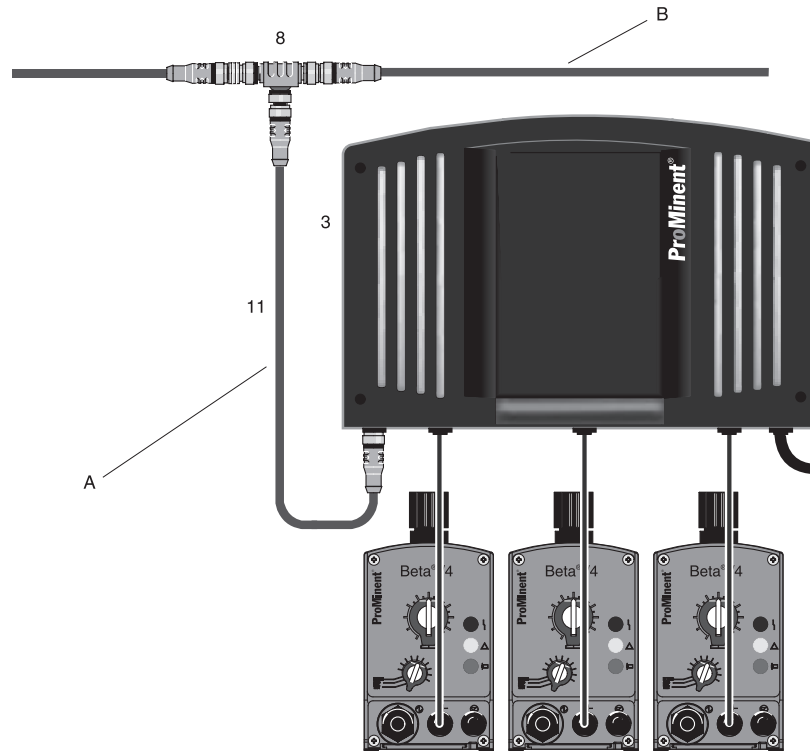
Item	Number	Designation	Order no.
1	1	DULCOMARIN®II central unit DXCa W 0 0 1 0 0 P S DE 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5P, 0.5 m	included in delivery
14	1	Connecting cable - CAN, M12, 5P	depending on requirements
10	1	Termination resistor M 12 coupling	included in delivery
12	1	Termination resistor M 12 connector	included in delivery

* optional

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.5 The Combination Module

- A Stub cable
- B Main BUS cable



pk_5_044

Combination A module and P module

Up to three different modules can be connected to the combination module (DXCa without controls). The function of the combination module is based on the function of the individual modules (see description above). The modules in the combination module are operated via the DXCa central unit.

The module is connected to the other bus modules via the main bus cable using the T-distributor supplied and the 0.5 m CAN connection cable.

See the table below for the various fitting options:

Module position 1	Module position 2	Module position 3
M module	M module	P module
M module	M module	N module
A module	A module	P module
A module	A module	N module
M module	A module	P module
M module	A module	N module

The combination in the above example consists of the following components (without chemical fluid handling):

Item	Number	Name	Order No.
3	1	Control module DXCa W 2 0 0 0 A P S 00 01	
8	1	T-distributor M12 5-pole CAN	supplied
11	1	Connection cable - CAN M12 5-pole 0.5 m	supplied

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.6 Identcode Ordering System Multi-Channel Measuring And Control System DULCOMARIN®II DULCO®-Net (Central Unit And Combination Module)

DULCOMARIN® II DXC range

DXCa	Installation
W	Wall mounting (IP 65)
S	Control cabinet (IP 54)
Version	
0	With controls
2	Without controls
D	Area of application drinking water/disinfection
Communication interfaces	
0	None
5	Embedded web server, LAN including 5 m LAN patch cable 1:1, LAN coupling, 5 m crossover cable ¹⁾
6	OPC server + embedded web server, LAN including 5 m LAN patch cable 1:1, LAN coupling, 5 m crossover cable ¹⁾
Options	
0	None
1	Videographic recorder with data logger including SD card and USB card reader for PC
Module 1	
0	Not used
M	M-module, measuring module: pH, ORP, temperature
A	A-module, control module: 3 pump and 4 analogue outputs
I	I module, current input module, 3 mA inputs, 2 digital inputs
Module 2	
0	Not used
A	A-module, control module: 3 pump and 4 analogue outputs
M	M-module, measuring module: pH, ORP, temperature
I	I module, current input module, 3 mA inputs, 2 digital inputs
Module 3	
P	P-module, mains power module, 1 alarm relay, 3 solenoid valve relays
N	N-module, mains power module unit without relay
Application	
S	Swimming pool
D	Drinking water/disinfection
Language default	
DE	German
EN	English
ES	Spanish
FR	French
IT	Italian
PL	Polish
NL	Dutch
CZ	Czech
Approvals	
01	CE mark

The Identcode describes the complete **DULCOMARIN®II DULCO®-Net** central unit.

The peripheral components mentioned in the above item list, however, are not included. If modules are assigned to the central unit, the following applies:

Module 1 preferably assigned as M module

Module 2 preferably assigned as A module

Module 3 must always be assigned as P module or N module.

¹ Module 1 preferably assigned as M module

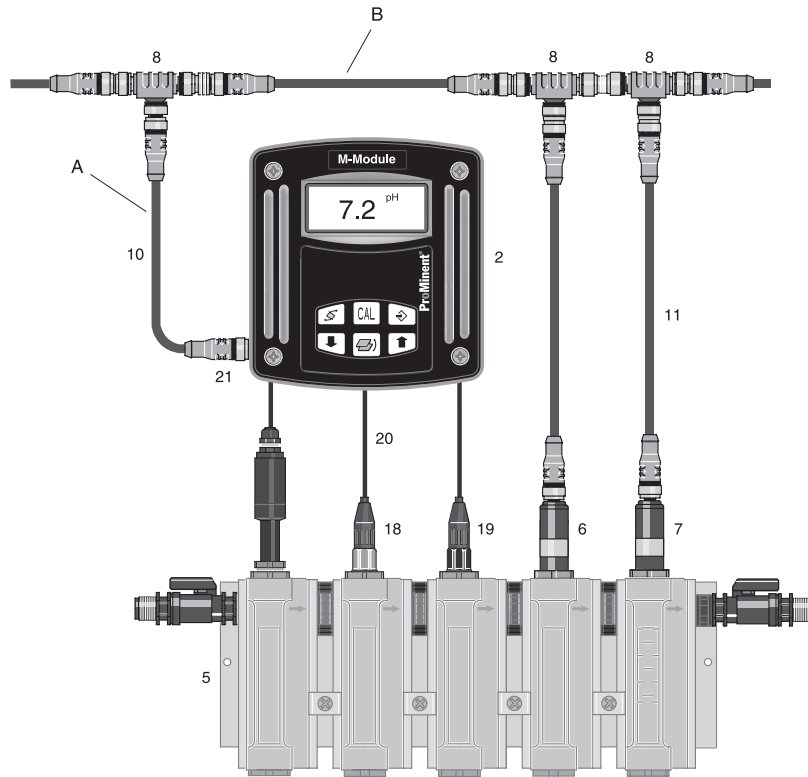
² only in the version: 2 without controls

For the area of application D = drinking water/disinfection, drinking water/disinfection must be selected for version D = area of application.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.7 M Module (Measuring Module)

- A Stub cable
- B Main BUS cable



pk_5_042

The M module with its illuminated graphic display and keypad displays the measured values and allows all sensors for the corresponding filter circuit to be calibrated on site.

The following measurements can be taken:

- pH value
- ORP potential
- free chlorine and
- total available chlorine (optional or combined chlorine is calculated) and
- sample water temperature using the temperature probe in the chlorine sensor or optionally using a separate Pt100/Pt1000 resistance thermometer

The M module has 3 digital inputs for:

- sample water monitoring
- controlling breaks in filter backwashing
- Parameter changeover for Eco!Mode

The M module is connected to the other bus modules via the main bus cable, using the T-distributor supplied and the 0.5 m CAN connection cable.

The M module in the above example consists of the following components:

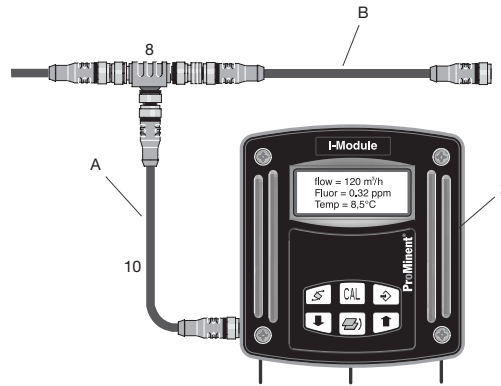
Item	Number	Name	Order no.
2	1	M module DXMa M W 0 S EN 01	
5	1	In-line probe housing DGMa 3 2 2 T 0 0 0	
6	1	Chlorine measuring cell CTE 1-CAN-10 ppm	1023427
7	1	Chlorine measuring cell CLE 3.1-CAN-10 ppm	1023426
8	3	T-distributor M12 5 pole CAN	included in delivery
10	1	Connection cable - CAN M12 5-pole 0.5 m	included in delivery
11	2	Connection cable - CAN M12 5-pole 0.5 m	included in delivery
18	1	pH-electrode PHES 112 SE	150702
19	1	ORP electrode RHES-Pt-SE	150703
20	2	Cable combination coax 2 m- SN6 - pre-assembled	1024106
21	2 m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122

MaharFan

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.8 I Module (Current Input Module)

- A Stub cable
- B Main BUS cable



AP_DC_0011_SW

The I module with its illuminated graphics display and keypad is a current input module which is able to process 3 standard signals from sensors and two digital signals. It can be used together with the multi-channel controller DULCOMARIN® II in drinking water applications. Two analogue inputs are designed as 2-wire inputs and one as passive input. The inputs can process the following values as standard 0/4... 20 mA signal.

- Flow
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride (via D1Ca)
- Pt100 resistance thermometer via transducer

The I module has 2 digital inputs for:

- sample water monitoring and
- pause control

The I module is connected to other bus modules via the main bus train. For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

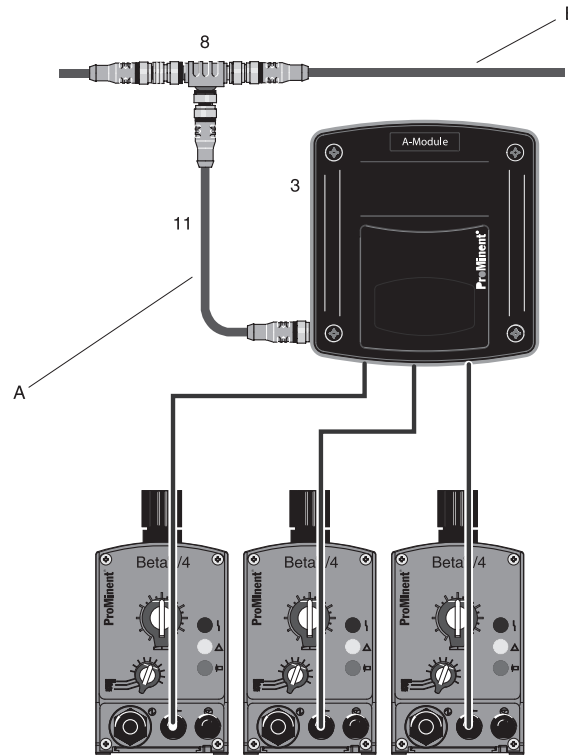
The I module in the above example consists of the following components:

Item	Number	Name	Order no.
2	1	I module DXMa I W 0 D EN 01	
8	1	T-distributor M12 5P CAN	included in delivery
10	1	Connecting cable - CAN, M12, 5P, 0.5 m	Included in delivery

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.9 A Module (Control Module)

- A Stub cable
- B Main BUS cable



pk_5_043

The A module permits the control of up to three metering pumps via pulse frequency. Possible metering combinations are:

- pH lowering and disinfectant and flocculant or
- pH raising and disinfectant and flocculant or
- pH lowering and pH raising and disinfectant

It includes 3 digital inputs to evaluate the alarm relay of metering pumps, 4 freely programmable standard signal outputs 0/4 ... 20 mA to document measured values, or as control outputs.

For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

To be noted: If Beta®/4CANopen metering pumps are used, no A modules are required!

The A module in the above example consists of the following components (without metering technology):

Item	Number	Designation	Order no.
3	1	A module DXMa A W 20 00 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5P, 0.5 m	included in delivery

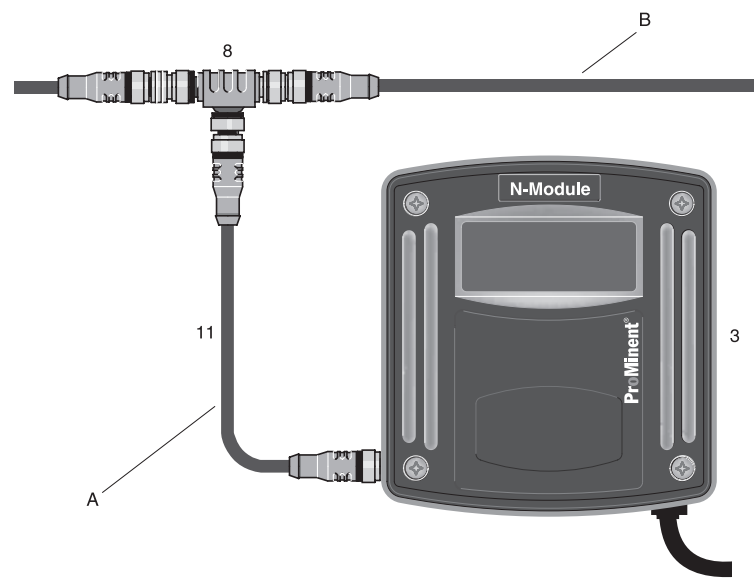
The A module is connected to other units via the main bus train.

For connection to units which are not electrically isolated (e.g. PLC), an isolating amplifier, e.g. order no. 1033536, is required!

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.10 N Module (Power Supply Module)

- A Stub cable
- B Main BUS cable



pk_5_043_C_power

The N module (power supply) is used to supply the bus modules with power and has no further function. The number of N modules required can be seen from the table below. If P modules are used in a system, the number of N modules is reduced accordingly. The central unit always includes a power supply unit (N or P module)

How many additional N or P modules do you require?

Number filtration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The N module requires power supply for operation and is connected to the other bus modules via the main bus train. For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

The N module in the above example consists of the following components:

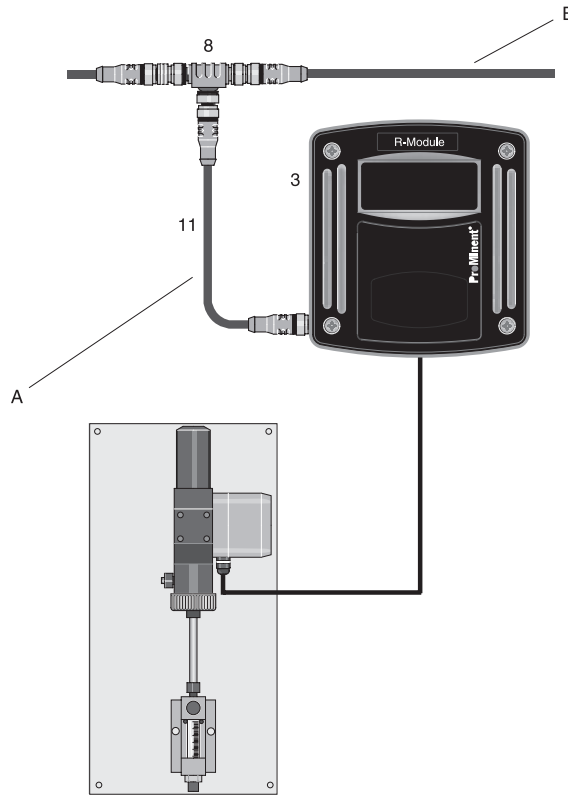
Item	Number	Designation	Order no.
3	1	N module DXMa N W 2 0 00 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5P, 0.5 m	included in delivery

If you have any questions, please contact our sales department.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.11 R Module (Control Module For Chlorine Gas Metering Units)

- A Stub cable
- B Main BUS cable



pk_5_043_C

The R module permits the control of chlorine gas metering units which are 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.

For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

The R module in the above example consists of the following components (without chlorine gas metering unit):

Item	Number	Designation	Order no.
3	1	R module DXMa R W 2 0 0 0 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5P, 0.5 m	included in delivery

If you have any questions, please contact our sales department.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.12 Identcode Ordering System CANopen Modules

Measurement Module for DULCOMARIN® II Series DX

DXMa	Modul	
M	M	M module, measuring module: pH, ORP, temperature
A	A	A module, control module: 3 pump and 4 analogue outputs
R	R	R module, control module: chlorine gas metering unit with feedback ^{1), 2)}
N	N	N module, mains power module without relay ^{1), 2)}
P	P	P module, mains power module with relay, only mounting type "0" ^{1), 2)}
I	I	I module, current input module, 3 mA inputs, 2 digital inputs
Installation		
0		No housing, only P module (IP 00)
W		Wall mounting (IP 65)
E		Retrofit module (installation module for DXCa, IP 20)
Version		
0		With controls (only M module, mounting type W) ¹
2		Without controls
3		Without controls (only mounting type "E" and "H")
Application		
0		Standard
S		Swimming pool (only M-module)
D		Drinking water/disinfection (only I module)
Language default		
00		No controls ²⁾
DE		German
EN		English
ES		Spanish
FR		French
IT		Italian
Approvals		
00		No approval, only P-module without housing
01		CE mark

Example configurations:

External modules:

- M module: DXMa M W 0 S EN 01
- A module: DXMa A W 2 0 00 01
- N module: DXMa N W 2 0 00 01
- R module: DXMa R W 2 0 00 01
- P module: DXCa W 2 00 00 PS 00 01
- I module: DXMa I W 0 D D E 01 (with display)
- I module: DXMa I W 2 D 0 0 0 1 (without display)

Internal modules (replacement or upgrade modules)

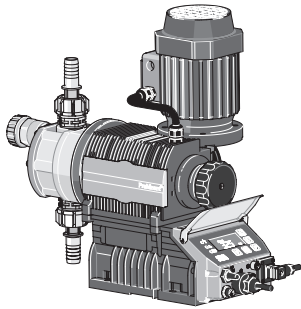
- M module: DXMa M E3S 00 01
- A module: DXMa A E30 00 01
- P module: DXMa P03 00 00
- I module: DXMa I E 3 D 00 01

¹ only in the mounting type: „W“

² only in the version: "2" without controls

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

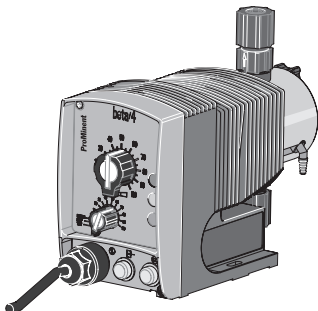
8.5.13 Diaphragm Metering Pumps With CANopen Bus Interface



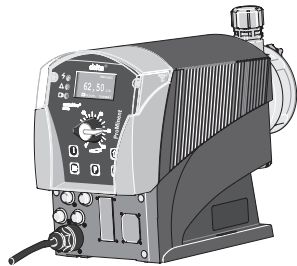
pk_2_001
Sigma

- CANopen bus interface for DULCOMARIN® II
- Output range 0.74 - 32 l/h, 16 - 2 bar
- Stroke length continuously adjustable between 0 - 100 % (recommended 30 - 100 %)
- Transmission of the stroke length setting from DULCOMARIN® II
- Material versions PP, plexiglass/PVC
- Patented coarse / fine bleed valve for PP and plexiglass/PVC
- Self-bleeding liquid end version in PP and plexiglass/PVC
- Port for 2-phase level switch
- Version for extra-low voltage 12/24 V DC, 24 V AC
- 4 LED display for operation, warning and error messages
- Alarm for stroke length changes > ± 10 %
- Transmission of level alarm without alarm relay via the bus

For further informations: Beta® Solenoid Diaphragm Metering Pumps → 1-11, delta® Solenoid-driven Diaphragm Metering Pumps → 1-23, Sigma/ 1 Diaphragm Metering Pumps → 2-9, Sigma/ 2 Diaphragm Metering Pumps → 2-15, Sigma/ 3 Diaphragm Metering Pumps → 2-20



pk_1_004_1
Beta®



P_DE_0002_SW
delta®

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.14 Multi-Channel Measuring And Control System DULCOMARIN®II DULCO®-Net Module Combinations

Number and type of modules required for a given number of pools

Number filtration circuits	Central unit DXCa	P module	M module	A module*	Additional N or P module (power supply unit)	Sensor free chlorine	Sensor total chlorine - (optional)
1	1	1	1	1	-	1	1
2	1	1	2	2	-	2	2
3	1	1	3	3	1	3	3
4	1	1	4	4	2	4	4
5	1	1	5	5	2	5	5
6	1	1	6	6	3	6	6
7	1	1	7	7	3	7	7
8	1	1	8	8	4	8	8
9	1	1	9	9	4	9	9
10	1	1	10	10	5	10	10
11	1	1	11	11	5	11	11
12	1	1	12	12	6	12	12
13	1	1	13	13	6	13	13
14	1	1	14	14	7	14	14
15	1	1	15	15	7	15	15
16	1	1	16	16	8	16	16

* No A module if metering pumps with CANopen are used.
 The above modules include all CAN bus connecting elements (T-distributor and spur line).
 The T-distributors can also be directly coupled.
 For distributed systems, CAN cable must be ordered by the metre with the by-the-metre connecting kit.

	Order no.
CAN (by the metre) – connection kit*	1026589
Connecting cable – CAN (by the metre)*	1022160

* The CAN by-the-metre connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.
 The by-the-metre connecting cable can be configured into a cable of individual length using the CAN by-the-metre connecting kit.
 One CAN by-the-metre connecting kit is required for each cable to be configured.
 The connecting cables CAN M12 5P 0.5 m (pump 1 m) supplied with the sensors and modules must be used for the spur lines.

If you have any questions, please contact our sales department.

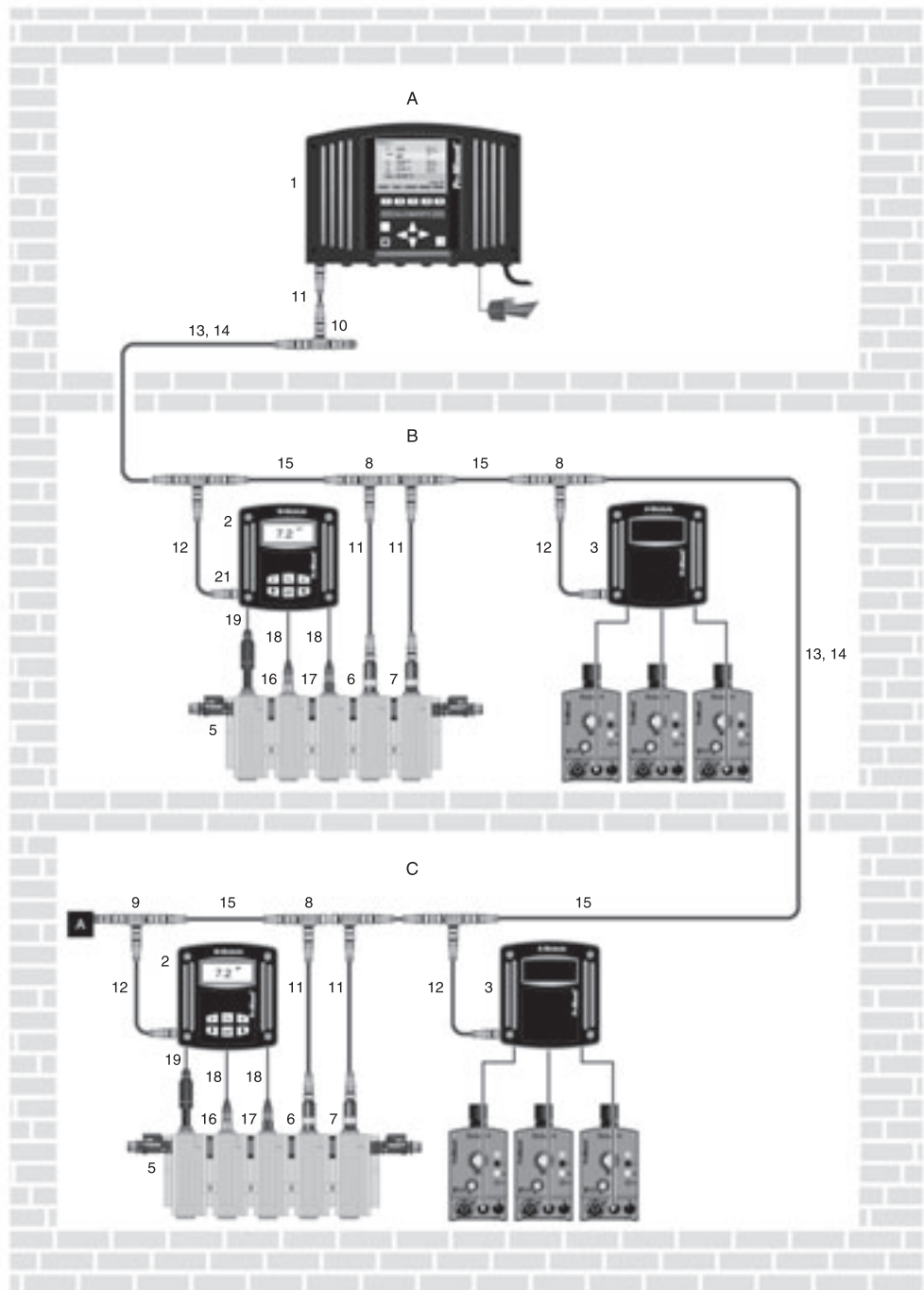
Caution:

The maximum main bus length (not including spur lines) may be 400 m at the most.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.15 Configuration Example 1

- A Masters room
- B Systems room Pool 1
- B Systems room Pool 2



pk_5_022_1

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

Measuring and control system for two drinking water systems/filtration circuits consisting of the following components:

Item	Number	Name	Order no.
1	1	DULCOMARIN® II central unit DXCa W 0 0 1 0 0 P S EN 01	
2	2	M-module DXMa M W 0 S EN 01	
3	2	A-module DXMa A W 2 0 00 01	
5	2	DULCOTEST® in-line probe housing DGMa 3 2 2 T 0 0 0	
6	2	Chlorine measuring cell CTE 1-CAN-10 ppm	1023427
7	2	Chlorine measuring cell CLE 3.1-CAN-10 ppm	1023426
8	9	T-distributor M12 5-pole CAN	supplied
9	1	Termination resistance M12 coupling	supplied
10	1	Termination resistance M12 plug	supplied
11	5	Connection cable - CAN M12 5-way 0.5 m	supplied
12	5	Connection cable - CAN M12 5-way 0.3 m	supplied
13		Connecting cable – CAN (by the metre)*	1022160
14		CAN (by the metre) – connection kit*	1026589
15		CAN M12 5-pole connection cable - length as re- quired	
16	2	pH-electrode PHES 112 SE	150702
17	2	ORP electrode RHES-Pt-SE	150703
18	4	Cable combination coax 2 m- SN6 - pre-assem- bled	1024106
19	4 m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122

* The CAN by-the-metre connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.
The by-the-metre connecting cable can be configured into a cable of individual length using the CAN by-the-metre connecting kit.
One CAN by-the-metre connecting kit is required for each cable to be configured.
The connecting cables CAN M12 5P 0.5 m (pump 1 m) supplied with the sensors and modules must be used for the spur lines.

Caution:

The maximum main bus length (not including spur lines) may be 400 m at the most.

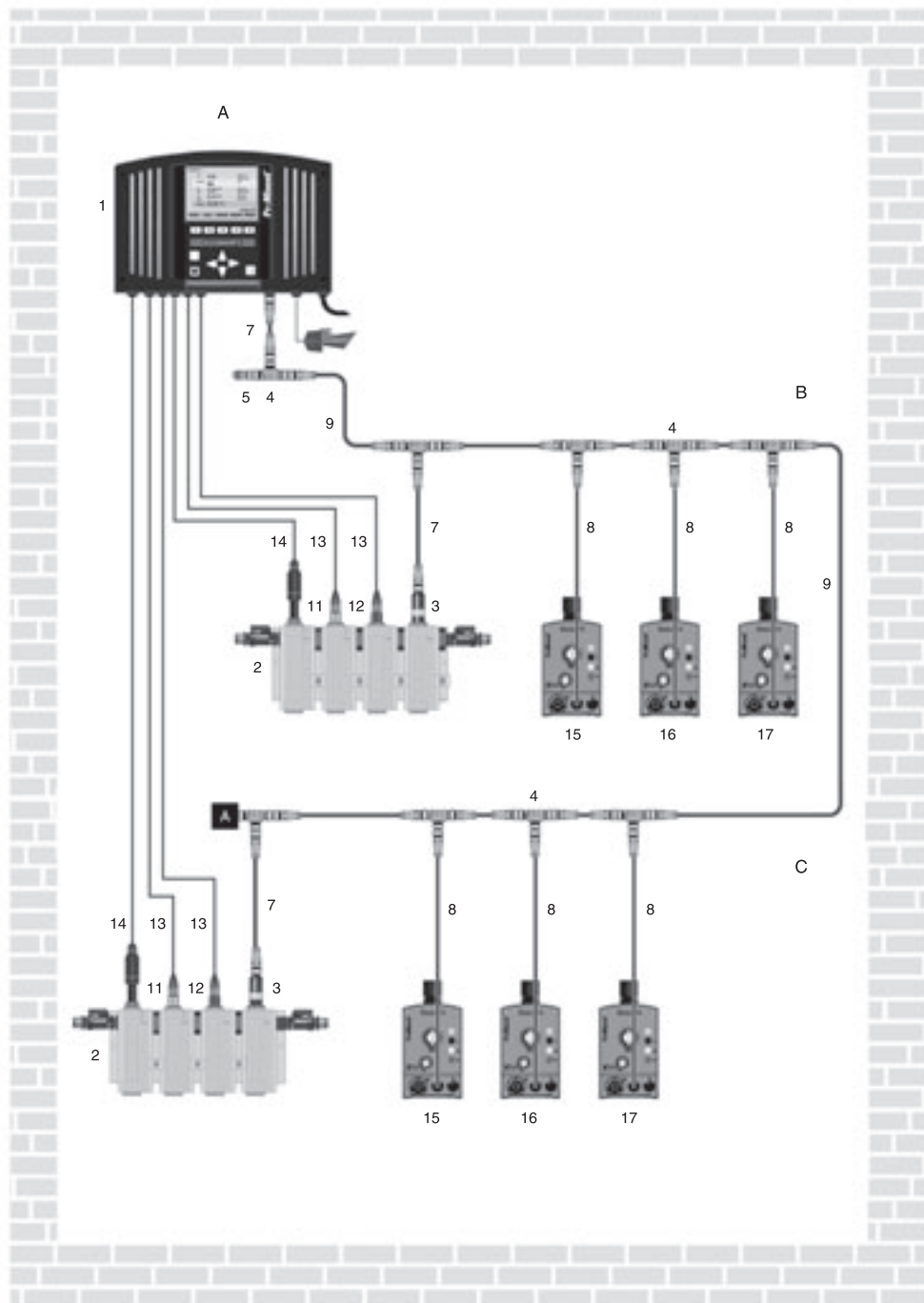
8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.16

Configuration Example 2

Two M modules in central unit, use of metering pumps with CANopen bus.

- A Swimming pool attendant's room
- B Installations room/Pool 1
- C Installations room/Pool 2



pk_5_022_2

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

Measuring and control system for two filter circuits consisting of the following components:

Item	Number	Name	Order no.
1	1	DULCOMARIN®II central unit DXCa W 0 0 1 M M P S EN 01	
2	2	DULCOTEST® in-line probe housing DGMa 3 2 2 T 0 0 0	
3	2	Chlorine measuring cell CLE 3-CAN-10 ppm	1023425
4	9	T-distributor M12 5 pole CAN	included
5	1	[Terminator] M12 connector	included
6	1	[Terminator] M12 plug	included
7	5	Connection cable - CAN M12 5-pole 0.5 m	included
8	6	Connection cable - CAN M12 5-pole 0.3 m	included
9		Connecting cable – CAN (by the metre)*	1022160
10		CAN (by the metre) – connection kit*	1026589
11	2	pH-electrode PHES 112 SE	150702
12	2	ORP electrode RHES-Pt-SE	150703
13	4	Cable combination coax 2 m- SN6 - pre-assembled	1024106
14	4 m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
15	2	Beta®/4CANopen for pH adjustment BT4A0402PPE200AA000D00**	
16	2	Beta®/4CANopen for disinfectant BT4A0402NPB900AA000D00**	
17	2	Beta®/4CANopen for flocculant BT4A0400PPE200AA000D00**	

* The CAN by-the-metre connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.
The by-the-metre connecting cable can be configured into a cable of individual length using the CAN by-the-metre connecting kit.
One CAN by-the-metre connecting kit is required for each cable to be configured.
The connecting cables CAN M12 5P 0.5 m (pump 1 m) supplied with the sensors and modules must be used for the spur lines.

** Example configurations

Caution:

the maximum main bus length (not including spur lines) may be 400 m at the most.

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.17

Accessories For The Measuring And Control System DULCOMARIN® II compact And DULCOMARIN® II DULCO®-Net

	Order no.
CLE 3-CAN-10 ppm	1023425
CLE 3.1-CAN-10 ppm	1023426
CTE 1-CAN-10 ppm	1023427
CGE 2-CAN-10 ppm	1024420
BRE 3-CAN-10 ppm	1029660
T-distributor M12 5 pole CAN	1022155
Termination resistance M12 coupling	1022154
Termination resistance 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 (by the metre)	1022160
CAN (by the metre) - connection kit	1026589
PHES 112 SE	150702
RHES-Pt-SE	150703
Cable combination coax 0.8 m - pre-assembled	1024105
Cable combination coax 2 m- SN6 - pre-assembled	1024106
Cable combination coax 5 m- SN6 - pre-assembled	1024107
Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122
Connecting cable LAN M12 - RJ45 5.0 m	1026715
Cross-over patch cable 2x RJ45 connector 5 m	1027859
LAN coupling 2x RJ45 socket 1:1	1027860
USB 2.0 SD card reader	732981
SD memory card/DXC measuring data archiving	1027470
Isolating amplifier 4-channel for mA outputs of the A module	1033536

* The CAN by-the-metre connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.
The by-the-metre connecting cable can be configured into a cable of individual length using the CAN by-the-metre connecting kit.
One CAN by-the-metre connecting kit is required for each cable to be configured.
The connecting cables CAN M12 5P 0.5 m (pump 1 m) supplied with the sensors and modules must be used for the spur lines.

Caution:

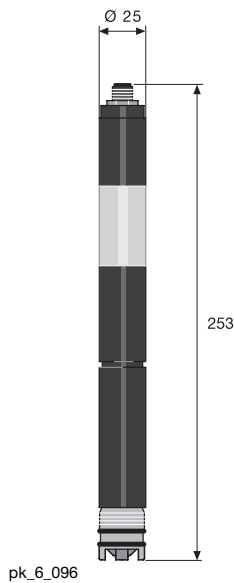
The maximum main bus length (not including spur lines) may be 400 m at the most.

Sensor selection table

Sensor	Measurement task Measurement free chlorine for small percentage of combined chlorine. Calibration method DPD 1	Measurement free chlorine for large percentage of combined chlorine. Calibration method DPD 1	Measurement combined chlorine and free chlorine (differential chlorine measurement) Calibration method DPD 1+3	Measurement total chlorine (e.g. trichlorinated isocyanuric acid) Calibration method DPD 1	Measurement Bromine BCDMH DBDMH DPD1 or DPD1+3
CLE3-CAN-10ppm (Order no.: 1023425)	X				
CLE3.1-CAN-10ppm (Order no.: 1023426)		X	X		
CTE1-CAN-10ppm (Order no.: 1023427)			X		
CGE2-CAN-10ppm (Order no.: 1024420)				X	
BRE3-CAN-10ppm (Order no. 1029660)					X

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8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment



CLE 3-CAN

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

Measured variable	free chlorine (hypochlorous acid HOCl)
Reference method	DPD1
Measuring range	0.01...10.0 mg/l
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)
Power supply	via CAN-interface (11 – 30 V)
Temperature measurement	via integrated digital semiconductor element
Output signal	uncalibrated, temperature compensated, electrically isolated
Compatibility	CANopen bus systems

Order no.

CLE 3-CAN-10 ppm*

1023425

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

CLE 3.1-CAN

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

Measured variable	free chlorine (hypochlorous acid HOCl) in high proportions of bound chlorine and/or pH-values up to 8.5
Reference method	DPD1
Measuring range	0.01...10.0 mg/l
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)
Power supply	via CAN-interface (11 – 30 V)
Temperature measurement	via integrated digital semiconductor element
Output signal	uncalibrated, temperature compensated, electrically isolated
Compatibility	CANopen bus systems

Order no.

CLE 3.1-CAN-10 ppm*

1023426

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

CTE 1-CAN

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

Measured variable	total chlorine
Reference method	DPD4
Measuring range	0.01...10.0 mg/l
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)
Power supply	via CAN interface (11 – 30 V)
Temperature measurement	via built-in semiconductor device
Output signal	uncalibrated, temperature-compensated, electrically isolated
Compatibility	CANopen bus systems

Order no.

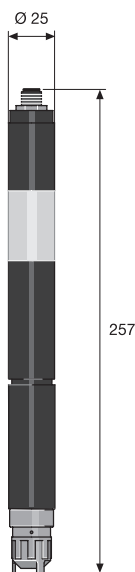
CTE 1-CAN-10 ppm*

1023427

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

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8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment



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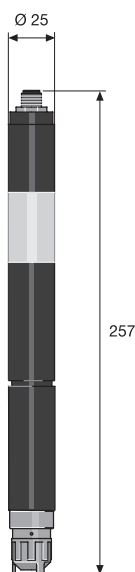
CGE 2- CAN

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

Measured variable	total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine
Reference method	DPD1
Measuring range	0.01...10.0 mg/l
pH range	5.5 ... 9.5
Temperature	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (with DGMa or DLG III)
Power supply	via CAN interface (11 – 30 V)
Temperature measurement	via built-in semiconductor device
Output signal	uncalibrated, temperature compensated, electrically isolated
Compatibility	CANopen bus systems

	Order no.
CGE 2-CAN-10 ppm*	1024420

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



pk_6_084

BRE 3-CAN

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

Measured variable	total available bromine (free and organic bound bromine)
Reference method	DBDMH, free bromine: DPD1 BCDMH: DPD4
Measuring range	0.02...10.0 mg/l
Temperature	5 ... 45 °C
Max. pressure	3.0 bar
Intake flow	30...60 l/h (in DGM or DLG III)
Power supply	via CAN interface (11 – 30 V)
Output signal	uncalibrated, temperature-compensated, electrically isolated

	Order no.
BRE 3-CAN-10 ppm	1029660

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

8.5 Multi-Channel Measuring And Control System For Drinking Water And Swimming Pool Water Treatment

8.5.18 Technical Data For The Multi-Channel Measuring And Control System DULCOMARIN® II compact And DULCO®-Net

Measurement range	pH -1...15 ORP: -1200...+1,200 mV Chlorine, free 0.01...10 ppm Chlorine, total 0.01...10 ppm Chlorine, combined 0.01... 2.00 ppm
Temperature range	-20 ... 150 °C Pt 100 or Pt 1000
Resolution	0.01 pH / 1 mV / 0.01 ppm / 0.1 C
Accuracy	0.5% of the final value of the measuring range (at 25 C)
Measurement input	ph and ORP via terminal mV Chlorine via CANopen bus
Control characteristic	P/PI/PID control, intelligent control
Control	Acid and/or alkali and chlorine (2 control circuits), temperature
Digital inputs	5 potential-free inputs (sample water, pause, 3 pump failures, 2nd parameter set)
Signal current output	4 x 0/4-20 mA max. load 600 Ω range adjustable. For connection to units which are not electrically isolated, an isolating amplifier, e.g. order no. 1033536, is required!
Control outputs	3 Reed contacts for acid, alkali or flocculants and chlorine (pulse frequency to control metering pumps) 3 relays (pulse length) contact type changeover to control solenoid valves or peristaltic pumps
Alarm relay	250 V ~3 A, 700 VA contact type, changeover
Interfaces	LAN, SD-expansion slot
Electrical connection	85...265 V~, 50/60 Hz
Permissible ambient temperature	-5...45 °C
Storage temp.	-10...70 °C
Enclosure rating	IP 65
Climate	Permissible relative humidity: 95% non-condensing DIN IEC 60068-2-30
Dimensions H x W x D	227 x 342 x 78

Compliance of all devices with CANopen specifications:

All devices meet on the hardware side the harmonised CAN specification 2.0 (ISO991, ISO992). This includes the CAN protocol (ISO 11898-1) and details about the physical application layer in accordance with ISO 11898-2 (high speed CAN up to 1Mbit/sec.) and ISO 11898-3 (low speed CAN up to 125kBit/sec.). The unit meets the CANopen specification CiA-DS401, which is the basis of the European standard EN 50325-4. It complies with the controller device profile CiA-404.

8.6 Controller With Integrated Metering Pump For pH, ORP, Type D_4a

8.6.1 Controller With Integrated Metering Pump For pH, Redox, Type D_4a

- A range of fully expanded elements and dosing head materials (PP, NP, TT, SS, NS) allows process requirements to be optimally adapted
- Self-bleeding dosing head for gaseous process chemicals
- Simple to operate using adjusting potentiometer
- Chemical resistant plastic housing (IP 65)
- Compact design

Application:

- laboratory
- pilot systems
- electroplating
- cooling water
- neutralization
- swimming pool
- potable water

Technical data

Controller

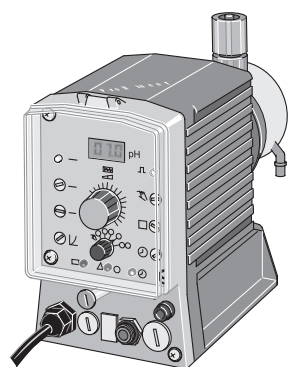
Measurement range	pH 0.0-14, Redox 0-999 mV
Measurement input	SN6 (input resistance > 5 x 10 ¹² Ω)
Control characteristic	P control
Control	switchable
Signal current output	0/4-20 mA

Dosing pump

Pump type	Delivery rate	Connection size o Ø x i Ø
		mm
D_4a 1601	0.84 l/h	6 x 4
D_4a 1601 NS	0.54 l/h	6 x 4
D_4a 1201	1.45 l/h	6 x 4
D_4a 1201 NS	0.84 l/h	6 x 4
D_4a 0803	2.86 l/h	6 x 4
D_4a 0803 NS	1.98 l/h	6 x 4
D_4a 1002	1.91 l/h	8 x 5
D_4a 1002 NS	1.50 l/h	6 x 4
D_4a 0308	7.00 l/h	8 x 5
D_4a 0215	12.30 l/h	12 x 9

Reproducible metering accuracy <±2%

Connectors Hose sleeve with threaded clamping ring for PP, NP, NS, TT, Swage-lock for SS version



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8.6 Controller With Integrated Metering Pump For pH, ORP, Type D_4a

Miscellaneous

Relay output	max. 250 V/3 A/1100 VA
Electrical connection	115/230 V~
Power Uptake	15 W
Permissible ambient temperature	-10...45 °C
Enclosure rating	IP 65, insulation class F
Dimensions H x W x D	173 x 112 x 200

A complete measuring station comprises the following:

- Controller with integrated D_4a pump
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- pH sensor (dependent on Identcode)
- Redox sensor (dependent on Identcode)
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; pH-Combination Probes With SN6 Or Vario Pin see p. → 7-10; ORP Combination Probes With Fixed Cable see p. → 7-22; Sensor Accessories see p. → 7-53)

8.6 Controller With Integrated Metering Pump For pH, ORP, Type D_4a

8.6.2 Identcode Ordering System For D_4a

D Pump, Type 4, Version a

D_4a	Measured variable
PH	pH measurement range 0-14 pH
RH	Redox measurement range 0-999 mV
	Pump type
1601	16 bar; 0.84 l/h (NS version 0.54 l/h)
1201	12 bar; 1.45 l/h (NS version 0.84 l/h)
0803	8 bar; 2.86 l/h (NS version 1.98 l/h)
1002	10 bar; 1.91 l/h (NS version 1.50 l/h)
0308	3 bar; 7.00 l/h
0215	2 bar; 12.30 l/h
	Material Liquid end
XX	No liquid end
NP	Acrylic glass/FPM
NS	Self-bleeding Acrylic glass/FPM (not version 0308, 0215)
PP	Polypropylene/EPDM
TT	PTFE + 25 % carbon/PTFE
SS	Stainless steel 1.4571/PTFE
	Power supply
A	230 V, 50/60 Hz Euro plug
B	230 V, 50/60 Hz Swiss plug
C	230 V, 50/60 Hz Austral. plug
D	115 V, 50/60 Hz USA plug
	Measured variable connection
2	SN6 pH/RH
7	DIN 19262 plug (without reference electrode connector) pH/RH
8	SN6 with reference electrode connector pH/RH
	Correction variable (temperature)
0	None
1	Temperature (SN6) for pH only
	Control direction
1	Raise measured value
2	Lower measured value
3	Direction switchable via external switch (for pH only)
	Signal current output
0	None
1	0/4 ... 20 mA: pH 1 ... 12; 0-1000 mV; 0-2 mg/l
2	0/4 ... 20 mA: 0-20 mg/l
	Relay
0	None
A	Liquid level relay output (n/c)
B	Stroke pacing relay output (n/c)
C	Pump stop relay output (n/c)
D	Set point indicating relay output (n/c)
E	Control period exceeded (n/c)
F	Fuse and power supply failure indicating relay (n/o)

8.7 Cooling Tower And Boiler Controller

8.7.1 Cooling Water Treatment

Cooling circuits are used in diverse industries, in office buildings and shopping malls around the world. If a flow-type cooling with fresh water is not feasible, a circulating cooling system is used.

In this respect, the cooling water consumption has to be reduced.

From the operator's point of view it is necessary to protect the heat exchanger and the entire piping against corrosion and deposits to maximise the availability of the system.

Deposits and biological growth reduce the efficiency of the heat exchanger and increase the consumption of cooling water and thus also the operating costs.

Negative effects on the environment and the formation of legionella must be prevented.

In the circulating cooling, the loss caused by evaporation and exhaust air is replaced by make-up water.

The increase in salt concentration caused by evaporation is compensated for by desalination and addition of make-up water. The desalination is controlled on the basis of the conductivity in the circulating water.

The deposition of biofilms is prevented by a time-controlled metering of biocides.

Corrosion is prevented by a volume-proportional metering of corrosion inhibitors and dispersants to the make-up water.

Function Description

The DULCOMETER® ProMcon, Cool Control and MultiFlex M10 are compact systems for cooling tower control.

They include all necessary functions to control desalination, metering of up to two biocides and corrosion inhibitors.

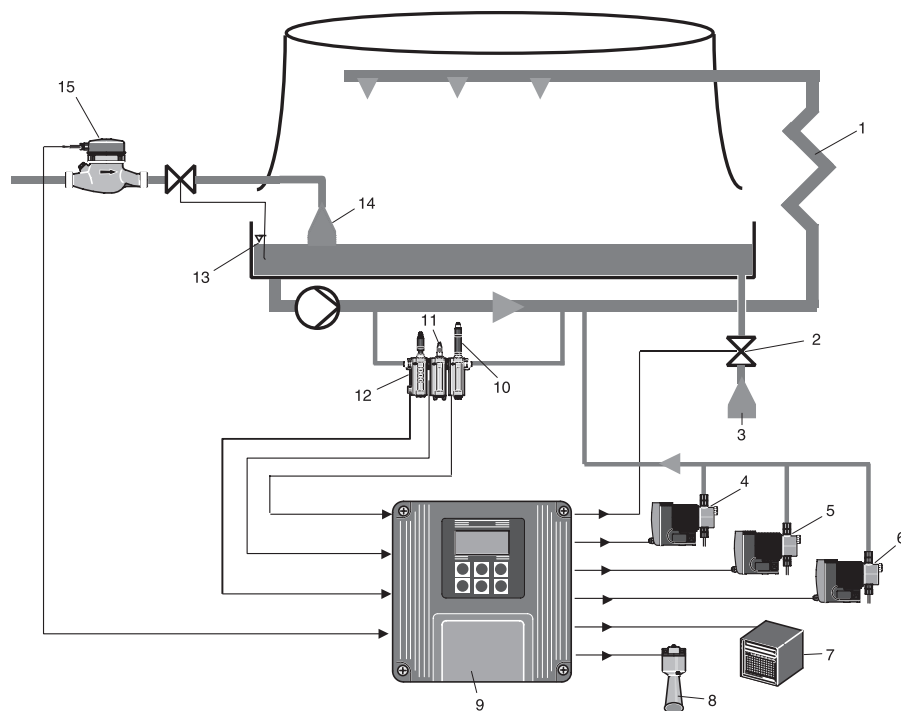
The desalination is controlled on the basis of the conductivity measured in the circulating water.

The inhibitor pump is controlled depending on the make-up water quantity which is detected using a contact water meter.

The desired concentration of the inhibitor is determined by the cooling tower control based on the operating time of the metering pumps.

The controls can control up to two biocide pumps independently of each other via a timer.

Wet cooling tower



- 1 Heat exchanger
- 2 Desalination valve
- 3 Outlet
- 4 Biocide 1
- 5 Biocide 2
- 6 Inhibitor
- 7 Recorder
- 8 Siren
- 9 Cool-Control
- 10 Conductivity probe
- 11 Pt 100
- 12 Flow monitor
- 13 Float switch
- 14 Intake
- 15 Contact water meter

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8.7 Cooling Tower And Boiler Controller

The controls include the following Basic functions

- Forced desalination prior to a planned biocide metering. Biocides with an oxidising effect increase the conductivity in the cooling systems.
- Locking of the desalination after completed biocide metering to let the biocide take effect
- Limitation of the maximum desalination duration
- Emergency mode in case of failure of the conductivity measurement

ProMcon:

- Economical starter control for one cooling tower
- 1 or 2 biocides
- 1 inhibitor
- Control of a solenoid valve for desalination
- Second measuring/control variable (pH, ORP, bromine or chlorine)
- Conductive conductivity measurement

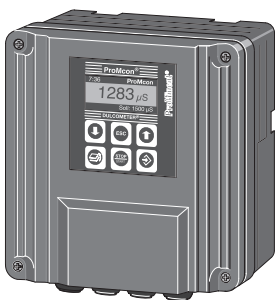
Cool Control:

- Control of one cooling tower
- 1 or 2 biocides
- 1 inhibitor
- Control of a solenoid valve or motor ball valve/motor valve for desalination
- Inductive or conductive conductivity measurement

MultiFlex M10:

- Freely programmable control of up to 4 cooling towers or boilers, also combined
- 1 or 2 biocides for each cooling tower
- 1 inhibitor for each cooling tower
- Control of a solenoid valve or motor ball valve/motor valve for desalination
- Second measuring/control variable (pH, ORP, bromine or chlorine)
- Corrosion measurement
- Inductive or conductive conductivity measurement
- Standard LAN/Ethernet connection
- Optional operating and configuration software for Windows® PC, Trackster 3
- Optional modem
- Subsequently upgradable thanks to modular design

8.7.2 Cooling Tower Control ProMcon



P_DM_0018_SW

NEW

- Control of desalination via conductivity measurement or measurement of the make-up water quantity
- Control of one inhibitor
- Metering of up to 2 biocides via metering pumps or bromine lock
- Automatic switching between summer/winter
- Timer with 4x8 events per cycle
- Forced desalination and desalination lock
- Contact water meter input with adjustable pulse spacing
- Connection of a second measured variable via mA, e.g. pH or chlorine or bromine or conductivity via mA
- Pause input to stop the controller
- Digital input to monitor the circulation
- 2 standard signal outputs, 0/4 ... 20 mA for conductivity and 2nd measured variable
- Alarm relay for alarm signalling
- Adjustable alarm limit values for measured value conductivity
- Wall mounting
- Optional modem (on request)

Applications:

- Cooling tower
- Air condition systems

	Order no.
ProMcon cooling tower control 230V	1034730
ProMcon cooling tower control 115 V	1034731

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8.7 Cooling Tower And Boiler Controller

8.7.3 Technical Data

Measurement range	0 ... 100/1,000 µS/cm and 20 mS/cm
Cell constant	0.01 ... 10.0 (depending on the measuring range)
Accuracy	0.5 % of measuring range
Measurement frequency	56 Hz ... 2.7 kHz
Measurement input	Terminal for conductive 2-electrode sensor
Correction variable	Temperature
Correction range	0 ... 100 °C
2. measuring input	4...20 mA Zweileitereingang für induktive Leitfähigkeit, pH-/Redox über Mesumformer, Chlor-, Brom-, oder Ozonsensor
Control characteristic	Desalination: 2-point controlling with hysteresis
Signal current output	2x 0/4-20 mA, electrically isolated max. load 500 Ω Range adjustable for measured value
Control outputs	3 power relays to control one inhibitor and two biocide pumps 1 power relay to control a desalination valve
Alarm relay	250 V ~ 2 A, 700 VA contact type changeover
Electrical connection	~/115 V~ or 230 V~ ±10 %
Ambient temperature	wall mounted: 0 ... 45 °C
Enclosure rating	Wall mounted: IP 65
Dimensions	Wall mounted: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation

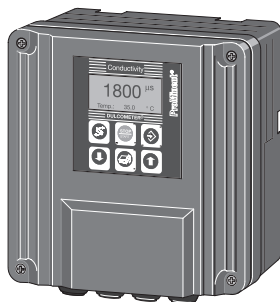
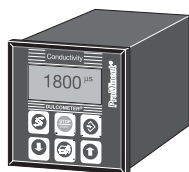
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A complete measuring station comprises the following:

- Measuring transducer / controller ProMcon
- Conductivity sensor with integrated temperature
- Fitting: DGMa..., DLG III ..., immersion assembly
- Temperature sensor Pt 100
- Sensor cable

(for further informations: DULCOTEST® Conductivity Sensors see page → 7-41; Immersion Probe Housings see page → 7-62; Temperature Sensors see page → 7-23; Sensor Accessories see page → 7-53)

8.7.4 Cooling Tower Controller Cool-Control, Type D1Ca



pk_5_006_1

- Control of desalination
- Metering of the inhibitor
- Metering of up to 2 biocides via metering pump or bromine lock
- Daily and 2-weekly timer
- Forced desalination and desalination lock
- Calibration function for metering pumps
- Water meter input with adjustable pulse spacing
- Pause input to lock the measuring in-line measuring probe
- Signal output for conductivity 0/4 ... 20 mA, electrically isolated
- Alarm relay for alarm signalling
- Adjustable alarm limit values for measured value conductivity
- Wall and control panel mounting housing

Applications:

- cooling tower,
- air scrubbers
- air condition systems

A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Conductivity sensor
- Sensor cable

(for further informations: Immersion Probe Housings see p. → 7-62; DULCOTEST® Conductivity Sensors see p. → 7-41; Sensor Accessories see p. → 7-53)

MaHarFan

8.7 Cooling Tower And Boiler Controller

8.7.5 Identcode Ordering System, Cool-Control, Type D1Ca

DULCOMETER® Cool-Control, type D1Ca

D1Ca	Installation	
D	Control panel version 96 x 96 mm (IP 54)	
W	Wall mounted (IP 54)	
	Power supply	
0	230 V, 50/60 Hz	
1	115 V, 50/60 Hz	
4	24 V, AC/DC	
	Measured variable	
K	Conductivity for cooling tower control	
	Measured variable connection	
3	Conductive conductivity sensor terminal	
6	Terminal inductive conductivity sensors	
	Correction variable (temperature)	
0	None	
2	Temperature via terminal (Pt 100 form conductivity sensor LFT, LM, ICT)	
4	Manual temperature input	
	Disturbance variable	
0	None	
2	Flow as frequency 0-500 Hz (contact water meter)	
	Control input	
0	None	
1	Pause	
	Signal output	
0	None	
1	0/4-20 mA measured value (conductivity)	
	Relay control	
G	Alarm, timer and 2 output relays (desalination valve and biocide 2)	
S	Alarm and servomotor (desalination valve only)	
	Pump control	
2	2 pumps(inhibitor and biocide 2)	
	Control characteristic	
0	2-point control with hysteresis/desalination	
	Protocol output	
0	None	
	Language	
D	German	
E	English	
F	French	
G	Czech	
S	Spanish	

8.7 Cooling Tower And Boiler Controller

8.7.6

Technical Data

Measurement range	0...500/2000/5000 µS/cm, 20 mS/cm measured variable L3 0...200/0...2000 µS/cm, 0...20/200/2000 mS/cm measured variable L6
Cell constant	0.006 ... 12.0 (depends on measurement range)
Resolution	0.0625 % of input range
Accuracy	0.5 % from measurement range
Measurement frequency	56 Hz ... 2.7 kHz
Measurement input	terminal (conductive 2- and 4-electrode sensors or/inductive conductivity sensors)
Correction variable	temperature
Correction range	0 ... 100 °C
Control characteristic	2-point control with hysteresis
Signal current output	1 x 0/4-20 mA electrically isolated max. load 600 Ω adjustable measured variable range
Control outputs	2 reed contacts for control for inhibitor and biocide pump 1 2 relays for control of biocide pump 2 and desalination valve
Alarm relay	250 V ~3 A, 700 VA contact type make/break
Electrical connection	24 V ~±/115 V~/230 V~ ±10 %
Ambient temperature	Panel mounted: 0...50 °C (0...45 °C fully dismantled) Wall mounted: -5...50 °C (-5...40 °C fully dismantled)
Enclosure rating	panel mounted: IP 54 wall mounted: IP 65
Dimensions	panel mounted: 96 x 96 x 140 mm (WxHxD) wall mounted: 189 x 200 x 76 mm (WxHxD)

Order no.

Mounting kit for control panel installation

792908

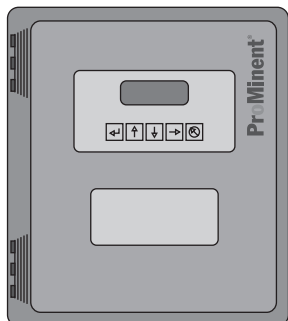
A complete measuring station comprises the following:

- D1Ca measuring transducer /controller (see Identcode)
- Conductivity sensor
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Pt 100 temperature sensor or on-site standard signal
- Sensor cable

(for further informations: DULCOTEST® Conductivity Sensors see p. → 7-41; Immersion Probe Housings see p. → 7-62; Temperature Sensors see p. → 7-23; Sensor Accessories see p. → 7-53)

8.7 Cooling Tower And Boiler Controller

8.7.7 Cooling Tower/Boiler Controller MultiFlex M10



P_DM_0017_SW

NEW

The powerful features

- Simultaneous control of up to 4 cooling towers and/or steam generators
- Configuration via display and keyboard using a standard Web server (to be operated only via the Web browser, e.g. Internet Explorer, no special software required)
- LAN/Ethernet interface
- Up to 14 analogue inputs and outputs
- 12 digital inputs (standard)
- 10 relay outputs (standard)

Easy to operate

- 5-key universal keypad
- illuminated display with 4 lines with 20 characters each
- easy to upgrade with I/O cartridges
- free adaptation to the processes thanks to flexible programmability
- the comprehensive flexibility of the control permits to control cooling towers or steam generators (e.g. 1 steam generator and 3 cooling towers)
- standard built-in Ethernet/LAN interface with IP address which can be specified by the user

Applications:

- Cooling tower
- Boilers

The software Trackster 3 (optional)

Comfortable configuration and remote control via the software Trackster 3.

Together with the embedded Web server, the Trackster 3 software is the programming and control software for the MultiFLEX controllers for cooling towers and steam boilers. Trackster 3 offers tools for real-time visualisation of simple to complex water treatment systems. Trackster 3 permits a time- or event-controlled report generation, data import and export, manual data input, alarm logging and tools for controller networks.

Housing

- IP rating: NEMA4X, IP65, fibreglass housing with two spring locks
- 230 V AC or 115 V AC selectable via switch
- Approvals: CE, CSA, UL

The MultiFlex M10 controller is not listed in our price list. We would be pleased to send you an individual offer on request.

	Nominal sizes and details	Remarks
Analogue and digital inputs and outputs		
Analogue inputs and outputs	14 analogue inputs and outputs for sensors or measuring units	Automatic configuration and driver installation or deactivation
Digital inputs	12 pieces (standard)	User-definable as contact water meter input or as contact input to activate functions
Relay outputs	10 pieces. 2 as make contact, 8 as change-over (standard)	Protection in groups of 5 relays
Alarm relay	Drying contact, without protection	Can be configured by the user as NO or NC

8.7 Cooling Tower And Boiler Controller

	Nominal sizes and details	Remarks
Communication / user interface		
Keypad and LCD display	Universal keypad with 5 keys 4 lines x 20 characters with illumination	Sample rate 100 mS (nominal) User-adjustable contrast
10Base T, TCP/IP Ethernet / LAN	HTML, Telnet Micro Web Server Fixedly adjustable IP address and & port specifications	The embedded Web server shows the controller values in real time and permits a configuration of the unit
Modem (optional)	56K, V.90 Remote Telnet Access	Automatic alarm signalling to pager, mobile phone or PC
Data logging	600 memories for each of the 26 inputs & 10 relays, saved in xml format	Recording rate adjustable from 5 to 1,440 minutes
Operating language	English, other languages available on request	

	Nominal sizes and details	Remarks
Controlling / control		
Relay ON/OFF	ON / OFF control	Each individual relay can be freely assigned to a function
Proportional output 4-20 mA (optional)	User-defined setting through sensor or relay control	Adjustment of zero point and final value of range
Cooling tower: desalination volumetric	User-definable volume unit of measure & metering pumps ON time	Periodic desalination: measures the make-up water volume and then activates the volume-dependent desalination based on user specifications
Boiler: captured sample	Cycle sampling / measurement / desalination / renewed sampling according to user specification	Each sensor can be used
Locking	1 to 12 contact input, AND & OR operation	Relay OFF if contact input open
Lock	When activating the relays 1 to 10, any other relay can be locked (e.g. desalination lock)	Supports the joint metering of oxidant and inhibitor
Alarm - metering time limitation	Time per actuation and day	User-defined metering time limitation
Metering monitor (optional)	Concentration calculation with regard to metering quantity & concentration factor	The metering monitor responds if e.g. no chemical throughput can be measured after 30 seconds of metering pump operation

	Nominal sizes and details	Remarks
System		
Electrical data	115 / 230 V AC, 50/60 Hz	Voltage range switchable
Fuse	7.3 A at 120 V AC 4.15 A at 240 V AC	Relay protection: Relay 1-5 and relay 6-10 each with 6.3 A
Overvoltage protection	Relay 2-5 and 7-10 NO contact, snubber with 0.1 µF	The processor is electrically isolated from the voltage supply
Supply voltage of accessories	15-22 V DC, unregulated, thermically protected with 200 mA	
Housing	Plastics, NEMA4X, IP65	W x H x D = 30 x 35 x 18 cm

	Nominal sizes and details	Remarks
Certification		
CSA: 1523642	CSA-tested, complies with CE guidelines	CSA tested to comply with UL 61010C-1

8.8 DULCOMETER® Transmitters

8.8.1 Measured Variables pH, ORP, Chlorine, Temperature, Conductivity, Measuring Transducer DMTa



DULCOMETER® DMT type transmitters are compact 2-wire transmitters for measured variables pH, redox, chlorine, conductive conductivity, temperature. Easily combined with programmable memory controllers.

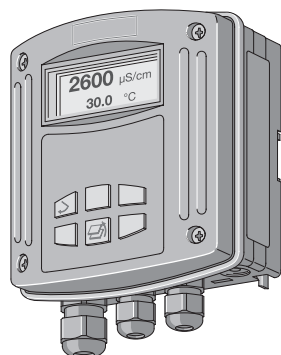
Summary of advantages:

- Reliable measurement due, e.g., to symmetrical input for pH and redox signals
- High level of operating safety, e.g. probe monitoring (pH), electrical isolation
- Simple flexible installation
- Full text user guidance
- Automatic buffer recognition (pH)
- Autoranging (conductivity)
- Compact design
- Switch between pH, redox and temperature

Applications:

- process control
- food and beverage industry
- chemical industry
- pharmaceutical industry
- water treatment
- waste water treatment
- power stations

Technical data



pk_5_001

Measurement range	pH - 1.00 ... 15.00 - 1200 ... +1200 mV redox voltage 0.01 ... 5.0 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, Redox); input resistance > 5 x 10 ¹¹ Ω Chlorine terminal (DMT chlorine probes) 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, LF: 0 ... 100 °C
Current output	4...20 mA
Fault current	23 mA
Feed voltage	2-wire transmitter, 16 ... 40 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	up to 95 % relative humidity (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
Weight	0.45 kg

8.8 DULCOMETER® Transmitters

A complete measuring station comprises the following:

- Measuring transducer DMTa (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Chlorine sensor (dependent on Identcode)
- Assembly set for chlorine sensor
- pH sensor (dependent on Identcode)
- Redox sensor (dependent on Identcode)
- Temperature sensor Pt 100 /Pt 1000 (dependent on Identcode)
- Conductivity sensor
- Sensor cable
- PROFIBUS®-DP connection accessories

(for further informations: Immersion Probe Housings see p. → 7-62; Chlorine Measuring Cells see p. → 7-24; pH-Combination Probes With SN6 Or Vario Pin see p. → 7-10; ORP Combination Probes With Fixed Cable see p. → 7-22; Temperature Sensors see p. → 7-23; DULCOTEST® Conductivity Sensors see p. → 7-41; Sensor Accessories see p. → 7-53; Dosing Monitor, Control Cable see p. → 1-73)

8.8 DULCOMETER® Transmitters

8.8.2 Identcode Ordering System Measuring Transducer 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 Redox
		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 4-7-10
		D Ref. buffer DIN 19266 pH 4-7-9
		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 Prop. 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 Identcode 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 does not exist for control panel mounting.

8.9 Measuring and test systems

8.9.1

Portamess Portable Meters, Measured Variable pH

- Smooth membrane keypad
- Large easy-to-read LC display
- Integrated sensor quivers for protection of electrode
- Robust housing (enclosure rate IP 66)
- Robust, watertight gold plated connector sockets

Applications:

- industrial
- environmental protection
- food production
- in water and waste water investigation.

Technical data



pk_5_099

Measurement range	pH: -2.00 ... +16.00 mV: -1300 ... +1300
Measurement error	pH: < 0.01 mV: < 0.1 % of measured value ± 0.3 mV
Sensor adjustment	8 buffer record options
Temperature compensation	manual
Enclosure rating	IP 66
Operating life	2000 hours with 3 AA batteries
Dimensions H x W x D	160 x 133 x 30
Weight	560 g with batteries
Included in delivery	Measuring device, carrying case, operating instructions manual in German, English and French

	Order no.
Portamess® 911 pH	1008710

Note:

The scope of delivery does not include any pH sensor.

Zubehör

	Capacity ml	Order no.
pH sensor PHEK-112-S	-	305051
Coaxial cable Ø 5 mm, 0.8 m - SD*	-	305098
Buffer pH 7.0	50	506253
Buffer pH 4.0	50	506251

* fitting for all ProMinent®pH sensors with SN6 connection

Electrode tubular see Chapter 8.10.2

8.9 Measuring and test systems

8.9.2 Portamess Portable Meters Measured Variable, Conductivity

- Connection of the 4-electrode sensor LF 204 (see Chapter 5.4.3 Accessories for Portamess® units)
- 4-electrode sensor LF204 included in delivery scope
- robust key pad
- large, well-legible LC display
- integrated electrode tubular to protect the electrode
- robust housing (IP rating IP 66)
- robust, watertight, gold-plated connecting sockets

Applications:

- in the industry
- in environmental protection
- in the food industry
- in the water or waste water analysis.

Technical data



pk_5_098

Measurement range	Unit 0.01 $\mu\text{S}/\text{cm}$... 1,000 mS/cm , with sensor LF204: 1 $\mu\text{S}/\text{cm}$... 500 mS/cm
Temperature	-20 ... 120 °C
Salinity	0.0 ... 45.0 g/kg (0 ... 30 °C)
TDS	0 ... 1999 mg/l (10 ... 40 °C)
Measurement error	Conductivity < 0.5 % of M. (at conductivity levels > 500 mS/cm < 1 % of M.) ± 1 digit Temperature < 0.3 K ± 1 digit
Measuring cell adjustment	Direct input of cell constants, automatic detection of cell constants with KCl solution 0.01 or 0.1 mol/l, cell adjustment with any known solution
Cell constant	0.010 ... 199.9 cm^{-1} (adjustable)
Temperature compensation	configurable
Enclosure rating	IP 66
Operating life	Approx. 1000 hours with 3 AA batteries
Dimensions H x W x D	160 x 133 x 30
Weight	560 g with batteries
Included in delivery	Measuring unit, field case, conductivity sensor LF 204, operating instructions in the German, English, and French language

	Order no.
Portamess® 911 Cond	1008713

Accessories:

Conductivity sensor and electrode tubular see Chapter 8.10.2

Note:

The scope of delivery does include the conductivity sensor LF 204.

8.9 Measuring and test systems

8.9.3

Photometer

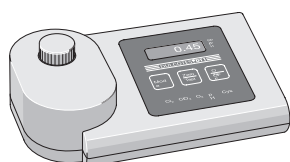
Photometer DT1, DT2, DT3 and DT4

- Portable compact Photometer
- Simple to operate with support text
- Reliable, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H₂O₂, bromine, ozone, pH and and trichloroisocyanuric acid
- Self-diagnostic

Applications:

- swimming pool
- drinking water
- process water

Technical data



pk_5_021
Photometer

Measurement range

DT1:

0.05 ... 6.0 mg/l free chlorine (DPD1) + total chlorine (DPD1+3)
 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

DT2B:

0.05 ... 2.0 mg/l fluoride
 0.05 ... 6.0 mg/l free chlorine and total chlorine
 0.05 ... 11.0 mg/l chlorine dioxide

DT3:

1 ... 50 / 40 ... 500 mg/l hydrogen peroxide

DT4:

0.03 ... 2.5 mg/l chlorite,
 0.05 ... 11 mg/l chlorine dioxide,
 0.05 ... 6 mg/l chlorine

Measuring tolerance

Dependant upon measured value and measuring method

Battery

9 V battery (approx. 600 x 4-minute measurement cycles)

Permissible ambient temperature

5...40 °C

Relative humidity

30 ... 90 % (non-condensing)

Material

Housing material: ABS
 Keypad: Polycarbonate

Dimensions L x W x H (mm)

190 x 110 x 55

Weight

0.4 kg

	Order no.
Photometer DT1	1003473
Photometer DT2B	1010394
Photometer DT3	1023143
Photometer DT4	1022736

Photometers supplied with accessories, container vessels and reagents.

8.9 Measuring and test systems

Consumable items

	Order no.
DPD 1 buffer, 15 ml	1002857
DPD 1 reagent, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets R 263 (100 in each)	305531
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l for calibration of photometer (fluoride detection)	1010382
3 off spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 off spare cells for fluoride detection (DT2A and B)	1010396
DPD reagents set, 15 ml each: 3 x DPD 1 buffer, 1 x DPD 1 reagent, 2 x DPD 3 solution	1007567
Chlorine dioxide tablets Nr. 1 R 127	501317
Chlorine dioxide tablets Nr. 2 R 128	501318

Spare parts

Chlorite Photometer

	Order no.
Foamer for expulsion of chlorine dioxide (DT4)	1022754
3 off spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566

H₂O₂ measurement

	Order no.
Reagent for H ₂ O ₂ (DT3), 15 ml	1023636
Spare cell, 5x , for H ₂ O ₂ (DT3)	1024072

8.10 Accessories For Measurement And Control Devices

8.10.1 Measurement Transmitter 4...20 mA (Two Wire)

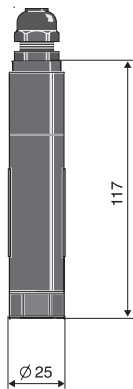
Advantages:

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

Typical applications:

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

pH measuring transducer 4 ... 20 mA type pH V1



pk_5_064

Measurement range	pH 0 ... 14
Measurement error	better than 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 measurement transducer 4 ... 20 mA type pH V1	809126

ORP measuring transducer 4 ... 20 mA type RH V1

Measurement range	0 ... 1000 mV
Measurement error	better than ±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 measurement transducer 4 ... 20 mA type RH V1	809127

8.10 Accessories For Measurement And Control Devices

Temperature measuring transducer 4 ... 20 mA type Pt100 V1

Measurement range	0 ... 100 °C
Measurement error	better than $\pm 0,5$ °C (typical $\pm 0,3$ °C)
Socket	SN6
Input resistance	$\sim 0 \Omega$
Signal current output	4 ... 20 mA \approx 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 (\varnothing)

Order no.
Temperature measurement transducer 4 ... 20 mA type Pt 100 V1

809128

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 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 H₂O₂ measurement

contains an internal selector switch for the three ranges:

1 ... 20, 10 ... 200 and 100 ... 2000 mg/l H₂O₂

Order no.
Perox transducer PEROX-micro-H1.20-mA

741129

Accessory:

Order no.
Test lead, 3-core (3 x 0.25 mm², 5 mm diam.)

791948

8.10 Accessories For Measurement And Control Devices

8.10.2

Accessories For Portamess® Portable Meters

Electrode case

Set of 5, for water-tight storage of sensors. For Portamess® pH and Cond

	Order no.
Electrode case	1008716

Conductivity sensor



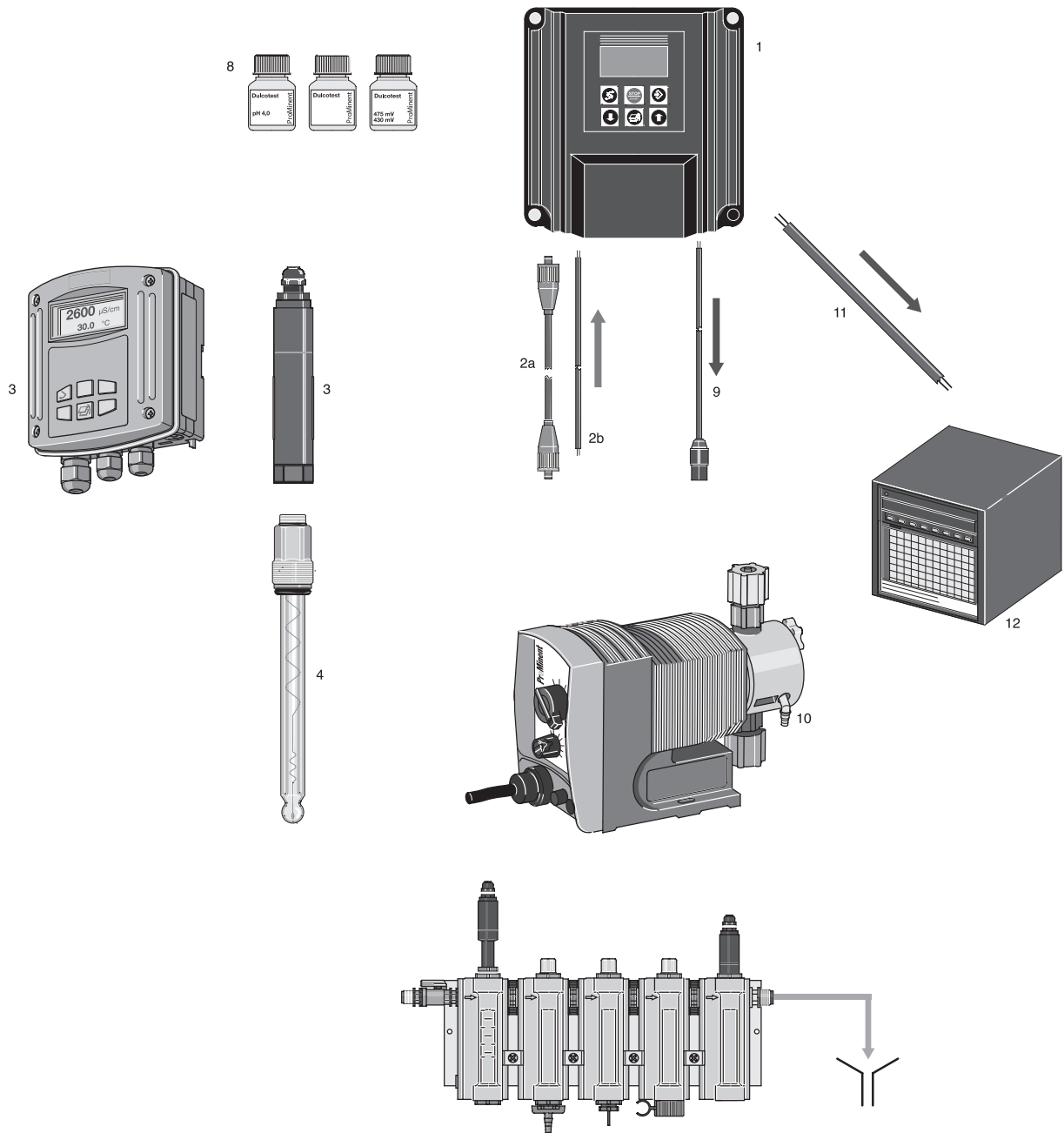
	Conductivity sensor LF 204
Number of electrodes	4
Electrode shaft	Black Epoxy
Electrode material	Graphite
Shaft length	120mm
Shaft diameter	15.3mm
Cable length	1.5 m
Temperature probe	NTC (30 kΩ) -5 ... 100 °C
Immersion depth min.	36mm
Max. pressure	2 bar
Temperature	0 ... 90 °C
Cell constant	0.475 cm ⁻¹ ±1.5 %
Measurement range	1 μS/cm...500 mS/cm

	Order no.
Conductivity sensor LF 204	1008723

pk_5_093

8.11 Application Examples

8.11.1 Measuring And Control Systems Consist Of



pk_5_000_2

- 1 Measuring and control device e.g. D1CA
- 2a Signal lead e.g. coaxial cable for pH, Redox, Pt 100 measuring cells
- 2b 2-core cable for Cl₂, ClO₂, O₃ measuring cells and transmitters
- 3 4-20 mA transmitter (for 2-wire technology), DMTa or pH V1
- 4 Probe, e.g. pH combination probe
- 5 Probe housing, e.g. in-line type DGMA
- Assembly kit (791818) for Cl₂, ClO₂, O₃ measuring cells (not shown)
- 6 Sample water pipe stop cock
- 7 Sampling tap
- 8 Buffer solutions (pH/redox)
- 9 Control cable (for control of dosing pump)
- 10 actuating device e.g. ProMinent® Beta® dosing pump
- 11 2-core cable
- 12 Recorder e.g. line recorder

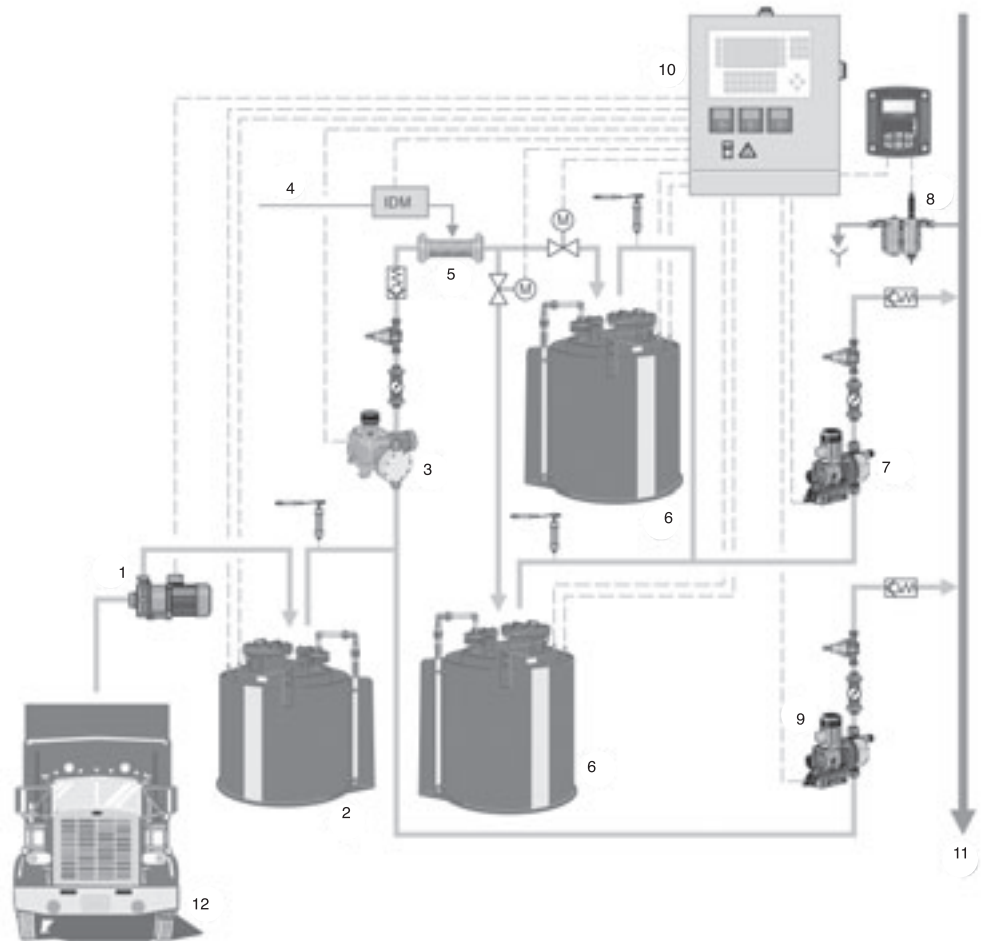
8.11 Application Examples

8.11.2 Disinfection Of Drinking Water

Product: **D1Ca single-channel controller, DMTa measurement transducer, chlorine sensors and fittings, Makro and Sigma motor metering pumps, tanks (approved according to the German Water Resources Act)**

Sector: **Municipal drinking water**

Application: **Disinfection of drinking water by means of sodium hypochlorite**



pk_5_054

- 1 Centrifugal pump for filling concentrate tank - **vonTaine®**
- 2 Concentrate tank $V = 8 \text{ m}^3$
- 3 Metering pump for sodium hypochlorite - **Makro TZ**
- 4 Fresh water feed for dilution
- 5 Mixing of water/sodium hypochlorite in static mixer
- 6 Supply tank $V = 20 \text{ m}^3$ for diluted solution
- 7 Metering into drinking water network - **Sigma**
- 8 Measurement of chlorine concentration in drinking water network
- 9 **DULCOMETER® DMTa transducer**
- 10 Concentrate metering in case of malfunction - **Sigma**
- 11 Central control
- 12 Drinking water network
- 13 Chemical feed

8.11 Application Examples

Tasks and requirements

Securing the drinking water supply in a town with a water demand of 36.000 m³/day.

Operating conditions

- Greatly fluctuating drinking water demand

Solution

Controlled metering of a 12 % sodium hypochlorite solution, made from diluting a 19 % solution, in two drinking water lines by means of three ProMinent Sigma® motor metering pumps. At times of peak load of raw water, the undiluted solution is metered directly from the concentrate tank by means of two further Sigma motor metering pumps. To ensure controlled metering and effective monitoring of the chlorine concentration in the drinking water, the chlorine concentration is measured with a ProMinent® CLE chlorine sensor and a ProMinent® DMTa measurement transducer at a suitable location downstream of the metering points in each drinking water line.

All metering operations are controlled by ProMinent® D1Ca controllers. The overall system is controlled and monitored by means of a Siemens S7 PLC with touch panel.

Benefits

- Sterile drinking water
- No operating personnel necessary – fully automatic system
- No interface problems
- Everything from one single supplier

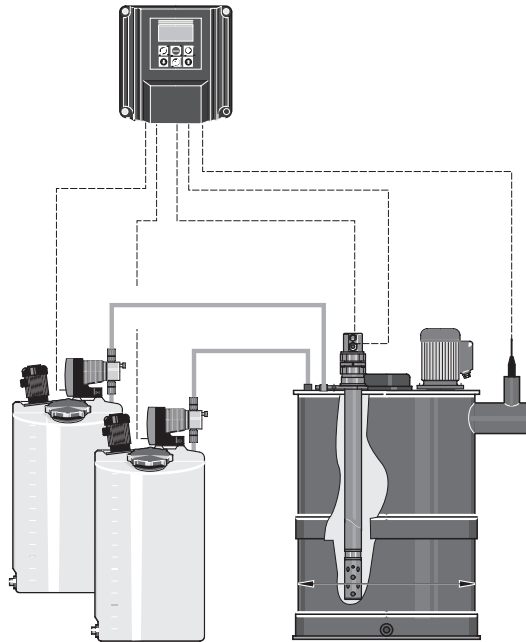
8.11 Application Examples

8.11.3 Neutralisation Of Industrial Waste Water

Product: **D2Ca two-channel controller, pH sensors and fittings, solenoid metering pumps, tank, agitator**

Sector: **Industrial waste water treatment**

Application: **Neutralisation of industrial waste water that may be acid or alkaline**



pk_5_052

Tasks and requirements

Waste water that may have a pH value between 4 and 12 occurs discontinuously in an industrial plant. Only waste water that has a pH value between 6.5 and 9.5 may be directed into the public sewage system.

Operating conditions

- Greatly fluctuating pH value
- Discontinuous occurrence of waste water

Solution

- The D2C controller controls the pH value in the neutralisation tank and monitors the pH value in the final stage
- Only when released can the neutralisation tank be discharged into the sewage system.

Benefits

- The pH value is always within the legally stipulated limits
- No interface problems
- Everything from one single supplier

8.11 Application Examples

8.11.4 Treatment Of Swimming Pool Water In A Wellness Hotel

Product: **DULCOMARIN® II, chlorine sensors with CANopen bus, Beta® 4aCANopen metering pumps, pH sensors, and flow-type conductivity cell**
 Metered medium: **Sodium hypochlorite, sulphuric acid, flocculants**
 Application: **Disinfection of swimming pool water**

Tasks and requirements

- Hygienically safe swimming pool water
- The measurement and control system is to be connected to the building control system (EIB).

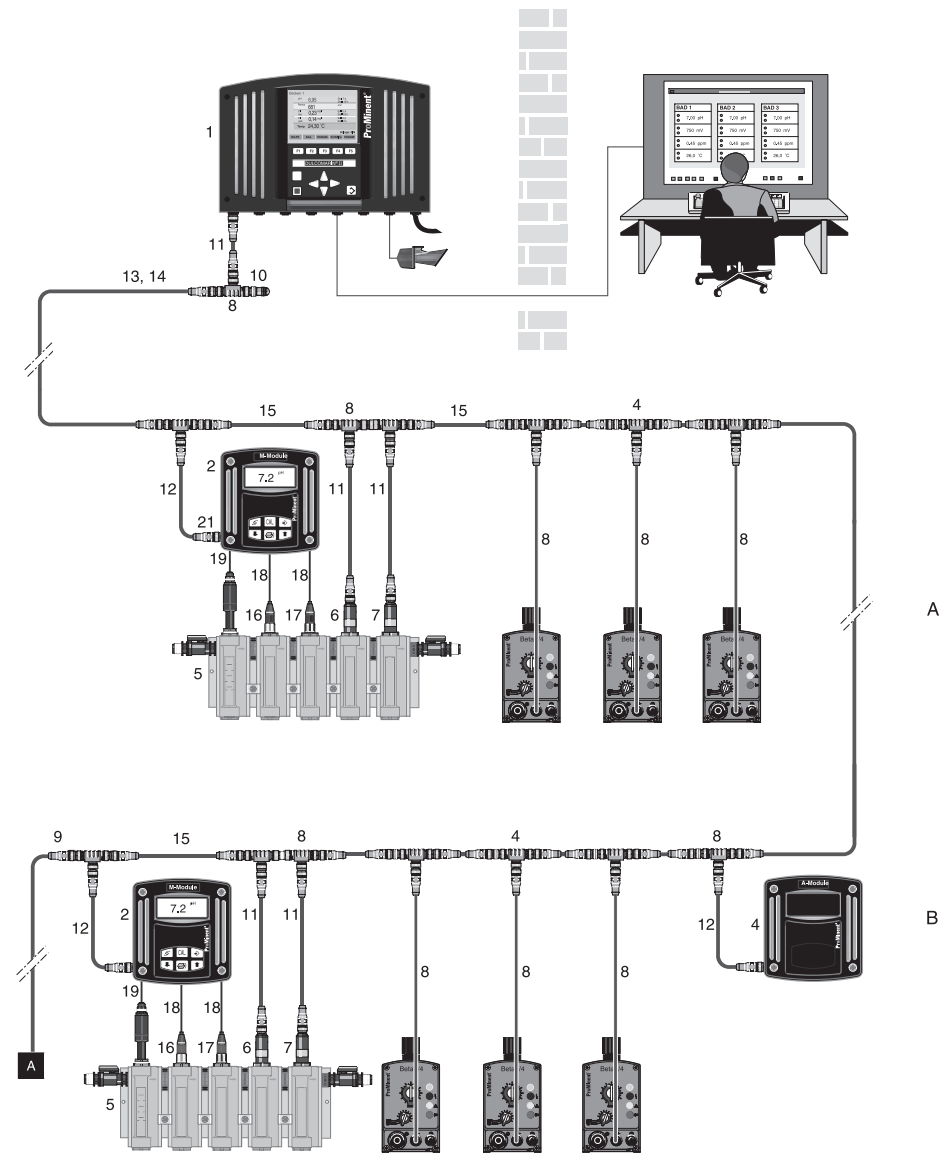
Operating conditions

- Whirlpools and swimming pools in a wellness hotel

Solution

The distributed swimming pool control system DULCOMARIN® II makes it possible to monitor all 5 water circuits from one location (swimming pool attendant's station) and measured values on the integrated videographic recorder. The most important parameters such as pH value, chlorine concentration, ORP and water temperature are transferred to the building control system via Ethernet and the open Windows® interface OPC. From here, alarm SMSs are sent to the operating personnel as required.

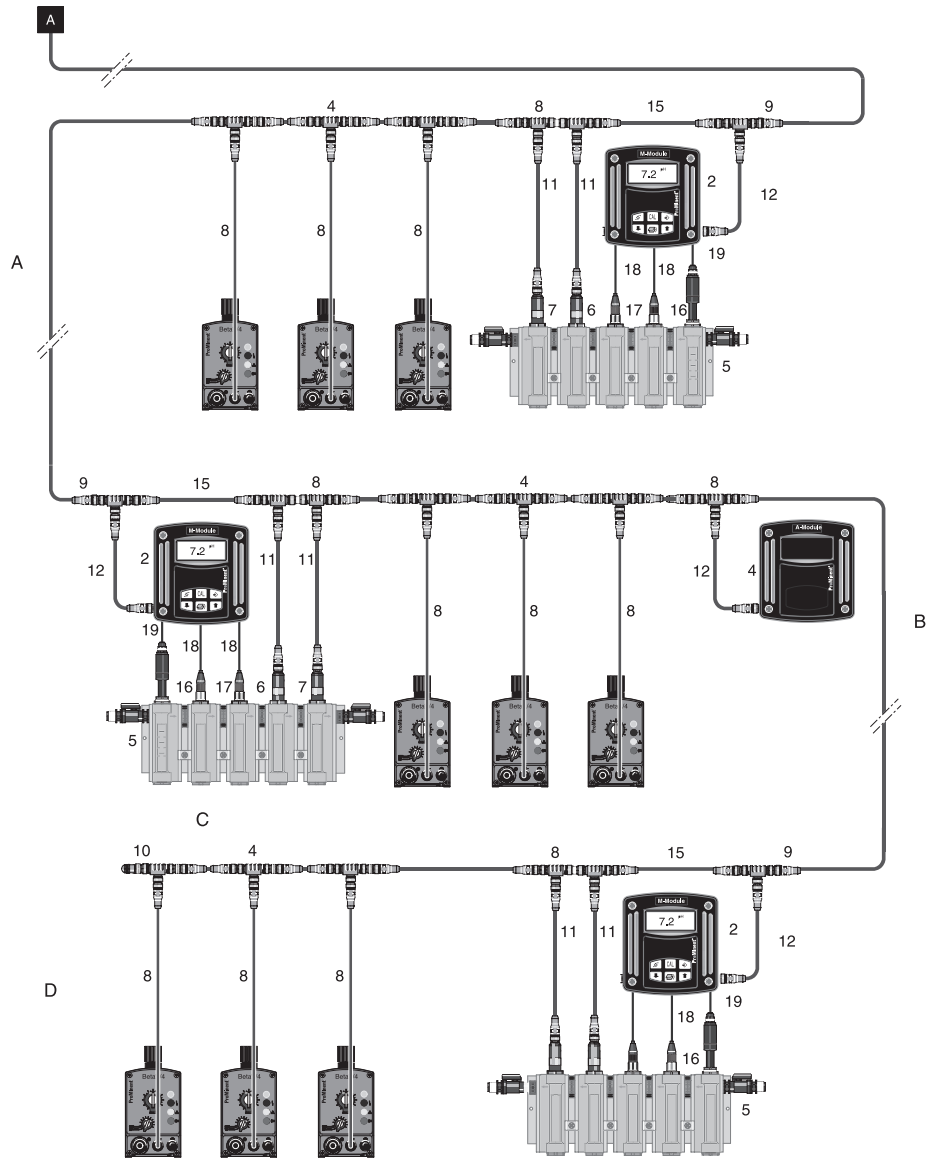
A Whirlpool 1
 B Whirlpool 2



pk_5_050

8.11 Application Examples

- A Dip pool
- B Paddle pool
- C (terminating resistor)
- D Swimming pool



pk_5_051

Benefits

- Hygienically safe swimming pool water
- Clear overview of the complete system from the swimming pool attendant's station
- Videographic recorder, installed as standard, provides seamless documentation of the hygiene parameters
- Most important parameters visible in building control room
- No interface problems
- Everything from one single supplier

8.11 Application Examples

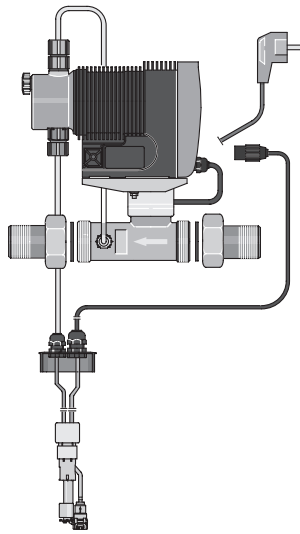
9 Domestic Water Plant

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9.0 Systems For Domestic Water Installations

9.0.1

Proportional Flow Dosing System For Liquid Dosing



pk_4_001

turboDOS®, DULCODOS®

metering systems protect pipework, fittings, and devices such as boilers, washing machines and dish-washers against corrosion and scale. Here, active substances such as silicate, phosphate or silicate-phosphate mixtures are metered. These active substances form a protective layer in the pipework and reduce the corrosiveness and hardness deposits of the water:

Silicate

as corrosion inhibitor to prevent rust formation: "brownish water" in galvanised piping system, "pitting": needle-like holes in the piping. The applications include soft, corrosive waters with a high percentage of aggressive carbonic acid. The silicate acts to raise the pH value in the direction of the lime-carbonic acid equilibrium. Hydrolysis produces a silica gel which forms a thin protective layer in the pipework and fittings and thus prevents corrosion.

Phosphate

as ortho- and polyphosphate to prevent scale and corrosion in hard waters up to max. 20 CH (carbonate hardness). The hard-water salts such as calcium and magnesium ions responsible for scales are stabilised, i.e. these ions remain dissolved in the water and do not deposit as scale at the pipe walls. Overgrowing of the pipes is prevented and no scales deposit on the heating coils which dramatically reduce the efficiency. A thin, solid protective layer is formed. Mixtures containing silicate and phosphate for soft and medium-hard waters as corrosion and scale inhibitor. In order to maintain the protective layer, a continuous feed of the metering medium is required because otherwise this layer degrades within a few days.

EXACTAPHOS®

The EXACTAPHOS® metering solutions are matched to the metering output of the turboDOS® and DULCODOS® systems. This guarantees that the percentages permissible according to the "German drinking water ordinance" of max. 40 mg/l SiO₂ silicate and/or 6.7 mg/l phosphate PO₄ (5 mg/l P₂O₅) are complied with.

Function of the systems

The water flow causes the turbine meter or contact water meter to signal pulses with fixed pulse spacing corresponding to the flow rate to the metering pump. Each of these pulses result in a metering stroke of the metering pump, adding metering solution. The metering amount per stroke can be adjusted continuously between 100 - 50 % using the stroke adjustment knob. Because of the very low response threshold and the short pulse spacing, a constant volume-proportional chemical metering is always maintained from minimum to maximum water flow rate and thus also guarantees the best process result.

turboDOS® proportional flow metering system

Consisting of a Beta® metering pump, turbine meter, suction fitting with foot valve and 2-phase level switch with pre-alarm as protection against dry running und empty signal, metering valve and metering line. In the version "R" compact metering system, the metering pump is built onto the turbine meter. In the version "W" split metering system with wall bracket for mounting the metering pump. The turbine meter can be installed either vertically or horizontally.

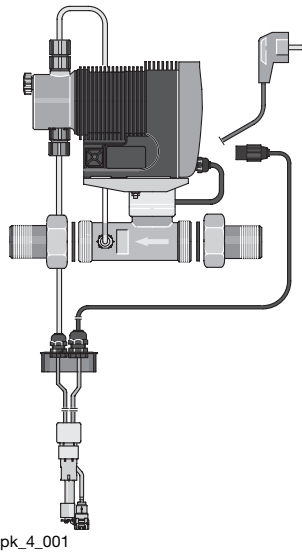
DULCODOS® domestic

Consisting of a ProMinent® metering pump of the Beta® series and gamma/ L with Pulse Control option for increasing or decreasing the incoming pulses, assembled on a stable, refillable metering tank with suction fitting and lockable screw cover as well as contact water meter. Manual or electronic agitators and further accessories can be installed. With the metering systems DULCODOS® domestic, the specific metering output can be adapted to the individual requirements using the option Pulse Control, e.g. for chlorine metering in a domestic well water supply.

9.1 turboDOS® Proportional Flow Dosing Plant

9.1.1

turboDOS®



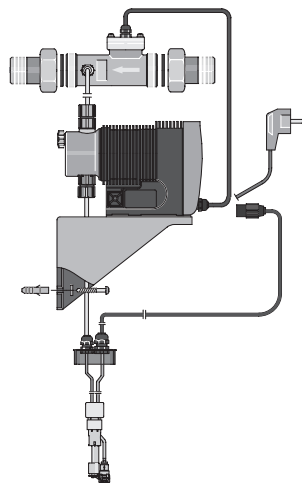
pk_4_001

Flow dosing system for adjustable chemical feed for the treatment of drinking water with chemicals such as EXACTAPHOS®. Consisting of ProMinent® Beta® metering pump, flow meter, suction assembly with foot valve and float switch, dosing valve and discharge tubing.

Version "R"; compact dosing system. Dosing pump mounted horizontally onto flow meter (see fig. pk_4_001).

Version "W"; split system with wall bracket for dosing pump. Pacing cable and 2 m PE discharge tubing. Optional flow meter mounting positions (see fig. pk_4_003).

		NG 10 R NG 10 W	NG 20 R NG 20 W
Flow meter connector*		1 1/4*	1 1/4*
Connector thread G		1 1/2 A	1 1/2 A
Length without thread	mm	135	135
Length with thread	mm	250	250
Response flow rate	m ³ /h	0.04	0.04
Lower operating limit	m ³ /h	0.05	0.08
Upper operating limit	m ³ /h	10.5	22.0
Dosing interval	l	1.80	3.20
Feed rate 50-100 %	ml/m ³	50 – 165	50 – 165
Max. turbine operating pressure	bar	10	10
Max. dosing pump operating pressure	bar	10	10
Operating temperature	°C	30	30
pressure loss at upper operating limit	bar	0.2	0.5
Flow rate at 0.2 bar pressure loss	m ³ /h	13	13
Electrical connection		230 V–50/60 Hz	230 V–50/60 Hz
Power Uptake	W	20	20
Metering pump type		BT4a 1602 PPE 2	BT4a 1005 PPE 2



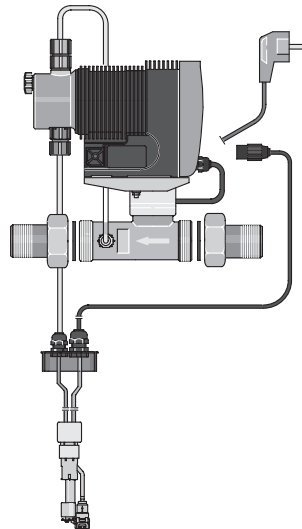
pk_4_003

* Connector width 1 1/4" with standard dimension threaded connector. Can be connected to smaller threaded connectors (see page 4).

The threaded connector is not supplied as standard.

9.1 turboDOS® Proportional Flow Dosing Plant

9.1.2 turboDOS® Accessories



pk_4_001

Shipping weight Order no.
kg

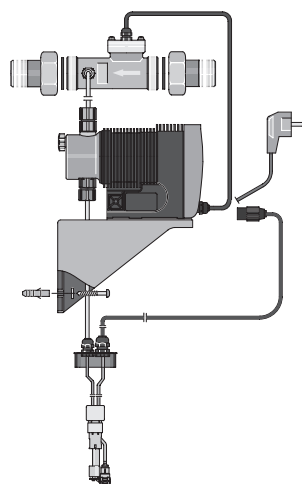
NG 10 R compact dosing system	4	1002515
NG 10 W split dosing system	4	1002517
NG 20 R compact dosing system	4	1002516
NG 20 W split dosing system	4	1002518

Accessories not supplied as standard

Threaded union set, brass with seal and 1 1/2" union nut. 2 connectors required.

Order no.

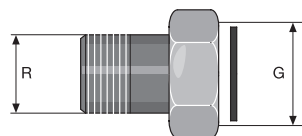
Flow meter connector DN 32 – R 1 1/4 – G 1 1/2 - (turboDOS®) – brass	359034
Flow meter connector DN 25 – R 1 – G 1 1/2 – brass	359026
Flow meter connector DN 20 – R 3/4 – G 1 1/2 – brass	359025



pk_4_003

Materials

- Liquid end and valve polypropylene (PP)
- Dosing diaphragm EPDM with PTFE insert
- O-rings EPDM
- Valve balls ceramic
- Float switches PP
- Suction assembly flexible PVC
- Discharge tubing PE
- Flow meter housing brass
- Turbine PPE
- Shaft hard alloy
- Mounting sapphire



pk_1_098

9.2 DULCODOS® domestic Water Meter Controlled Dosing Plant

9.2.1 DULCODOS® domestic

Flow proportional flow dosing for potable and industrial water.

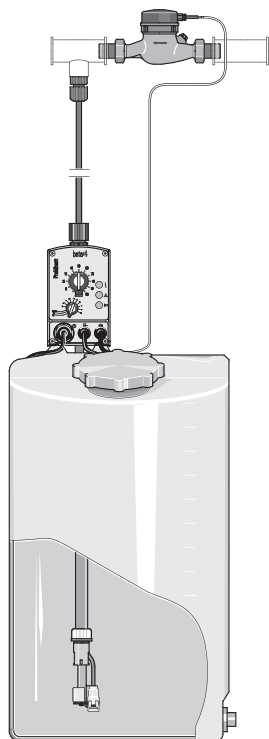
Included in delivery:

Contact water meter PN 16 - read-off - unions and seals.

Metering tank made of transparent PE with litre scale and lockable screw cover constructed with ProMinent® Beta® and/or gamma/ L metering pump with Option Pulse Control for flow-proportional metering. With operating, advance warning and empty indication, mains leads with safety plug and 2 meter contact lead.

Technical data

Water treatment chemicals see chapter 7.4.



pk_4_004_1

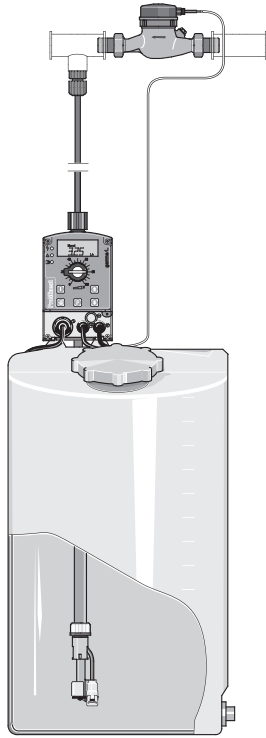
Metering systems with Beta® metering pump

	Pump type	Max. flow rate m ³ /h	Max. pressure bar	Tank size		Connector width (KWM)	Pulse rate I	Shipping weight kg	Order no.
				I	R				
DN 10/16	BT4a1602NPB2	10	16	60	1	1	25	1008155	
DN 10/16-140	BT4a1602NPB2	10	16	140	1	1	28	1008156	
DN 20/10	BT4a1005NPB2	20	10	60	1 1/2	2	30	1008157	
DN 20/10-140	BT4a1005NPB2	20	10	140	1 1/2	2	33	1008158	
DN 30/10	BT4a1008NPB2	30	10	140	2	3	50	1008159	

Max. temperature 45 °C
Electrical connection 230 V 10%, 50/60 Hz
Feed rate 16.500...165 ml/m³

9.2 DULCODOS® domestic Water Meter Controlled Dosing Plant

Metering systems with metering pump gamma/ L



	Pump type	Max. flow rate	Max. pressure	Tank size		Connector width (KWM)		Pulse rate	Shipping weight	Order no.
				l	R	l	R			
DN 10/16	GALa1602NPB2	10	16	60	1	1	1	25	913051	
DN 10/16-140	GALa1602NPB2	10	16	140	1	1	1	28	913052	
DN 20/10	GALa1005NPB2	20	10	60	1 1/2	2	2	30	913053	
DN 20/10-140	GALa1005NPB2	20	10	140	1 1/2	2	2	33	913054	
DN 30/10	GALa1008NPB2	30	10	140	2	3	3	50	913055	

Max. temperature 45 °C
Electrical connection 100-230 V 10%, 50/60 Hz
Feed rate 0.165...165 ml/m³, even higher concentrations possible at reduced flow

pk_4_004_2

9.3 Chemicals For Water Treatment

9.3.1

Chemicals

DULCOPHOS CF 3

Solid phosphate (powder) P₂O₅ content 20 %, boiler water treatment, residual hardness bonding and alkalinity level raising agent. Metering device, after dissolving in water: DULCODOS®.

	Volume kg	Order no.
DULCOPHOS CF 3	50	500713

EXACTAPHOS SP 210

Phosphate-silicate liquid metering solution. Potable water treatment for soft water. turboDOS® compact metering system.

	Volume l	Order no.
EXACTAPHOS SP 210	10	950044
EXACTAPHOS SP 210	20	950097
EXACTAPHOS SP 210	200	950043

EXACTAPHOS P 612

Phosphate liquid metering solution. Potable water treatment for medium hard water. turboDOS® compact metering system.

	Volume l	Order no.
EXACTAPHOS P 612	10	950049
EXACTAPHOS P 612	20	950098
EXACTAPHOS P 612	200	950048

EXACTAPHOS P 1020

Phosphate liquid metering solution. Potable water treatment for hard water. turboDOS® compact metering system.

	Volume l	Order no.
EXACTAPHOS P 1020	10	950054
EXACTAPHOS P 1020	20	950099
EXACTAPHOS P 1020	200	950053

ProMaqua® Equipment Catalogue

Products:

- **For Disinfection**
- **For Oxidation**
- **Membrane Technology**
- **Gravity Filters**

Issued by:

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Subject to technical amendments.

This product catalogue replaces
all previous catalogues and
price lists.

Heidelberg, January 2009



MaharFan

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1 Dulcodes UV Systems

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1 Dulcodes UV Systems

1.1 General Notes On UV Treatment

Disinfection is a fundamental step in modern water treatment. UV disinfection is being used to an ever increasing extent here, as a safe, chemical-free and reliable disinfection process. Extensive research projects and numerous trouble-free operational systems prove the safety and reliability of UV disinfection.

With UV disinfection, the water to be disinfected is irradiated with ultraviolet light, which involves a purely physical, chemical-free process for water disinfection.

UV-C radiation in particular, with a wavelength in the 240 to 280 nm range, attacks the vital DNA of the bacteria directly. The radiation initiates a photochemical reaction and destroys the genetic information contained in the DNA. The bacteria lose their reproduction capability and are destroyed. Even parasites such as Cryptosporidia or Giardia, which are extremely resistant to chemical disinfectants, are efficiently reduced.

The initiation of photochemical reactions is utilised in other applications too. The undesirable combined chlorine in swimming pool water is reduced by UV radiation, as a result of which enormous fresh water savings are achieved. Oxidants such as ozone, chlorine or chlorine dioxide are reliably reduced in the production water used in the food and beverages industry, avoiding the need for costly activated charcoal filters.

Special version systems with special lamps and special composition of the radiation chamber can be used for reduction of TOC (Total Organic Carbon) in the treatment of ultrapure water.

UV disinfection has many advantages:

- Immediate and safe destruction of the bacteria without addition of chemicals
- Photochemical reduction of undesirable substances
- No THM or AOX formation, no formation of other undesirable substances
- No impairment of odour or taste of the water
- No storage and handling of chemicals required
- Effect is independent of pH
- No reaction vessel or reaction tank required
- Low space requirement
- Low investment and operating costs with high reliability and efficiency

1.2 Applications Of Dulcodes UV Systems

A large number of UV disinfection systems have been supplied worldwide, for the most diverse applications:

- **Own source water suppliers and municipal water works**
for disinfection of drinking water
- **Food and beverages industry**
to destroy the bacteria in the water needed for food and beverages production and for disinfection of service water
to reduce the chlorine dioxide in the production water
- **Pharmaceuticals and cosmetics industry**
to maintain the high microbiological requirements of the production water
to destroy residual ozone in the production water without use of activated charcoal filters
- **Reverse osmosis plants**
for permeate disinfection
- **Municipal sewage plants**
for reduction of the bacterial count in the sewage plant outflow
for reduction of the bacterial count in the industrial water extracted from the sewage plant outflow
- **Horticulture**
for disinfection of the irrigation water
- **Spa pools and swimming pools**
for disinfection of the pool water
for chloramine reduction in the pool water
- **Semiconductor industry**
for reduction of TOC and to maintain the high microbiological requirements of the production water

1 Dulcodes UV Systems

1.3 Description Of Dulcodes UV Systems

Basically, Dulcodes UV disinfection systems consist of:

- High-quality radiation chambers made from stainless steel (DIN 1.4404 or 1.4571 or ANSI 316 Ti) or UV-resistant plastic
- Lamp protection tubes made from high-quality quartz, easily removable for cleaning purposes
- Lamps with a particularly high UV output in the 254 nm range, ensuring an outstanding disinfection characteristic
- Highly selective UV sensors with good long-term and temperature stability
- UV system controllers and modern electronic ballasts fitted in a control cabinet

The special features of our Dulcodes UV disinfection systems are:

- Even irradiation of the entire water flow through optimised system hydraulics, so ensuring outstanding disinfection results
- Flow-optimised inlet zone
- Longitudinal flow against UV lamps with high turbulence
- Use of UV lamps with long service life and high UV-C output
- Automatic cleaning system for the sleeve of medium-pressure lamps
- Manual cleaning system for the sleeve of system type Dulcodes R
- System controller with comprehensive monitoring and reporting functions
- Display of all important operating parameters and reporting of faults in plain text
- Trend display of the variation of the UV sensor signal with time
- Analogue output sensor signal and alarm relay
- Use of modern electronic ballasts with bus technology for lamp-friendly ignition and operation
- Individual lamp monitoring
- Direct control of automatic isolation and flushing valves

1.3.1

Dulcodes UV Lamps

Standard low pressure lamp

Robust low pressure mercury lamp with a life expectancy of approx. 10,000 to 14,000 operating hours. The operating temperature of the lamp is 30-50 °C. This is why its use is limited to water temperatures between 5 and 40 °C. The output is approx. 100 W per metre arc length.

Low pressure lamp High-Flux

Low pressure amalgam lamp with a life expectancy of approx. 8,000 to 10,000 operating hours. The operating temperature of the lamp is 100-130 °C. This is why its use is limited to water temperatures of up to 70 °C. The output is independent of the water temperature and is approx. 200 W per metre arc length.

Low pressure lamp Opti-Flux

Doped, high-performance low pressure amalgam lamp with a life expectancy of approx. 14,000 operating hours. The operating temperature of the lamp is 100-130 °C. This is why its use is limited to water temperatures of up to 70 °C. The output is independent of the water temperature and is approx. 300 W per metre arc length.

Medium pressure lamp Powerline

Medium pressure mercury lamp with a life expectancy of approx. 6,000 to 10,000 operating hours, depending on lamp size. The high output of these lamps (up 10,000 W per metre arc length) permits the treatment of very large flows. Thanks to their broad range spectrum, these lamps are specifically suitable for photochemical processes. The operating temperature of the lamp is 650-850 °C. Powerline medium pressure lamps are typically operated with a mechanical wiper system. This is why their use is limited to water temperatures of up to 40 °C.

1 Dulcodes UV Systems

1.3.2 Dulcodes UV Controllers

Compact controller

Compact unit for control of all basic functions of the UV system. The large graphical display shows the current UV-C output, the operating hours and the number of lamp switch-ons. With the fixed-setting warning and safety threshold levels, a warning signal is generated and a relay output (230 V / 0.2 A) for operation of an isolation valve is actuated if the UV output is too low. Alternatively, this output can also be used as a common alarm relay (230 V / 2.5 A).

Comfort control

The Dulcodes comfort control includes a large, graphical display for viewing the UVC sensor signal. Shown as a trend display, the lamp ageing, any possible deposit formation on the lamp protection tube or a change in water quality can be seen in a time window. The freely programmable safety and alarm thresholds are also shown as well as the number and times of the lamp activations. All operating and error messages are shown in full text. Setting the operating parameters is facilitated by the clear menu navigation. The control offers a selection of 9 different languages.

The control is connected to the ballasts via a bus system which permits monitoring of each individual lamp. This also facilitates a spatial separation of the control over long distances from the radiation chamber including lamps and ballasts.

Various additional functions such as the automatic flushing of the system in a freely programmable flushing time, the control of a shut-off valve as well as of a circulating pump are integrated as standard. For this purpose, 2 voltage outputs 230 V / 0.2 A and a switching output 230 V / 2.5 A are integrated.

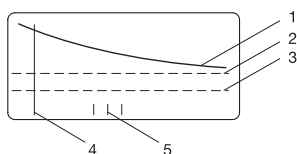
The UVC sensor signal can be monitored online via a standard signal output 0/4-20 mA. If the alarm and safety thresholds are undershot, two relay outputs (230 V / 2.5A) send a corresponding signal. All other faults are signalled via a combined alarm relay (230 V / 2.5 A).

3 potential-free control inputs facilitate linking of the control with external information: The error input can e.g. be used for an external temperature monitoring, the operation of the system can be normally interrupted using the pause input, the flow monitoring can be of help in connection with flushing processes.

Comfort control Powerline

This control type in addition includes the option for an external power control via a standard signal 0/4-20 mA (not for Dulcodes M 2 kW, 3 kW, and Dulcodes S). The systems can thus e.g. be controlled independent of the flow or the lamp output can be automatically adapted to a defined UVC sensor signal. This saves energy costs and extends the service life of the lamps.

The control also is equipped with a display and monitoring of the temperature of the radiation chamber as well as with a freely programmable control of the mechanical wiper system for an automatic cleaning of the lamp protection tube (not for Dulcodes S).



- pk_7_046
- 1 UV sensor signal
 - 2 Warning threshold
 - 3 Safety threshold
 - 4 Calibration
 - 5 On/off contacts

1 Dulcodes UV Systems

1.3.3

Performance Overview Of Dulcodes UV Systems

ProMaqua offers a wide range of UV systems for the most diverse applications. The following overview shows the output and main applications of our standard systems:

	Type P Compact	Type D Thin film	Type K Plastic chamber	Type S Pool water	Type Z Certified	Type R Manual wiper	Type W Standard	Type M Medium pressure
Output [m ³ /h]								
1000								
500								
200								
100								
50								
20								
10								
5								
2								
400 J/m ² , 98 %/cm transmission (80 %/cm for type D)								
Drinking water	✓				✓	✓	✓	✓
Industrial water	✓	✓	✓	✓	✓	✓	✓	✓
Swimming pool water			✓	✓		✓	✓	✓
Waste water		✓						
Salt water			✓					

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We offer a full advisory service covering everything required for safe use of a Dulcodes UV system:

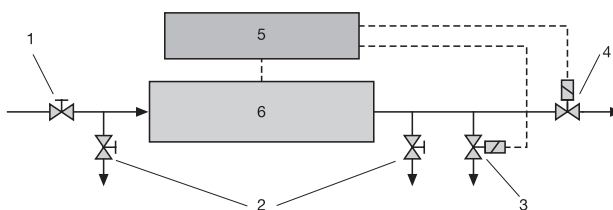
- Assessment of the situation on site by trained, competent field employees.
- All water parameters needed for an optimal system design can be measured in our water laboratory.
- Design and planning of the system.
- Commissioning and system maintenance by our trained service technicians.

1 Dulcodes UV Systems

1.3.4 Notes On Planning And Designing An UV System

- The system must always be designed for the greatest water flow.
- The system must always be designed for the worst anticipated UV transmission.
- Fireproof sampling cocks for microbiological tests must be provided before and after UV disinfection systems.
- A manual isolation valve must be provided before the UV system to isolate the system for maintenance work.
- With drinking water disinfection and similar applications, an electrically-controlled isolation valve must be provided after the UV disinfection system, which also closes automatically on mains failure (solenoid valve, automatic closing flap valve or similar).
- With service water disinfection, it is normally sufficient to provide a manual valve to isolate the system for maintenance work, instead of the electrically-controlled valve.
- With drinking water disinfection and similar applications, a flushing valve must be provided after the UV disinfection.
- It must be ensured that there is sufficient space available for removing the lamp protection tube and lamp replacement.
- Modern electronic ballasts only allow a limited cable length between ballast and lamp, so that the control box with the ballasts must be positioned close to the lamp. On the other hand, the controller can be fitted in a control area, for example. However, the maximum cable lengths specified by us must not be exceeded in this case.

- 1 Isolation valve
- 2 Sampling cock
- 3 Flushing valve
- 4 Isolation valve
- 5 Controller/ballast
- 6 Radiation chamber



pk_7_059

Typical installation schematic of a UV disinfection system

The following details are required for design of a UV system:

- Application of the system
- Maximum water flow
- Minimum UV transmission of the water

The UV transmission must be determined by means of a laboratory measurement of the absorption at 254 nm.

A full water analysis gives important conclusions on the operating conditions of the system. The following questionnaire provides our project engineers with the information needed to design an appropriate system.

1 Dulcodes UV Systems

Questionnaire For Designing A UV System

Application of the UV system:

- | | |
|---|--|
| <input type="checkbox"/> for disinfection of | <input type="checkbox"/> drinking water |
| | <input type="checkbox"/> production water in the food industry, cosmetics or pharmaceuticals |
| | <input type="checkbox"/> utility water |
| | <input type="checkbox"/> wastewater |
| | <input type="checkbox"/> salt water or brackish water |
| | <input type="checkbox"/> _____ |
| <input type="checkbox"/> for photochemical reduction of | <input type="checkbox"/> ____ ppm ozone |
| | <input type="checkbox"/> ____ ppm chlorine dioxide |
| | <input type="checkbox"/> ____ ppm chlorine |
| | <input type="checkbox"/> ____ ppm chloramine |

Water data:

Maximum water flow _____ m³/h Maximum water pressure _____ bar

Minimum UV transmission at 254 nm _____ %/1 cm _____ %/10 cm _____ SAC 254 nm

Turbidity _____ FTU _____ NTU

Suspended particles content _____ mg/l

Water quality constant fluctuating

Total hardness _____ mmol/l _____ °dH

Carbonate hardness _____ mmol/l _____ °dH

Chloride _____ mg/l

Manganese _____ mg/l

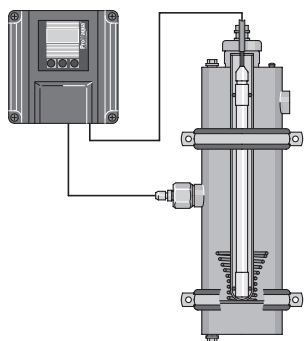
Iron _____ mg/l

Water temperature _____ °C

Other requirements:

1 Dulcodes UV Systems

1.4 Dulcodes P UV Systems



pk_7_045_V2

Dulcodes P UV systems are used for disinfection of drinking water and service water and – depending on transmission – can be used with flows up to 4 m³/h.

Features

- Flow: up to 4 m³/h (depending on transmission)
- Controller with switching output, to which an isolation valve or fault indicating device can be connected
- High-quality, factory-calibrated UV sensor
- Graphical display to show UV intensity, total number of operating hours and number of lamp switchings
- Standard low pressure lamp with a lamp life time of approx. 10,000 – 14,000 operating hours
- Radiation chamber made from high-grade stainless steel 1.4571
- Controller and ballast in compact plastic housing

Main applications

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
✓	✓			

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connected load W	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
16P	1.5*	16	30	382	350	114	6/10	G 3/4"
45P	3.8*	45	60	940	900	114	10/20	G 1 1/4"

Lamp type	Standard low pressure lamp (see Chap. 1.3.1)
Controller type	Compact controller (see Chap. 1.3.2)
Permissible operating pressure	10 bar
Permissible ambient temperature	5–45 °C
Permissible water temperature	5–40 °C

* 98 %/cm transmission , 400 J/m²

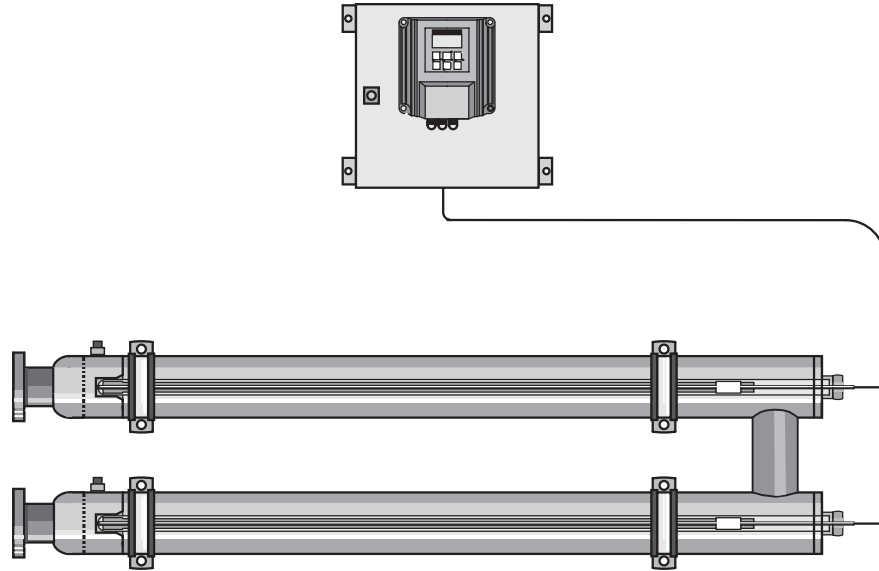
Spare Parts For Dulcodes P UV Systems

Name of the item	Order no.
UV lamp 16 W	1002472
UV lamp 45 W	1002473
O-ring for fixing the lamp in the lamp sleeve	481016
Lamp protection tube for 16 P	1004450
Lamp protection tube for 45 P	1002468
O-ring lamp protection tube/lamp cover	1004920
UVC sensor P/D/W/R G 3/4 1.4539 for systems delivered from Sept. 2006	1004734
O-ring UVC sensor	1002175
Sensor cable 2 m long	1004411
Screwed plug G 1/4"	1002752
O-ring for G 1/4" screwed plug	741256

1 Dulcodes UV Systems

1.5 Dulcodes D UV Systems For High Turbidity Water

Dulcodes D thin-film type UV systems with High-Flux lamps are used for disinfection of high turbidity or discoloured service water or wastewater and – depending on transmission – can be used with flows up to 33 m³/h.



pk_7_050

Features

- Flow: up to 33 m³/h (depending on transmission)
- Standard chambers made up of one or more longitudinal flow radiation chambers arranged one after the other, each with its own lamp
- High-efficiency low pressure High-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp life: 8.000-10.000 h
- Ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- Long-term stable UV-C sensor for monitoring the disinfection capability and transmission (UV transmission factor) of the water, factory-calibrated
- Large graphical display for display of the sensor signal
- Monitoring of lamp ageing, lamp sleeve fouling and changes in water quality
- Freely programmable controller, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from high-grade stainless steel 1.4571
- Control cabinets made from coated steel
- Complete cleaning system available as an accessory and consisting of acid tank, circulating pump, valves and hoses for rapid chemical cleaning of lamp sleeve and radiation chamber.

Main applications

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
—	✓	—	✓	—

1 Dulcodes UV Systems

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connected load W	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x45 D**	2.0*	1x45	60	940	900	89	10/15	1"
1x130 D	4.6*	1x130	150	940	900	89	10/15	1"
1x230 D	8.2*	1x230	250	1,500	1,400	89	18/25	DN 65
2x230 D	16.0*	2x230	500	1,500	1,400	89	36/50	DN 65
3x230 D	25.0*	3x230	750	1,500	1,400	89	54/75	DN 65
4x230 D	33.0*	4x230	1,000	1,500	1,400	89	72/100	DN 65

* 80 %/cm transmission, 400 J/m²

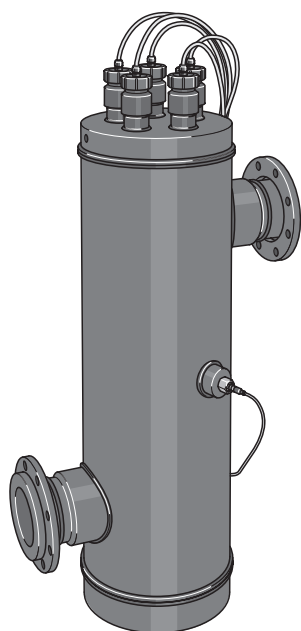
Lamp type	Standard low pressure lamp (see Chap. 1.3.1) with 1x45 D High-Flux low pressure lamp (see Chap. 1.3.1) with 1x130 D - 4x230 D
Controller type	Compact controller (see Chap. 1.3.2) with 1x45 D De luxe controller (see Chap. 1.3.2) with 1x130 D - 4x230 D
Permissible operating pressure	10 bar
Permissible ambient temperature	5-40 °C
Permissible water temperature	5-70 °C **5-40 °C

Spare Parts For Dulcodes D UV Systems

	Order no.
UV lamp 45 W	1002473
High-Flux UV lamp 130 W	1002486
High-Flux UV lamp 230 W	1002487
Lamp protection tube für Dulcodes 45 D und 130 D	1002468
Lamp protection tube for Dulcodes 1-6x230 D	1002469
O-ring lamp protection tube/lamp cover	1004920
UVC sensor P/D/W/R G 3/4 1.4539 for systems delivered from Sept. 2006	1004734
O-ring UVC sensor	1002175
Sensor cable, 5 m long	1004412
Screwed plug G 1/4"	1002752
O-ring for G 1/4" screwed plug	741256
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212
Hook spanner (special tool required for lamp replacement)	1002764

1 Dulcodes UV Systems

1.6 Dulcodes K UV Systems With PE-HD Radiation Chamber



The Dulcodes K range of UV systems with High-Flux lamps can be used for disinfection of saline water (thermal spring water, sea water). The radiation chambers are made from high-grade plastic and are optimised for compressive strength by special welding procedures (can be used up to an operating pressure of 4 bar). Depending on transmission, the range can be used with flows up to 170 m³/h

Features

- Flow: up to 170 m³/h (depending on transmission))
- High-efficiency low pressure High-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp life time: 8,000-10,000 h
- Ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- Long-term stable salt water-resistant UV-C sensor for monitoring the disinfection capability and transmission (UV transmission factor) of the water, factory-calibrated
- Large graphical display for display of the sensor signal
- Monitoring of lamp ageing, lamp sleeve fouling and changes in water quality
- Freely programmable controller, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from UV-stabilised PE-HD
- Control cabinets made from coated steel

Main applications

pk_7_047

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
—	✓	✓	—	✓

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connected load W	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x130K	8.7*	1x130	150	1,371	1,400	125	12/18	DN 50
2x130K	37.0*	2x130	280	1,371	1,400	280	38/78	DN 100
3x130K	54.0*	3x130	420	1,371	1,400	280	40/78	DN 100
4x130K	99.0*	4x130	550	1,371	1,400	400	48/160	DN 150
5x130K	122.0*	5x130	680	1,371	1,400	400	50/160	DN 150
6x130K	148.0*	6x130	810	1,371	1,400	400	52/160	DN 150

* 98 %/cm transmission, 400 J/m²

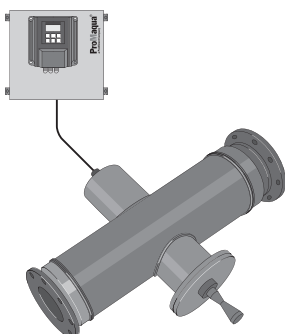
Lamp type	High-Flux low pressure lamp (see Chap. 1.3.1)
Controller type	De luxe controller (see Chap. 1.3.1)
Permissible operating pressure	4 bar
Permissible ambient temperature	5–40 °C
Permissible water temperature	5–30 °C

Spare Parts For Dulcodes K UV Systems

	Order no.
High-Flux UV lamp 130 W	1002486
Lamp protection tube for Dulcodes K	1006385
O-ring lamp protection tube/lamp cover	1006332
UVC sensor K red brass	1006329
O-ring UVC sensor K	1002175
Sensor lead, 5 m long	1004412
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212

1 Dulcodes UV Systems

1.7 Dulcodes S UV Systems For Chloramine Control In Pool Water



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NEW
from 3rd quarter
of 2009

Dulcodes S UV treatment systems are suitable for a photochemical degradation of combined chlorine (chloramine) and ozone in swimming pool water treatment. Special medium pressure UV lamps generate the intensive polychromatic UV radiation to reduce the odour-intensive and eye-irritating substances. The result is an improved water quality for healthy and pleasant bathing.

Features

- Extremely compact inline system with low space requirement
- Simple installation thanks to little installation work, quick refitting
- Highest level of installation flexibility due to free choice of mounting orientation
- Flow: up to 200 m³/h (depending on transmission)
- Powerline type medium pressure lamp with a mercury vapour pressure above 1 bar, hence high connection loads of up to 3 kW per metre of arc length
- High gas pressure as well as relatively high operation temperature of the lamp of 600 up to 800 °C, hence large emission spectrum
- Lamp life time: approx. 6,000-8,000 h depending on lamp type
- Long-time stable UVC sensor for monitoring the lamp output, the lamp protection tube contamination as well as changes in the water quality
- Integrated temperature sensor for monitoring the water temperature in the radiation chamber
- Large graphical display for monitoring the sensor signal with trend line
- Manual power control to optimally adapt the system to the relevant capacity needed (not for Dulcodes 1 x 1S)
- Automatic chloramine value-dependent control of the UV system, e.g. in combination with DUL-COMARIN® II
- Manual wiper for efficient removal of deposits on the lamp protection tube
- Radiation chambers made of stainless steel 1.4571
- Control cabinet made of coated steel
- Uniform radiation of the entire water flow thanks to optimised system hydraulics

Application focuses

Drinking water	Industrial water	Swimming pool water	Waste water	Salt water
	✓	✓	-	-

1 Dulcodes UV Systems

Technical Data

Type	Max. flow m ³ /h	Lamp power kW	Connected load kW	Length of radiation chamber mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x1S	49.0*	1	1.05	**	**	165		**
1x2S	115.0*	2	2.05	**	**	220		**
1x3S	202.0*	3	3.05	**	**	320		**

* 98 %/cm transmission 600J/m²

** Technical data will follow

Lamp type	Medium pressure lamp Powerline (see Chap. 1.3.1)
Controller type	Comfort control Powerline
Permissible operating pressure	6 bar
Permissible ambient temperature	5–40 °C
Permissible water temperature	5–40 °C

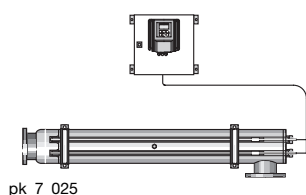
Replacement parts for Dulcodes S UV systems

	Order no.
UV lamp Powerline 1 kW	on request
UV lamp Powerline 2/3 kW	1009385
Lamp protection tube for Dulcodes 1 S	on request
Lamp protection tube for Dulcodes 2/3 S	on request
O-ring lamp protection tube/lamp cover	on request
UVC sensor M 1.4539	on request
O-ring UVC sensor	1002175
Sensor cable, 5 m long	1009398
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212

The contents of the technical data were compiled very thoroughly and reflect our present state of knowledge. We reserve technical changes within the scope of further development.

1 Dulcodes UV Systems

1.8 Dulcodes Z UV Systems With Certified Performance



Dulcodes Z UV disinfection systems serve the disinfection of drinking and industrial water and can be used - depending on transmission - for flows between 2 and 230 m³/h.

All Dulcodes Z systems are DVGW-certified and meet the requirements of the DVGW Test Regulation W 294. This test regulation requires comprehensive biosimetric measurements as a proof of the required effectiveness of the disinfection.

The list of the treatment substances and disinfection processes according to section 11 German Drinking Water Ordinance 2001 specifies that in Germany only UV systems may be used for drinking water disinfection which meet the requirements according to the DVGW Test Regulation W 294.

Features

- Flow: up to 230 m³/h (depending on transmission)
- High-efficiency low pressure Opti-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp life time: 14,000 h
- Low maintenance costs as a result of higher output per lamp and longer lamp life time
- Electronic ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- DVGW certified UV-C sensor for monitoring the disinfection capability and transmission (UV transmission factor) of the water
- Large graphical display for display of the sensor signal and operating messages in plain text
- Monitoring of lamp ageing, lamp sleeve fouling and changes in water quality
- Freely programmable controller, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from high-grade stainless steel 1.4404
- Radiation chamber hydraulics optimised by computer simulation
- Control cabinets made from coated steel

Main applications

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
✓	✓	—	—	—

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connect- ed load W	Radiation chamber length mm	Minimum clear- ance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
75Z***	4.5*	1x75	90	1,115	910	140	12/27	G 1 1/4"
200Z	10.0*	1x200	220	1,040	785	140	16/30	DN 50
300Z	20.0*	1x300	320	1,540	1,285	140	25/47	DN 80
2x300Z	60.0*	2x300	650	1,590	1,560	219	39/97	DN 100
3x300Z	110.0*	3x300	1,000	1,625	1,695	219	39/97	DN 150
4x300Z	165.0*	4x300	1,300	1,630	1,563	273	56/143	DN 150
5x300Z	230.0*	5x300	1,600	1,630	1,590	273	56/144	DN 200
7x300Z	230.0**	7x300	2,200	1,630	1,590	324	73/201	DN 200

* 98 %/cm transmission, 400 J/m²

** 94 %/cm transmission

Lamp type

Standard low pressure lamp (see Chap. 1.3.1) with Type 75 Z
Opti-Flux low pressure lamp (see Chap. 1.3.1) with Types 200 Z
to 7x300 Z

Controller type

De luxe controller (see Chap. 1.3.2)
UVC sensor signal in W/m² which can be calibrated with the help
of a reference radiometer (see Chap. 1.11)

Permissible operating pressure

10 bar

Permissible ambient temperature

5–40 °C

Permissible water temperature

5 - 70 °C ***5-40 °C

1 Dulcodes UV Systems

Spare Parts For Dulcodes Z UV Systems

	Order no.
UV lamp 75 W	1020911
Opti-Flux UV lamp 200 W	1021008
Opti-Flux UV lamp 300 W	1020929
Lamp protection tube for Dulcodes 75 Z	1020845
Lamp protection tube for Dulcodes 200 Z	1021010
Lamp protection tube for Dulcodes 1-5x300 Z	1020846
O-ring lamp protection tube/lamp cover	1023569
UVC sensor Z 1.4404 DVGW	1022347
Sensor window G 1x20 for Dulcodes 75, 200, 2x300Z	1021113
Sensor window G 1x30 for Dulcodes 300, 3x300Z	1022377
Sensor window G 1x47.5 for Dulcodes 4-7x300Z	1023884
O-ring sensor window	1023570
Sensor cable, 3.5 m long	1017867
Sensor cable, 7.5 m long	1024826
Sensor cable, 5 m long	1021041
Extension for sensor cable, 5 m long	1024825
Screwed plug G 1/4"	1002752
O-ring for G 1/4" screwed plug	741256
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212

1 Dulcodes UV Systems

1.9 Dulcodes R UV Systems With Manual Wiper

Dulcodes R UV systems are used for the purpose of disinfecting drinking water and service water as well as for photochemical degradation of chloramines in swimming pool water. Dulcodes R UV systems are particularly suitable for water which tends to form deposits on the protection tubes. These deposits can be easily removed with the manual wiper mechanism even at full operating pressure without the need to interrupt operation.

Thanks to the Opti-Flux high-performance UV lamps with a power output of 300 W, maximum flow rates are achieved with a minimum number of lamps. With the long lamp life time of the UV lamps of up to 14,000 operating hours, compared to conventional systems, lamps need to be replaced less frequently thus reducing costs.

Depending on the water transmission rate and the required radiation level, the system can be used at volumetric flow rates of up to 438 m³/h.

Features

- Flow rate: Up to 438 m³/h (depending on transmission and radiation level).
- Auto-adjusting wiper elements made from food-grade PTFE.
- Cleaning possible without interrupting operation: The manual wiper is easy to use even under maximum operating pressure of the system. Thanks to their self-sharpening function, the wiper elements achieve maximum cleaning effect in connection with a long lamp life time.
- Opti-Flux high-performance low-pressure UV lamps featuring special amalgam technology, increased UV output, largely unaffected by temperature.
- Lamp life time: up to 14,000 hours.
- Increased output with fewer lamps: a lamp power output of 300 W enables a higher flow rate per lamp, longer service cycles, lower operating costs.
- Electronic ballast units with BUS interface for ignition and monitoring of each individual lamp.
- Variable lamp current and thus gentle ignition and exact adaptation of the optimal lamp operation.
- Factory-calibrated UV-C-sensitive sensor.
- Large graphic display for showing sensor signal and operating messages in plain text.
- Freely programmable control, e.g. for various flushing, warning and shut-off procedures.
- Radiation chambers made from high-grade stainless steel 1.4404, hydraulically optimised by way of computer simulation.
- Coated steel control cabinets.

Main applications

Drinking water	Process water	Swimming pool water	Waste water	Saltwater
✓	✓	✓	—	—

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connected load W	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x300R	30.0*	1x300	320	1,562	1,438	140	45/67	DN 80
2x300R	95.0*	2x300	650	1,633	1,438	220	75/134	DN 150
3x300R	179.0*	3x300	1,000	1,638	1,438	273	90/182	DN 200
4x300R	274.0*	4x300	1,300	1,652	1,438	330	120/253	DN 250

* 98 %/cm transmission, 400 J/m²

Lamp type Opti-Flux low-pressure UV lamp (see Section 1.3.1)

Controller type De luxe controller (see Chap. 1.3.1)

Permissible operating pressure 10 bar

Permissible ambient temperature 5–40 °C

Permissible water temperature 5–70 °C

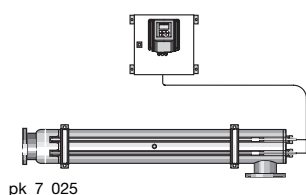
1 Dulcodes UV Systems

Spare parts for Dulcodes R UV systems

	Order no.
Opti-Flux UV lamp 300 W	1020929
Lamp protection tube for Dulcodes R	1020846
O-ring lamp protection tube/lamp cover	1023569
Wiper element (2 required per UV lamp)	1027879
UVC-U sensor P/D/W/R 1.4539	1028115
Sensor cable, 3.5 m long	1017867
Sensor cable, 7.5 m long	1024826
Sensor cable, 5 m long	1021041
Extension for sensor cable, 5 m long	1024825
O-ring for screw plug G 1/4"	792872
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212

1 Dulcodes UV Systems

1.10 Dulcodes W UV Systems



Dulcodes W UV systems with High-Flux lamps are used for irradiation of a very wide range of water types and – depending on transmission – can be used with flows up to 600 m³/h.

Features

- Flow: up to 600 m³/h (depending on transmission)
- High-efficiency low pressure High-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp life time: 8,000 – 10,000 h
- Ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- Long-term stable UV-C sensor for monitoring the disinfection capability and transmission (UV transmission factor) of the water, factory-calibrated
- Large graphical display for display of the sensor signal
- Monitoring of lamp ageing, lamp sleeve fouling and changes in water quality
- Freely programmable controller, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from high-grade stainless steel 1.4571
- Control cabinets made from coated steel

Main applications

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
✓	✓	✓	—	—

Technical Data

Type	Max. flow m ³ /h	Lamp power W	Connected load W	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x80 W**	5.4*	80	100	630	600	114	8/14	G 1 1/4"
1x130W	8.7*	130	150	940	900	114	10/20	G 2
1x230W	20.0*	230	250	1,468	1,400	140	24/46	DN 65
2x230W	64.0*	2x230	500	1,640	1,500	220	41/96	DN 125
3x230W	117.0*	3x230	750	1,665	1,500	273	53/138	DN 150
4x230W	184.0*	4x230	1,000	1,690	1,600	324	65/150	DN 200
5x230W	228.0*	5x230	1,200	1,690	1,600	324	70/190	DN 200
6x230W	273.0*	6x230	1,400	1,790	1,600	406	75/200	DN 200
7x230W	369.0*	7x230	1,700	1,920	1,600	406	115/310	DN 250
8x230W	418.0*	8x230	1,900	1,920	1,600	406	115/310	DN 250
9x230W	467.0*	9x230	2,100	1,920	1,600	406	130/320	DN 250
10x230W	514.0*	10x230	2,400	1,920	1,600	406	130/320	DN 250
11x230W	561.0*	11x230	2,600	1,920	1,600	406	130/320	DN 250
12x230W	600.0*	12x230	2,800	1,920	1,600	406	130/320	DN 250

* 98 %/cm transm., 400 J/m²

Lamp type	High-Flux low pressure lamp (see Chap. 1.3.1)
Controller type	De luxe controller (see Chap. 1.3.1)
Permissible operating pressure	10 bar
Permissible ambient temperature	5–40 °C
Permissible water temperature	5-70 C **5-40 °C

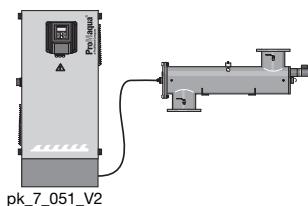
1 Dulcodes UV Systems

Spare Parts For Dulcodes W UV Systems

	Order no.
High-Flux UV lamp 80 W	1002485
High-Flux UV lamp 130 W	1002486
High-Flux UV lamp 230 W	1002487
Lamp protection tube für Dulcodes 80 W	1002467
Lamp protection tube für Dulcodes 130 W	1002468
Lamp protection tube for Dulcodes 230 W	1002469
Lamp protection tube für Dulcodes 2-5x230 W	1002470
Lamp protection tube für Dulcodes 6-12x230 W	1002471
O-ring lamp protection tube/lamp cover	1004920
UVC sensor P/D/W/R G 3/4 1.4539 for systems delivered from Sept. 2006	1004734
UVC sensor D/W gunmetal	1022945
O-ring UVC sensor	1002175
Sensor cable, 5 m long	1004412
Screwed plug G 1/4"	1002752
O-ring for G 1/4" screwed plug	741256
Replacement filter mat for control cabinet ventilation (2 pcs. required per control cabinet)	1004212
Hook spanner (special tool required for lamp replacement)	1002764

1 Dulcodes UV Systems

1.11 Dulcodes M UV Systems With Powerline Medium Pressure Lamps



pk_7_051_V2

Dulcodes M UV systems with Powerline medium pressure lamps are used for treatment of large water quantities and – depending on transmission – can be used with flows up to 800 m³/h. Their special lamp makes these systems particularly suitable for photochemical reduction of chloramine in swimming pool water, chlorine dioxide in the beverages industry, or chlorine and ozone in other applications.

Features

- Flow: up to 800 m³/h (depending on transmission)
- Powerline type medium pressure lamp with a mercury vapour pressure above 1 bar, hence high connected loads of up to 10 kW per metre of arc length
- High gas pressure and relatively high lamp operating temperature of 600 to 800 °C, hence broad emission spectrum
- Particularly suitable for chemical photochemical reduction of chloramine in swimming pool water, chlorine dioxide in the beverages industry, or chlorine and ozone in other production water, for example, due to the broad emission spectrum of the lamps
- Lamp life time: approx. 8,000-10,000 h
- Ballasts with BUS interface for ignition and monitoring of the lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- Long-term stable UV-C sensor for monitoring the disinfection performance and UV transmission of the water
- Large graphical display for monitoring the sensor signal with trend line
- Monitoring of lamp ageing, lamp sleeve fouling and changes in water quality
- External power control via 0/4-20 mA signal for optimal adjustment of the system to changing operating conditions such as flow fluctuations, for example
- Automatic adjustment of lamp power to a defined UV-C sensor signal saves energy and extends lamp life time (as from 4 kW systems)
- Automatic motorised wiper for efficient removal of deposits on the lamp protection tube
- Freely programmable controller, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from high-grade stainless steel 1.4571
- Control cabinets made from coated steel

Main applications

Drinking water	Process water	Swimming pool water	Wastewater	Salt water
✓	✓	✓	—	—

Technical Data

Type	Max. flow m ³ /h	Lamp power kW	Connected load kW	Radiation chamber length mm	Minimum clearance for lamp replacement mm	Ø mm	Empty weight/ Operating weight kg approx.	Connection nominal diameter
1x2ML	88.0*	2	2.3	850	1,750	220	146	DN 100
1x3ML	158.0*	3	3.2	850	1,750	220	156	DN 150
1x4ML	229.0*	4	4.2	1,200	2,450	270	190	DN 200
1x6ML	406.0*	6	6.2	1,200	2,450	320	230	DN 250
1x8ML	541.0*	8	8.2	1,500	3,050	320	240	DN 250
1x10ML	600.0*	10	10.2	1,500	3,050	320	240	DN 250
1x10ML	800.0*	10	10.2	1,500	3,050	400	283	DN 300

* 98 %/cm transmission, 600 J/m²

Lamp type	Powerline medium pressure lamp (see Chap. 1.3.1)
Controller type	Powerline de luxe controller (see Chap. 1.3.1)
Permissible operating pressure	10 bar
Permissible ambient temperature	5–40 °C
Permissible water temperature	5–40 °C

1 Dulcodes UV Systems

Spare Parts For Dulcodes M UV Systems

	Order no.
UV lamp Powerline 2/3 kW	1009385
Powerline UV lamp 4 kW	1009386
Powerline UV lamp 6 kW	1009387
Powerline UV lamp 8 / 10 kW	1009388
Lamp protection tube for Dulcodes 2 ML / 3 ML	1009214
Lamp protection tube for Dulcodes 4/6 ML	1009215
Lamp protection tube for Dulcodes 8/10 ML	1009216
O-ring lamp protection tube/lamp cover	1027553
UVC sensor M 1.4539	1025685
UVC-U sensor M 1.4539	1034147
O-ring UVC sensor	1002175
Sensor cable, 10 m long	1009398
Replacement filter mat for control cabinet ventilation (2 No. required per control cabinet)	791038

1 Dulcodes UV Systems

1.12 Accessories For Dulcodes UV Systems

Transmission Photometer TMX 02

Photometer for measurement of the UV transmission at 254 nm in accordance with DIN 38404.

Supplied in sturdy aluminium case complete with 40 mm quartz cuvette, 4 x NiMH rechargeable batteries and charger.

Technical Data

Dimensions L x W x H (mm)	370 x 330 x 150
Weight	3.0 kg
Voltage supply	4 x 1,500 mAh NiMH batteries
UV-C lamp	Mercury medium pressure lamp
Measurement resolution	Transmission in 0.1 %
Measurement accuracy	Transmission in ± 0.5 %

	Order no.
Transmission Photometer TMX 02	1027956

Reference radiometer RRM

Reference radiometer for checking and recalibrating DVGW-certified Dulcodes Z UV systems. The portable instrument complies with DVGW technical standard W 294/Part 3/2003 and is fitted with an insertion sensor which is inserted directly in the radiation chamber of the Dulcodes Z UV system in place of the sensor to be calibrated, so that the radiation intensity can be measured without interrupting operation. Suitable UV protective glasses must be worn as UV radiation escapes from the radiation chamber during this procedure.

Technical Data

Measurement range	20/200/2.000/20.000 W/m ² (switchable)
Display	3-digit
Voltage supply	Battery, 9 V Type 6F22 or equivalent
Wavelength range	220 ... 290 nm, spectral adjustment in accordance with W 294
Angular field of view	40° in accordance with W 294, Item 7.2

	Order no.
Reference radiometer RRM	1025094

UV protective glasses

Protective glasses to protect against harmful to the eye UV radiation when working on open UV systems.

	Order no.
UV protective glasses	1025243

Protective gloves

Protective gloves made from white cotton to avoid fingerprints on UV lamps and lamp sleeves. 1 pair in universal size.

	Order no.
Protective gloves	1032815

1 Dulcodes UV Systems

Sampling cock

Fireproof sampling cock made from stainless steel.

Sampling cock

Order no.

on request

Cleaning system

Cleaning system for flushing the radiation chamber with a cleaning concentrate to remove deposits on the lamp tubes and internal surfaces of the UV system. Consists of chemical tanks, booster and dosing pumps, valves and complete automatic or manual controller. Design and technical equipment are matched to the particular UV system and its application.

Cleaning system

Order no.

on request

2 OZONFILT® And Bono Zon® Ozone Plants

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2 OZONFILT® And Bono Zon® Ozone Plants

2.1 Ozone In Water Treatment

As the most powerful oxidant that can be used in water treatment, ozone enables a broad spectrum of possible applications:

Outstanding disinfection action against

- Bacteria and viruses
- Fungi and parasites

Oxidation of undesirable inorganic substances in the water

- Iron and manganese
- Arsen
- Nitrite and sulfide

Oxidation of undesirable organic substances in the water

- Strong-smelling and strong-tasting compounds
- Humic substances and other compounds which affect the colour of the water
- Cyclic hydrocarbons
- Trihalomethanes, chloramines and other chlorine compounds

Microflocculating action

- After oxidation with ozone, substances and colloids dissolved in the water become insoluble and can be filtered

Significantly less environmentally-harmful by-products occur in the production and use of ozone, than with other comparable oxidants and disinfectants. As a highly reactive gas, ozone is produced on site, and introduced to the water directly, without interim storage. Because of its high reactivity, ozone decomposes into oxygen again in the water, with a half-life of several minutes. All components of an ozone handling system must be perfectly matched with each other and with the planned application, to achieve an optimal relationship between ozone production and effect.

For every new project, our engineers can draw on the experience that we have continually accumulated since 1971, in the following applications:

Drinking water supply

- Oxidation of iron, manganese or arsenic
- Improvement in appearance and taste
- Disinfection

Food and beverage industry

- Disinfection of mineral water
- Disinfection at the rinser in the beverage industry
- Disinfection of production water

Swimming pools

- Reduction of chloramines and trihalomethanes, so avoiding typical swimming pool smell
- Crystal-clear water thanks to microflocculating action
- Reliable microbiological barriers in therapy pools
- Reduction of investment and operating costs through the possibility of reducing the circulating power and throttling the fresh water inlet

Industry

- Cooling water treatment
- Combating legionella in cooling water circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers

2 OZONFILT® And Bono Zon® Ozone Plants

2.2 Performance Overview Of ProMaqua® Ozone Plants

ProMaqua® ozone plants function according to the proven principle of dielectric barrier discharge. By applying a high voltage of several thousands of Volts, ozone is produced from oxygen between two electrodes separated by an insulating dielectric. Depending on the plant type, either dried ambient air or concentrated oxygen is used as oxygen source. ProMaqua® ozone plants are optimised to ensure maximum profitability and operating safety. They meet the German standard for ozone generation plants DIN 19627 and are characterised by low energy and cooling water consumption.

Medium frequency pressure systems

In case of the series OZONFILT® OZVa and OZMa, the operating gas air or oxygen is fed to the ozone generator under pressure. Ozone is generated using medium-frequency high voltages.

The use of an integrated variable pressure drying and of a dielectric with optimum thermal conductivity results in an extraordinarily compact design of the plant.

Thanks to operation under pressure, the generated ozone can be directly fed to water systems with a backpressure of up to 2 bar. Additional pressure-increasing pumps and injectors thus become superfluous in many applications.

Vacuum systems

In case of the series Bono Zon® BONA, the operating gas air is suctioned through the air drying and the ozone generator with the help of a pressure-increasing pump and an injector system. The ozone itself is generated under mains frequency and is controlled by changing the high voltage. The vacuum operation ensures a very safe operation.

ProMaqua® offers numerous ozone plants for diverse applications. The overview below shows the capacity ranges of our type series:

	OZVa 1-4	OZVa 5-7	OZMa 1-3 A	OZMa 1-3 O	BONa
1000					
500					
200					
100					
50					
20					
10					
5					
2					
Operating gas	Air	Oxygen	Air	Oxygen	Air
Ozone concentration	20 g/Nm ³	100 g/Nm ³	20 g/Nm ³	100 g/Nm ³	20 g/Nm ³

P_PMA_OF_0008_SW_G

larger plants available on request

2 OZONFILT® And Bono Zon® Ozone Plants

ProMaqua® offers all advise required for the safe operation of an ozone plant:

- Evaluation of the situation at site by trained, competent field sales staff.
- In our water laboratory, all important water parameters, which are required for an optimal plant design, can be analysed.
- Planning of the plant.
- Commissioning and plant service by our trained service technicians.

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.2.1 Questionnaire On The Design Of An Ozone Plant

Use of the ozone system:

- | | |
|---|---|
| <input type="checkbox"/> for treatment of | <input type="checkbox"/> Drinking water |
| | <input type="checkbox"/> Product water in the food and beverages industry, cosmetics or pharmaceutical industry |
| | <input type="checkbox"/> Industrial water |
| | <input type="checkbox"/> Cooling water |
| | <input type="checkbox"/> Swimming pool water |
| | <input type="checkbox"/> Zoo |
| | <input type="checkbox"/> _____ |
| <input type="checkbox"/> for oxidation of | <input type="checkbox"/> Iron, manganese, nitrite, sulphide etc. |
| | <input type="checkbox"/> Organic matter |
| | <input type="checkbox"/> Discolouration |
| | <input type="checkbox"/> _____ |
| <input type="checkbox"/> _____ | |

Water values:

- | | | | |
|----------------------|-----------------------------------|---|--|
| Max. water flow rate | _____ m ³ /h | Maximum water pressure | _____ bar |
| Water flow rate | <input type="checkbox"/> constant | <input type="checkbox"/> fluctuating from | _____ m ³ /h to _____ m ³ /h |
| pH value | _____ | Iron (Fe ²⁺) | _____ mg/l |
| Temperature | _____ °C | Manganese (Mn ²⁺) | _____ mg/l |
| Solid fraction | _____ mg/l | Nitrite (NO ₂ ⁻) | _____ mg/l |
| | | Sulphide (S ²⁻) | _____ mg/l |
| | | TOC (total organic carbon) | _____ mg/l |

Response time to application:

_____ m³ volume reaction tank or _____ minutes residence time in entire system.

Type of metering:

- constant
- flow-proportional
- depending on measured value

Desired amount of metering: _____ mg/l

Other requirements:

2 OZONFILT® And Bono Zon® Ozone Plants

2.3

OZONFILT® OZVa

Ozone plants in the OZONFILT® OZVa range are designed as pressurised plants, where the operating gas – air or oxygen – is fed into the ozone generator under pressure. The ozone is produced using medium-frequency high voltages and is primary current controlled. The introduction of ProMaqua® specially-developed PCC technology (primary current controlled) provides complete protection for the electrical components (high-voltage transformer and power stage) and also allows correct digital display of the ozone output in “grams/hour”. As a result, any desired ozone quantity between 3 and 100 % of the nominal capacity can be set reproducibly, and largely independently of voltage and pressure fluctuations.

The use of an integrated pressure swing dryer and a dielectric with optimal thermal conductivity makes the plant extremely compact. The unique design of the generator ensures outstanding cooling performance with low cooling water consumption, and removes the heat produced quickly, before the ozone produced can decompose due to excessive heat.

Operation under pressure means that the ozone produced can be introduced directly into water systems with back pressures up to 2 bar. Additional booster pumps and injectors can be dispensed with in many applications.

In combination with ProMinent® DULCOMETER® measurement and control equipment and DULCOTEST® OZE ozone probes, these plants are especially suitable for use where the operation is dependent on, and is controlled by the measured value.

Features

- Simple operation
- Fully equipped
- High efficiency
- Low consumption of energy and cooling water
- High ozone concentration thanks to operation with oxygen
- PCC technology ensures complete protection of electrical components
- Correct digital display of ozone output in g/h
- Reproducible setting of the desired ozone quantity between 3 and 100 % of nominal capacity

2 OZONFILT® And Bono Zon® Ozone Plants

2.3.1

OZONFILT® Ozone Production Plants OZVa 1-4 (Operating Gas - Air)

Under nominal conditions, the OZVa 1-4 range produces up to 40 g/h of ozone from oxygen in the surrounding air at a concentration of 20 g/Nm³. Using the designated mixing devices, ozone concentrations between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 or 0 °C).

Types OZVa 1 and 2 are installed in a control cabinet for wall mounting; types OZVa 3 and 4 are installed in a free-standing cabinet.

An adequate supply of compressed air and a mixing device designed for the operating conditions must be provided for the operation of the ozone plant.

Compressed air requirements

- Oil- and dust-free, non-corrosive
- Constant upstream pressure of 6 - 10 bar
- Required air quantities:
 OZVa 1: 7 l/min
 OZVa 2: 20 l/min
 OZVa 3: 40 l/min
 OZVa 4: 45 l/min

Mixing device

OZVa 1 can be ordered in the following versions:

- Transparent mixing system with flow monitor mounted at the side of the plant (see fig. pk_7_001_1_V2)
- Static helical mixer mounted directly below the plant, made of PVC, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see fig. pk_7_042_V2)
- Without mixing system for connection of 12/10 mm stainless steel pipes or 12/9 mm PTFE pipes

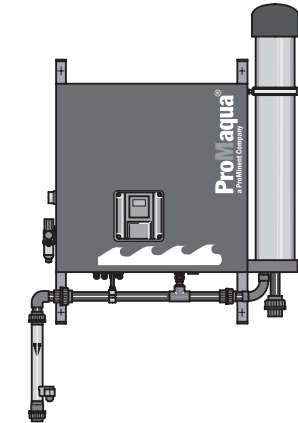
OZVa 2 can be ordered in the following versions:

- Static helical mixer mounted directly below the plant, made of PVC, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see fig. pk_7_042_V2)
- Without mixing system for connection of 12/10 mm stainless steel pipes or 12/9 mm PTFE pipes

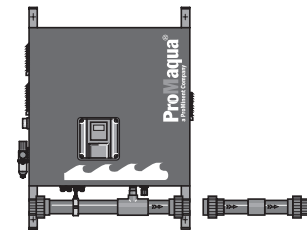
OZVa 3 and 4 are in principle delivered as versions without mixing system; a suitable mixing system must be ordered separately (see Fig. pk_07_043_V2, see Chap. 2.3.5).

Notes

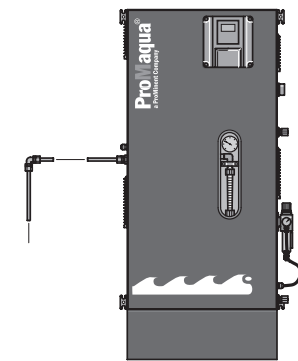
- The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozon (see Accessories).
- For all installations the ozone generator must be interlocked with the water flow into the metering point.
- To prevent any return of ozonised water into the ozone-transporting pipe, a non-return valve is to be installed upstream of the OZVa.



pk_7_001_1_V2
OZONFILT® OZVa 1; capacity: 5 g/h



pk_7_042_V2
OZONFILT® OZVa 2; capacity: 15 g/h



pk_7_043_V2
OZONFILT® OZVa 3; capacity: 35 g/h

2 OZONFILT® And Bono Zon® Ozone Plants

Technical Data

OZONFILT® ozone production plants OZVa 1-4 (Operating Gas - Air)

Environmental parameters

max. humidity of the surrounding air 85 %, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Number of generator modules		1	1	2	2
Ozone capacity, measured in accordance with DIN with air at 20 °C, cooling water at 15 °C	g/h	5	15	35	40
Air consumption	Nm ³ /h	0.37	1.00	2.25	2.50
Ozone concentration in the gas phase referenced to nominal conditions	g/Nm ³ *	20	20	20	20
Specific energy requirement at nominal capacity	Wh/g	30	30	21	20
Power factor at full capacity	cos φ	0.70	0.98	0.98	0.98
Ozone connection		integrated in mixing device or G 1/4" internal	integrated in mixing device or G 1/4" internal	G 1/4" internal	G 1/4" internal

* with air at 20 °C, cooling water at 15 °C

** Nm³ = m³ under standard conditions (p = 1.013x10⁵ Pa, T = 273 K)

Electrical connection

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Connected load	V/Hz/A	230/50;60/1,2	230/50;60/3	230/50;60/6	230/50;60/6
Enclosure rating		IP 43	IP 43	IP 43	IP 43

Overall dimensions (without mixing)

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Width	mm	840	840	710	710
Height	mm	840	805	1,400	1,400
Depth	mm	310	310	310	310

Weight

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Weight	kg	70	75	121	121

Ozone mixing

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Raw water temperature max.	°C	35	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0	0.8–1.5

Air supply

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Required air quantity	l/min	7	20	40	45

Air quality

oil and dust-free, non-corrosive, Constant upstream pressure of 6-10 bar

Cooling water

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Cooling water requirement	l/h	10–60	20–60	50–100	70–100
Cooling water inlet pressure	bar	1–5	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	6 x 4	6 x 4	6 x 4	6 x 4
Cooling water outlet, open discharge	mm	6 x 4	6 x 4	6 x 4	6 x 4
Cooling water temperature at ambient temp. max. 35 °C	°C	<30	<30	<30	<30
Cooling water temperature at ambient temp. 35–40 °C	°C	<25	<25	<25	<25

Cooling water quality No tendency to form lime scale; Removable substances: < 0.1 ml/l ; Iron: < 0.2 mg/l; Manganese: < 0.05 mg/l; no corrosive components; Conductivity: > 100 µS/cm

MaharFan

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.3.2

OZONFILT[®] OZVa 5-7 (Operating Gas - Oxygen)

The OZONFILT[®] OZVa 5-7 range is a new development based on proven PSG technology which enables ozone concentrations of up to 150 g/Nm³ through the use of oxygen as operating gas. Using the designated mixing devices, ozone concentrations in the water to be treated of up to 90 ppm can be achieved (theoretical value at 0 °C).

Depending on the plant type, ozone is produced in 1-3 generators from oxygen provided from special oxygen generators or bottles. The rated output of the individual generators is 30 g/h at 100 g/Nm³.

Type 5 is installed in a wall cabinet corresponding to OZVa 2; the types 6 and 7 are installed in a free-standing cabinet corresponding to OZVa 4. In all three plants, the ozone is transported to the mixing device through a separate 12/10 mm stainless steel pipe or 12/9 mm PTFE pipe.

Operating gas specification

- Oxygen
- Concentration: > 90 vol%
- Dew point: < -50 °C
- Pressure: 3-6 bar

Mixing device

Because of the high ozone concentrations, we recommend mixing systems made of stainless steel. Mixing systems made of PVC may show a reduced service life, depending on the operating conditions.

Notes

- The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT[®] plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozon (see Accessories).
- Depending on the operating and installation conditions, it might be necessary to also monitor the room air for excessive oxygen content. For this purpose, the gas detector GMA 36 Oxygen can be used.
- For all installations the ozone generator must be interlocked with the water flow into the metering point.
- To prevent any return of ozonised water into the ozone-transporting pipe, a non-return valve is to be installed upstream of the OZVa.
- All gas-transporting accessories must be resistant to ozone and oxygen (e.g. fat-free).
- Because of the high ozone concentrations, only catalytic residual ozone destructors can be used. Residual ozone destructors on the basis of activated carbon ignite spontaneously if subjected to increased ozone concentrations.

2 OZONFILT® And Bono Zon® Ozone Plants

Technical Data

OZONFILT® OZVa 5-7 (Operating Gas - Oxygen)

		OZVa 5	OZVa 6	OZVa 7
Number of generator modules		1	2	3
Nominal ozone capacity at 100 g/Nm ³ ** and cooling water at 15 °C	g/h	30	60	90
Ozone capacity at 150 g/Nm ³ *	g/h	17.5	35.0	52.0
Ozone capacity at 80 g/Nm ³	g/h	35	70	105
Specific energy requirement at nominal capacity	Wh/g	10	10	10
Power factor at full capacity	cos φ	0.98	0.98	0.98
Ozone connection		G 1/4" internal	G 1/4" internal	G 1/4" internal

Electrical connection

		OZVa 5	OZVa 6	OZVa 7
Connected load	V/Hz/A	230/50;60/3	230/50;60/6	230/50;60/10
Enclosure rating		IP 43	IP 43	IP 43

Overall dimensions (without mixing)

		OZVa 5	OZVa 6	OZVa 7
Width	mm	865	705	705
Height	mm	804	1,400	1,400
Depth	mm	310	345	345

Weight

		OZVa 5	OZVa 6	OZVa 7
Weight	kg	75	109	114

Ozone mixing

		OZVa 5	OZVa 6	OZVa 7
Raw water temperature max.	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0

Specification of operating gas: oxygen

		OZVa 5	OZVa 6	OZVa 7
Gas volume at nominal capacity 100 g/Nm ³	NI/h	300	600	900
Gas volume at capacity 150 g/Nm ³	NI/h	117*	234*	347*
Gas volume at capacity 80 g/Nm ³	NI/h	438	875	1,313
Concentration min.	vol%	90	90	90
Dew point max.	°C	-50	-50	-50
Pressure	bar	3 – 6	3 – 6	3 – 6
Particles max.	µm	5	5	5
Hydrocarbons max.	ppm	20	20	20
Max. temperature	°C	30	30	30

Cooling water

		OZVa 5	OZVa 6	OZVa 7
Cooling water requirement	l/h	30	70	100
Cooling water inlet pressure	bar	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	6 x 4	6 x 4	6 x 4
Cooling water outlet, open discharge	mm	6 x 4	6 x 4	6 x 4
Cooling water temperature at ambient temp. max. 35 °C	°C	<30	<30	<30
Cooling water temperature at ambient temp. 35–40 °C	°C	<25	<25	<25

Cooling water quality No tendency to form lime scale. Removable substances: < 0.1 ml/l; Iron: < 0.2 mg/l; Manganese: < 0.05 mg/l; no corrosive components; Conductivity: > 100 µS/cm

* Capacity 150 g/Nm³ must be factory set as a special version

** Nm³ = m³ under standard conditions (p = 1.013x10⁵ Pa, T = 273 K)

MaharFan

2 OZONFILT® And Bono Zon® Ozone Plants

2.3.3

Ordering Information For OZONFILT® OZVa Plants

Ozonfilt OZVa 1 capacity 5 g/h

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1004239
without mixing system	stainless steel	1026124
with transparent mixing system with flow monitoring 0.5–3m ³ /h	blue painted	1026118
with transparent mixing system with flow monitoring 0.5–3m ³ /h	stainless steel	1026125
with transparent mixing system with flow monitor, 3–5 m ³ /h	blue painted	1004235
with transparent mixing system with flow monitor, 3–5 m ³ /h	stainless steel	1026126
with static mixer PVC, DN 40, 5–10 m ³ /h	blue painted	1026120
with static mixer PVC, DN 40, 5–10 m ³ /h	stainless steel	1026127
with static mixer PVC, DN 50, 10–15 m ³ /h	blue painted	1026121
with static mixer PVC, DN 50, 10–15 m ³ /h	stainless steel	1026128
with static mixer PVC, DN 32, 0.5–2.8 m ³ /h	blue painted	1026122
with static mixer PVC, DN 32, 0.5–2.8 m ³ /h	stainless steel	1026129
with static mixer PVC, DN 32, 2.8–5 m ³ /h	blue painted	1026123
with static mixer PVC, DN 32, 2.8–5 m ³ /h	stainless steel	1026130

Ozonfilt OZVa 2 capacity 15 g/h

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1005129
without mixing system	stainless steel	1026133
with static mixer PVC, DN 40, 5–10 m ³ /h	blue painted	1005127
with static mixer PVC, DN 40, 5–10 m ³ /h	stainless steel	1026134
with static mixer PVC, DN 50, 10–15 m ³ /h	blue painted	1005806
with static mixer PVC, DN 50, 10–15 m ³ /h	stainless steel	1026135
with static mixer PVC, DN 32, 0.5–2.8 m ³ /h	blue painted	1026132
with static mixer PVC, DN 32, 0.5–2.8 m ³ /h	stainless steel	1026144
with static mixer PVC, DN 32, 2.8–5 m ³ /h	blue painted	1005125
with static mixer PVC, DN 32, 2.8–5 m ³ /h	stainless steel	1026145

OZONFILT® OZVa 3 capacity 35 g/h

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1009083
without mixing system	stainless steel	1026146

Ozonfilt OZVa 4 capacity 40 g/h

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1009105
without mixing system	stainless steel	1026147

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

Ozonfilt OZVa 5 capacity 30 g/h operating gas oxygen

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1026148
without mixing system	stainless steel	1026149

Ozonfilt OZVa 6 capacity 60 g/h operating gas oxygen

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1023452
without mixing system	stainless steel	1026150

Ozonfilt OZVa 7 capacity 90 g/h operating gas oxygen

Type	Control cabinet connection	Order no.
without mixing system	blue painted	1026151
without mixing system	stainless steel	1026152

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.3.4 OZONFILT[®] Compact OMVa

The OZONFILT[®] Compact OMVa is a complete, fully-assembled, ready for use ozone stage for treatment of drinking water, service water or swimming pool water in the capacity range from 5...40 g ozone/h, and consists of the following modules:

Ozone generation module (1), built in accordance with DIN 19627:

The ozone is produced with an OZONFILT[®] OZVa in a pressure-resistant ozone generator using an electronically produced and controlled medium-frequency voltage.

Ozone mixing module (2):

This module consists of an ozone dosing point and a downstream mixing section made from stainless steel, with a series of static mixing elements for intensive mixing of the ozone/air mix with the water to be treated. The pipelines carrying the ozone, and the pipeline from the raw water connection to the entry to the reaction tank are fabricated totally in stainless steel and have been factory pressure tested.

With back pressures up to max. 1.8 bar, no injector is required to suck out the ozone, as the ozone production takes place at positive pressure.

Reaction tank module (12):

The stainless steel reaction tank incorporates all necessary fittings for water distribution and an automatic vent valve (13) The ozone generation module (1), the residual ozone gas destructor (14) and room air monitoring (16) are mounted on this tank (12).

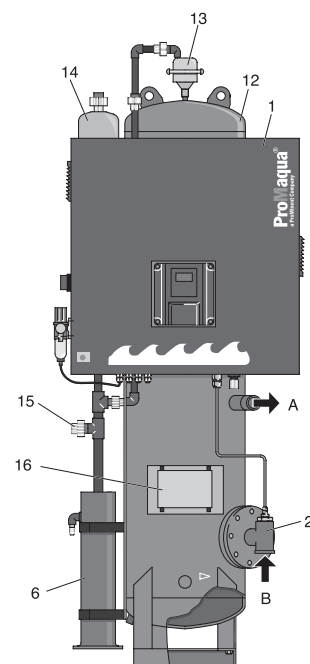
Residual ozone gas destruction module (14):

The residual ozone gas destruction (14) incorporates an integrated water separator, (6) to remove traces of ozone gas in the exhaust air coming from the reaction tank (12). A connection is also available for the exhaust air from any downstream filter plant (15) that may be fitted.

Room air monitoring module (16):

The room air is monitored for traces of ozone gas by a calibrated gas warning device with an electro-chemical sensor with good long-term stability.

If the alarm threshold is exceeded, ozone production is stopped and an alarm signalled. A buzzer is activated at the same time.



pk_7_024_V2

A to filtration
B Raw water

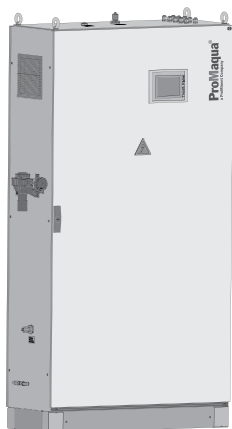
Technical Data

Type		OMVA 1	OMVA 2	OMVA 3
Ozone system type		OZVa 1	OZVa 2	OZVa 3
Ozone capacity	g/h	5	15	35
Reaction tank volume	l	205	460	1,080
Typical flow rate		5 – 10	10 – 15	25 – 35
Operating pressure		0.6 – 1.8	0.6 – 1.8	0.6 – 1.8
Reaction tank connection size		DN 40	DN 50	DN 80
Dimensions H x W x D	mm	2,000 x 850 x 760	2,200 x 850 x 760	2,600 x 1,100 x 1,160
Weight	kg	200	250	350
Connected load	V/Hz/A	230/50;60/2	230/50;60/3	230/50;60/6

All features of the three standard versions can be adapted to specific project-related customer requirements.

2 OZONFILT® And Bono Zon® Ozone Plants

2.4 OZONFILT® OZMa



P_PMA_OF_0010_SW

Ozone plants of the type series OZONFILT® OZMa are pressure systems which generate ozone using compressed air or oxygen under medium-frequency high voltage. The electronic power module offers complete protection for the electrical components (high-voltage transformer and power stage) and also permits a correct digital display of the ozone output in "gram/hour". It is thus possible to adjust any desired ozone quantity between 3 and 100 % of rated output reproducibly and largely independent of voltage and pressure fluctuations.

The use of an integrated, self-optimising (dynamic) variable pressure drying ensures a minimum compressed air consumption of the air systems. The use of a dielectric with optimum thermal conductivity results in an extraordinary compact design of the plant and minimum energy consumption. The novel design of the generator ensures excellent cooling with low cooling water consumption and quickly removes the generated heat before the ozone produced can degrade because of the high temperature.

A simple and safe operation is ensured by the programmable logic controller (PLC) in industry standard and the clear touch panel with data logger and screen recorder. Communication interfaces such as LAN or PROFIBUS® DP ensure an easy installation in industrial control systems; remote diagnosis and communication are facilitated via interfaces such as ISDN or GSM.

An ozone sensor can be directly connected to the ozone measuring and control device integrated in the PLC. Thus, the ozone fed to the water can be monitored and the ozone output can be directly controlled.

Thanks to operation under pressure, the generated ozone can be directly fed to water systems with a backpressure of up to 2 bar. Additional pressure-increasing pumps and injectors thus become superfluous in many applications.

Features

- Simple installation thanks to compact design and single-phase voltage supply
- Low compressed air consumption thanks to dynamic variable pressure drying with low pre-pressure (air systems)
- Minimum energy and cooling water consumption thanks to new, maintenance-free generator concept
- Electronical power module with automatic ozone generation largely independent of voltage and pressure fluctuations. Thus maximum error tolerance with regard to influences from installation environment
- Infinitely variable adjustment of any desired ozone quantity between 3 and 100 % of rated output
- PCL with integrated ozone measurement and control
- 5.7" touch panel with data logger and screen recorder
- Multiple communications interfaces (e.g. LAN, Profibus DP, ISDN, GSM)
- Easy integration of customer-specific control requirements

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.4.1

OZONFILT[®] Ozone Generation Plants OZMa 1-3 A (Operating Gas - Air)

Under nominal conditions, the OZMa 1-3 A range produces up to 140 g/h of ozone from compressed air at a concentration of 20 g/Nm³. Using the designated mixing devices, ozone concentrations between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 or 0 °C).

Different feature options can be compiled by combining different Identcode characteristics (see Chap. 2.4.3).

The plants are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and must only be connected to a single-phase voltage supply, compressed air, cooling water/waste water and ozone metering point at the customer's site.

For the operation of the ozone plant, an adequate compressed air supply and a mixing device designed for the operating conditions are to be integrated (see Chap. 2.6.3).

Requirements on the compressed air supply

- Oil- and dust-free, non-corrosive, constant upstream pressure of 4.5 - 10 bar
- Required air quantity:
 - OZMa 1 A: 73 l/min
 - OZMa 2 A: 110 l/min
 - OZMa 3 A: 147 l/min

Mixing device

All OZMa plants are in principle delivered without mixing device, a suitable mixing system must be ordered separately (see Chap. 2.6.3). When selecting a suitable mixing device, please note that the mixing of ozone is the more efficient the higher the water flow in the mixing system is. The mixing system should thus be designed such that the flow of the water to be treated is at the upper range of the flow specification.

Notes on installation

The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT[®] plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozon (see Chap. 2.6.6).

Ozonisation contributes a large amount of gas to the water of which only a small percentage can dissolve. An adequate bleeding is thus to be integrated. Because the gases discharged this way have a considerable residual ozone concentration, suitable residual ozone destructors must be installed (see Chap. 2.6.5).

For all installations the ozone generator must be interlocked with the water flow into the metering point.

To prevent any return of ozonised water into the ozone-transporting pipe, a non-return valve is to be installed between OZMa and ozone metering point.

2 OZONFILT® And Bono Zon® Ozone Plants

Technical Data

OZONFILT® ozone generation plants OZMa 1-3 A (operating gas - air)

Ambient parameters

max. 85 % relative humidity of ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C

		OZMa 1A	OZMa 2A	OZMa 3A
Number of generator modules		1	1	1
Ozone capacity, measured in accordance with DIN with air at 20 °C, cooling water at 15 °C	g/h	70	105	140
Air consumption (only ozone generation)	Nm ³ /h	3.50	5.25	7.00
Ozone concentration in the gas phase referenced to nominal conditions	g/Nm ³ *	20	20	20
Specific energy requirement at nominal capacity	Wh/g	16.5	16.5	16.5
Power factor at full capacity	cos φ	0.95	0.95	0.95
Ozone connection		G 1/4" internal	G 1/4" internal	G 3/8" internal

* Nm³= m³ at standard conditions (P = 1.013x10⁵ Pa, T = 273 K)

Electrical connection

		OZMa 1A	OZMa 2A	OZMa 3A
Connected load	V/Hz/A	230/50;60/10	230/50;60/16	230/50;60/16
Enclosure rating		IP 43	IP 43	IP 43

Overall dimensions (without mixing)

		OZMa 1A	OZMa 2A	OZMa 3A
Width	mm	1,114	1,114	1,114
Height	mm	1,961	1,961	1,961
Depth	mm	400	400	400

Weight

		OZMa 1A	OZMa 2A	OZMa 3A
Weight approx.	kg	270	280	300

Ozone mixing

		OZMa 1A	OZMa 2A	OZMa 3A
Raw water temperature max.	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2	0.8–2	0.8–2

Air supply

		OZMa 1A	OZMa 2A	OZMa 3A
max. required air quantity	l/min	73	110	147

Air quality Oil- and dust-free, Non-corrosive, Constant upstream pressure of 4.5 - 10 bar

Cooling water

		OZMa 1A	OZMa 2A	OZMa 3A
Cooling water consumption (15 °C)	l/h	90	135	180
Cooling water consumption (30 °C)	l/h	200	300	400
Cooling water inlet pressure	bar	2–5	2–5	2–5
Cooling water inlet, PE pressure hose	mm	8 x 5	8 x 5	12 x 9
Cooling water outlet, open discharge	mm	8 x 5	8 x 5	12 x 9

Cooling water quality No tendency to form lime scale; Removable substances: < 0.1 ml/l ; Iron: < 0.2 mg/l; Manganese: < 0.05 mg/l; no corrosive components; Conductivity: > 100 µS/cm

2 OZONFILT® And Bono Zon® Ozone Plants

2.4.2

OZONFILT® Ozone Generation Plants OZMa 1-3 O (Operating Gas - Air)

Under nominal conditions, the OZMa 1-3 O range produces up to 245 g/h of ozone from oxygen at a concentration of up to 150 g/Nm³. Using the designated mixing devices, ozone concentrations in the water to be treated of up to 90 ppm can be achieved (theoretical value at 0 °C). Ozone concentration in g/Nm³ and system output in g/h can be varied depending on the operating conditions and can thus be individually matched to the application conditions. Examples for various combinations are listed in the table of the technical data.

Different feature options can be compiled by combining different Identcode characteristics (see Chap. 2.4.3).

The plants are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and must only be connected to a single-phase voltage supply, oxygen, cooling water/waste water and ozone metering point at the customer's site.

Requirements on the oxygen supply

- See technical data
- Required gas quantities: see technical data

Mixing device

All OZMa plants are in principle delivered without mixing device, a suitable mixing system must be ordered separately (see Chap. 2.6.3). When selecting a suitable mixing device, please note that the mixing of ozone is the more efficient the higher the water flow in the mixing system is. The mixing system should thus be designed such that the flow of the water to be treated is at the upper range of the flow specification.

Because of the high ozone concentrations, we recommend mixing systems made of stainless steel. Mixing systems made of PVC may show a reduced service life, depending on the operating conditions.

Notes on installation

The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozon (see Chap. 2.6.6).

Depending on the operating and installation conditions, it might be necessary to also monitor the room air for excessive oxygen content. For this purpose, the gas detector GMA 36 Oxygen can be used.

All gas-transporting accessories must be resistant to ozone and oxygen (e.g. fat-free).

Ozonisation contributes a large amount of gas to the water of which only a small percentage can dissolve. An adequate bleeding is thus to be integrated. Because the gases discharged this way have a considerable residual ozone concentration, suitable residual ozone destructors must be installed (see Chap. 2.6.5). Because of the high ozone concentrations, only catalytic residual ozone destructors can be used. Residual ozone destructors on the basis of activated carbon ignite spontaneously if subjected to increased ozone concentrations.

For all installations the ozone generator must be interlocked with the water flow into the metering point.

To prevent any return of ozonised water into the ozone-transporting pipe, a non-return valve is to be installed between OZMa and ozone metering point.

2 OZONFILT® And Bono Zon® Ozone Plants

Technical Data

OZONFILT® Ozone Generation Plants OZMa 1-3 O (Operating Gas - Air)

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Number of generator modules		1	1	1
Nominal ozone capacity at 100 g/Nm ³ ** and cooling water at 15 °C	g/h	105	158	210
Ozone capacity at 150 g/Nm ³ *	g/h	60	90	120
Ozone capacity at 80 g/Nm ³	g/h	123	184	245
Specific energy requirement at nominal capacity	Wh/g	10	10	10
Power factor at full capacity	cos φ	0.95	0.95	0.95
Ozone connection		G 1/4" internal	G 1/4" internal	G 1/4" internal

Electrical connection

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Connected load	V/Hz/A	230/50;60/10	230/50;60/16	230/50;60/16
Enclosure rating		IP 43	IP 43	IP 43

Overall dimensions

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Width	mm	1,114	1,114	1,114
Height	mm	1,961	1,961	1,961
Depth	mm	400	400	400

Weight

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Weight	kg	220	230	250

Ozone mixing

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Raw water temperature max.	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0

Specification of operating gas: oxygen

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Gas volume at nominal capacity 100 g/Nm ³	Nl/h	1,050	1,580	2,100
Gas volume at capacity 150 g/Nm ³	Nl/h	400*	600*	800*
Gas volume at capacity 80 g/Nm ³	Nl/h	1,540	2,300	3,100
Concentration min.	vol%	90	90	90
Dew point max.	°C	-50	-50	-50
Pressure	bar	3 – 6	3 – 6	3 – 6
Particles max.	µm	5	5	5
Hydrocarbons max.	ppm	20	20	20
Max. temperature	°C	30	30	30

Cooling water

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Cooling water consumption (15 °C)	l/h	120	180	240
Cooling water consumption (30 °C)	l/h	200	300	400
Cooling water inlet pressure	bar	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	8 x 5	8 x 5	12 x 9
Cooling water outlet, open discharge	mm	8 x 5	8 x 5	12 x 9

Cooling water quality No tendency to form lime scale, no corrosive components; Sedimentable substances: < 0.1 ml/l; Iron: < 0.2mg/l; Manganese: < 0.05 mg/l; Conductivity: > 100 µS/cm; Chloride: < 250 mg/l

* Output 150 g/Nm³ as special version must be factory-set

** Nm³= m³ at standard conditions (P = 1.013x10⁵ Pa, T = 273 K)

2 OZONFILT® And Bono Zon® Ozone Plants

2.4.3 Order Information For OZONFILT® OZMa Plants

OZMa		Type ozone generator	
		feed g/h gas: air	feed g/h gas: oxygen
01		70	105
02		100	150
03		140	210
Operating gas			
A		Operating gas - air	
O		Operating gas - oxygen	
Type			
P		ProMaqua	
Mechanical design			
0		Standard	
1		In stainless steel cabinet	
Operating voltage			
A		Single-phase 230 V ±10 %, 50/60 Hz (only types 01-03)	
Gas treatment			
0		Gas treatment not integrated (design operating gas - oxygen)	
1		Gas treatment integrated without filter package (design operating gas - air)	
2		Gas treatment integrated with filter package (design operating gas - air)	
Preset language			
DE		German	
EN		English	
FR		French	
ES		Spanish	
Control			
0		Basic version with digital input to control two adjustable power stages	
1		external power control via 0/4-20 mA input, data logger	
2		external power control, ozone measurement and visualisation via screen recorder, 2 freely configurable 0/40-20 mA inputs, 1 freely configurable 0/4-20 mA output	
3		as 2 with additionally integrated PID controller for control of the ozone concentration independent of measured value and flow	
Communication interfaces			
0		None	
Additional options			
0		None	
1		Dew point sensor	
2		Oxygen sensor (design operating gas - oxygen)	
3		Dew point sensor and oxygen sensor (design operating gas - oxygen)	
Approvals			
01		CE-mark	
Hardware			
0		Standard	
Software			
0		Standard	

Explanations on the Identcode:

- Mechanical design: In the design 0, the plant is installed in a standard control cabinet made of powder-coated steel.
- Gas treatment: Without filter package for oil-free generated or already de-oiled compressed air.
With filter package for compressed air with residual oil content.

2 OZONFILT® And Bono Zon® Ozone Plants

2.5 Bono Zon® Ozone Plants

BONa Range: Capacity Range 40-720 g/h



pk_7_002_V2
 BONa 2A, capacity 160 g/h

BONa plants are manufactured as vacuum plants and so comply with the highest safety measures. A clear, easy to read display panel provides information on air flow, voltage, power consumption and the status of the air treatment.

The ozone capacity can be steplessly adjusted over the full capacity range. The entire process control and monitoring of safety-related parameters takes place with the aid of the integrated PLC.

Minimal operating costs are achieved through a load-dependent regeneration of the air treatment and a significant reduction in cooling water requirement.

Bono Zon® plants comply with the German standard for ozone production plants, DIN 19 627, and carry the TÜV GS approval mark (safety tested).

Bono Zon® plants are equipped with a reliable and economical adsorption drying system. The load-dependent control of the adsorption regeneration ends the heating phase when the breakdown temperature is reached. The required dew point is ensured at all times and the operating costs minimised at the same time. This ensures optimal operational safety of the ozone plant.

The control for the booster pump and protection device are already integrated in the electrical cabinet of the BONa plant.

Features

- Choice of stainless steel or PVC ozone generation modules.
- Automatic electronic overload detection linked to safety disconnection, even on part load.
- PLC Siemens® Simatic S7 which controls all process sequences and outputs fault messages if anomalies occur.
- Clear, easy to understand display and operation panel: the sequence of the ozone production is displayed on the flow schematic. LED displays inform the operator of the current operating status, and the set values, e.g. volume flow (take-off gas), primary voltage and primary current are displayed.
- Ozone producers (ozone generators) that are optimised for low power consumption, power requirement 18.7 Wh/g.
- Stepless matching of the ozone production to the requirement using a regulating transformer, which can be fitted with an electric actuator if required.
- Our Dulcotest® ozone measuring probe can be directly connected.
- Control for booster pump and protection device are already integrated in the electrical cabinet
- Clear, easy to read display area with operation and fault lamps and digital instruments integrated in a display panel
- Vacuum operation ensures highest possible protection against ozone escape
- Air treatment using cheap-to run adsorption drying plant. An optimal dew point is ensured by means of thermostatically-controlled regeneration.
- BonoZon plants comply with the German standard for ozone production plants, DIN 19627, and carry the TÜV GS approval mark (safety tested)

Nominal ozone concentration

20 g/m³ (referenced to standard conditions p=1.013x10⁵ Pa, T=273 K), measured with a cooling water temperature of 15 °C max., at an ambient air temperature of 20 °C max.

Design Conditions In Accordance with DIN 19627:

Max. 30 °C; 60 % rel. humidity, dust-free installation, no aggressive gases, supply and extract air ventilation of the installation room.

An air conditioning system may be required with elevated ambient temperature and/or humidity at the installation position of the plant. Please specify separately at time of ordering! Suitable measures (e.g. air conditioning of the installation room) must be taken to prevent condensation forming, even when the plant is shut down.

Standard values for cooling water quality:

- Temperature < 25 °C
- Replaceable substances < 0.1 ml/l
- Iron < 0.2 mg/l
- Manganese < 0.05 mg/l
- Chloride < 250 mg/l (BONa D und E)
- No tendency to form lime deposits
- No corrosive components

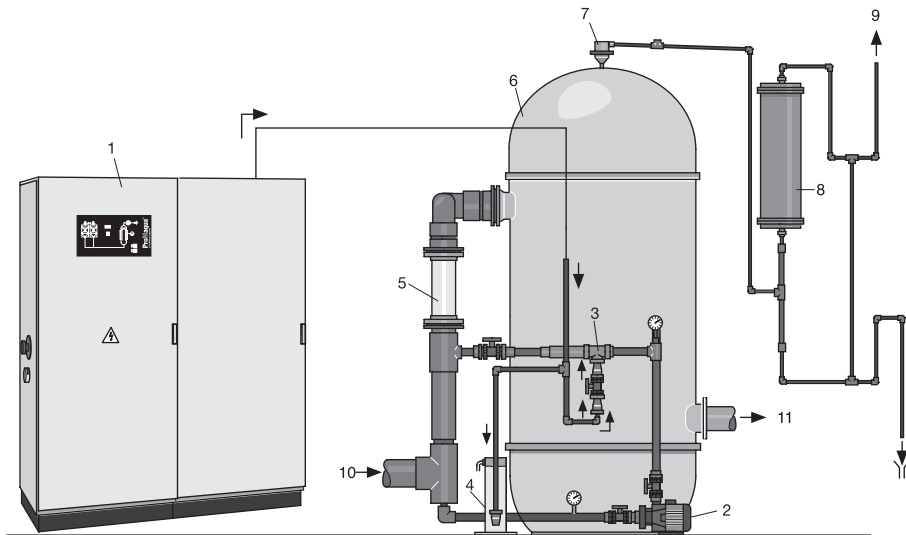
2 OZONFILT[®] And Bono Zon[®] Ozone Plants

Design

For optimal operation of a water treatment system using ozone, it is essential that all components are carefully matched with each other:

- **Ozone generation:**
Selection of a suitable ozone plant is not just determined by the required quantity of ozone/hour but also by other limiting conditions such as the nature and temperature of the cooling water and the environmental conditions, etc.
- **Mixing:**
First and foremost, the parameters of the water to be treated, such as flow rate, back pressure, etc. are required for the design the mixing system.
- **Reaction tank:**
Whether a reaction tank is required, and if so, what size and equipment is required, depends primarily on the requirements of the particular application.
- **Residual ozone destruction:**
Similarly, the choice of the suitable ozone destructor is determined by the ozonisation application. As an example, no catalytic residual ozone destructors can be used in the swimming pool, because of their sensitivity to chlorine.

The diagram below shows a typical arrangement of an ozone treatment system. For each ozone project, our project engineers combine all the right components to meet specific customer requirements.



pk_7_003_1

BONa ozone production plant with mixing device, reaction tank and residual ozone destruction pk_7_003_1_V2

- 1 Ozone plant type BONa
- 2 Booster pump
- 3 Injector system
- 4 Water trap
- 5 Mixer
- 6 Reaction tank
- 7 Vent valve
- 8 Residual ozone destructor
- 9 Ozone-free exhaust air
- 10 Raw water
- 11 Ozonised water

2 OZONFILT® And Bono Zon® Ozone Plants

2.5.1 Bono Zon® Ozone Plant With Ozone Generator Made Of Stainless Steel

Depending on capacity, the ozone plants in this range are equipped with 1 – 9 ozone generators made from stainless steel. Indirect cooling of the dielectrics eliminates the possibility of cooling water ingress. Individual electrodes can be easily replaced without any need to empty the entire reactor. This ensures a high level of reliability and makes the plant very service-friendly.

The operating pressure of the ozone generator is –0.08 to 0 bar and must be produced with an injector system matched to the particular application.

Ozone generators made from PVC are optionally available for use in connection with corrosive cooling water..

Technical Data

Bono Zon® Ozone Plant With Ozone Generator Made Of Stainless Steel

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Number of generator modules		1	2	2	3	4	5	6	7	8	9
Ozone capacity, measured in accordance with DIN, with air 20 °C, cooling water 15 °C	g/h	80	120	160	240	320	400	480	560	640	720
Air flow for ozone production max.	m³/h	4	6	8	12	16	20	24	28	32	36
Ozone generation power consumption (without air treatment)	kW	1.5	2.2	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5
Ozone connection		DN 15	DN 20	DN 20	DN 32	DN 32	DN 32	DN 40	DN 40	DN 40	DN 50

Cooling water

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Cooling water requirement cooling water temperature 15 °C and air temperature < 25 °C	m³/h	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Cooling water requirement cooling water temperature 25 °C and air temperature < 30 °C	m³/h	0.3	0.6	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7
Cooling water inlet pressure (before pressure reducer)	bar	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6
Cooling water inlet	G..i	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Cooling water outlet, open discharge		DN 15	DN 20	DN 20	DN 20	DN 20	DN 20	DN 20	DN 20	DN 20	DN 20

Electrical connection

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Mains supply, incl. booster pump	kVA	5.5	7.0	10.0	14.5	20.0	22.5	27.5	34.0	36.0	38.0
Infeed	3x A	25	50	50	63	50	63	80	80	80	80
Enclosure rating		IP 23	IP 23	IP 23	IP 23	IP 23	IP 23	IP 23	IP 23	IP 23	IP 23

Ozone conveying device interface

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Connection for booster pump	A	2.5 – 4.0	4.0 – 6.3	4.0 – 6.3	6.0 – 10.0	6.0 – 10.0	6.0 – 10.0	9.0 – 14.0	13.0 – 18.0	13.0 – 18.0	13.0 – 18.0
Motor circuit breaker (standard value)	kW	1.1	2.2	2.2	3.0	4.0	4.0	5.5	7.5	7.5	7.5

Overall dimensions

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Width	mm	800	1,600	1,600	2,000	2,400	2,400	2,800	3,200	3,400	3,400
Height	mm	1,950	1,950	1,950	1,950	2,200	2,200	2,200	2,200	2,200	2,200
Depth	mm	500	500	500	500	600	600	600	600	600	600

Weight

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Weight	kg	360	700	720	820	1,200	1,280	1,360	1,920	1,980	2,000

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.6 Accessories For Ozone Plants

2.6.1 Compressors For OZONFILT[®] OZVa 1-4

Atlas Copco LFX compressors

The outstanding feature of this range of compressors is their especially favourable price/performance ratio. They are equipped with active start unloading and automatic condensate discharge by solenoid valve. The compressors are not suitable for continuous operation and should only be used in less harsh operating conditions.

Technical Data

Type		LFX 0,7	LFX 1,5
Free air delivery rate at 7 bar	l/min	61	124
Power consumption at 7 bar	W	530	970
Number of cylinders		1	1
Sound pressure level	dB(A)	62	64
Air receiver capacity	l	20	20
Weight	kg	44	48
Suitable for OZVa Type		1 + 2	3 + 4

Type	Type	Order no.
LFX 0,7	230 V / 50 Hz	1004458
LFX 0,7	230 V / 60 Hz	1010719
LFX 1,5	230 V / 50 Hz	1006343
LFX 1,5	230 V / 60 Hz	1009638

Air filter kit

	Order no.
Air filter kit for Atlas Copco LFX compressors	1005789

Dürr ABK compressors

The outstanding feature of this continuously rated range of compressors is their extremely robust construction, making them ideally suitable for industrial use. They are equipped with active start unloading, automatic condensate discharge by solenoid valve and an hours-run meter. PTFE coated special aluminium pistons lead to the long service life and reliability of these compressor units.

Technical Data

Type		TA-080	HA-234
Free air delivery rate at 7 bar	l/min	62	152
Supply max.	V AC	230	230
Supply frequency	Hz	50 / 60	50
Power consumption at 7 bar	W	800	1,900
Number of cylinders		1	3
Sound pressure level	dB(A)	68	78
Air receiver capacity	l	25	55
Weight	kg	49	70
Suitable for OZVa Type		1 + 2	3 + 4

Type	Order no.
TA-080	1025398
HA-234	1025399

Air filter kit

	Order no.
Air filter kit for Dürr ABK compressors*	1025400

* 1 filter kit is required per cylinder.

Compressors with refrigeration drying for operation in conditions of high humidity, and high-capacity screw compressors for connection to several ozone plants are available on request.

2 OZONFILT® And Bono Zon® Ozone Plants

2.6.2

Oxygen Generator For OZONFILT® OZVa 5-7

OXYMAT 020

This compact oxygen generator works on the principle of pressure swing filtration of the surrounding air via a molecular sieve. When supplied with suitably dried compressed air, oxygen is generated with a purity of up to 95 % and a dew point of -70°C . The plant develops a pressure of 4 bar at the oxygen outlet and can be directly connected to the OZVa 5-7.

Technical Data

(at 90 % oxygen yield):

Type		Version 1	Version 2
Capacity	Nm ³ /h	0.9	1.2
Air requirement (min. 6 bar)	Nm ³ /min	0.17	0.24
Power consumption incl. compressor	kW	1.5	2.5
Specific energy requirement	kWh/Nm ³	1.7	2.1

Required components for version 1

	Order no.
OXYMAT 020, 110-240 V / 50-60 Hz	1025383
Reciprocating compressor (oil-lubricated) Atlas Copco LE 2-10 E/100, with 100 l air receiver, 400 V / 50 Hz	1025384
Refrigeration dryer FD 5, 230 V / 50 Hz	1025385
Filter set 006, for LE 2-10 and GX 2-10 FF	1025387
Hose set with quick-release couplings, LE 2-10 to OXYMAT 020 LE 2-10 to OXYMAT 020	1025388
Connecting set with connections for 6x4 mm PTFE hose, between OXYMAT and OZVa	1025395

Required components for version 2

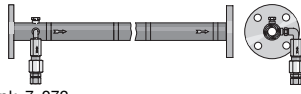
	Order no.
OXYMAT 020, 110-240 V / 50-60 Hz	1025383
Atlas Copco Aircenter GX 2-10 FF/200, with screw compressor (oil injection), integrated refrigeration drying and 200 l air receiver, 400 V / 50 Hz	1025386
Filter set 006, for LE 2-10 and GX 2-10 FF	1025387
Hose set with quick-release couplings, for connection of air treatment GX 2-10 FF with OXYMAT 020	1025389
Connecting set with connections for 6x4 mm PTFE hose, between OXYMAT and OZVa	1025395

Accessories

	Order no.
PTFE hose 6x4 mm, Admissible operating pressure 15 bar, sold in meters	037426
Service kit for Atlas Copco LE 2-10, (recommended after 8000 running hours)	1025390
Service kit for Atlas Copco GX 2-10 FF, (recommended after 8000 running hours)	1025391
Service kit 006, for Atlas Copco LE 2-10 and GX 2-10 FF	1025392

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.6.3 Static Helical Mixer Made From PVC Or Stainless Steel



pk_7_072
Static Helical Mixer

Designed for intensive mixing of gas with liquid flows. 4 helical blades ensure optimal mixing of the ozone with minimal pressure drop (0.1 bar per blade at maximum flow). For optimal mixing results, the specified flow range of the static helical mixer must be complied with.

Version with loose flanges to DIN 2501 and integrated injection point made from stainless steel with couplings for 12 mm diam. stainless steel tube, or 12/9 mm PTFE hose, using stainless steel support inserts. In addition, the injection point is fitted with a non-return valve to protect the ozone plant from reverse flowing water. The mixers are manufactured as grease-free, so they are also suitable for Types OZVa 5-7. The stainless steel version has a G 1/4" pressure gauge tapping at the ozone mixing point.

Flow m ³ /h	Material	Overall length mm	Connector	Order no.
5 – 10	PVC-U	718	DN 40	1024324
10 – 15	PVC-U	718	DN 50	1024325
15 – 25	PVC-U	718	DN 65	1024326
25 – 35	PVC-U	1,100	DN 80	1024327
35 – 50	PVC-U	1,100	DN 100	1024328
50 – 90	PVC-U	-	DN 125	1034641
95 – 160	PVC-U	-	DN 150	1034640
5 – 10	1.4404	718	DN 40	1022503
10 – 15	1.4404	718	DN 50	1022514
15 – 25	1.4404	718	DN 65	1022515
25 – 35	1.4404	1,100	DN 80	1022516
35 – 50	1.4404	1,100	DN 100	1024154

Other sizes on request

Connecting parts for the gas pipeline

	Order no.
Stainless steel pipe 12/10 mm, Sold by meter	015743
Stainless steel pipe 12/10 mm, grease-less, 1.4 m	1022463
PTFE hose 12/10 mm, grease-less, sold in meters	037428
Stainless steel support inserts, 2 No. for 12/9 mm PTFE hose, grease-less	1025397
Stainless steel coupling 12 mm - R 1/4, grease-less	1025755
Stainless steel fitting 12 mm - R 3/8, grease-less	1034642
Stainless steel 90° elbow D 12 - D 12, grease-less	1022462
Stainless steel pressure relief valve, Adjustable pressure range 0.07 – 2 bar, Connection size: 1/4" NPT, 2 additional inputs for connecting 2 pressure gauges.	1029032

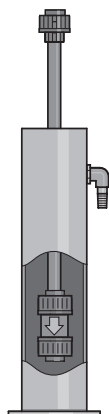
2 OZONFILT® And Bono Zon® Ozone Plants

2.6.4

Accessories For Bono Zon® Ozone Plants

Water trap

Water trap as a vacuum breaker to prevent backflow of water into the ozone generator. Pre-assembled unit consisting of PVC loss vessel including overflow with DN 10 hose spigot, and a non-return valve with DN 20 PVC coupling.



pk_7_071
Water trap

Order no.

Water trap

1008781

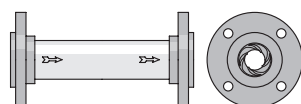
Ozone mixing

Static mixer designed for intensive mixing of gas with liquid flows. Made from PVC-U with two built-in helical mixers and a mixing section matched to the throughput.

The size depends only on the quantity of water to be ozonised.

Pressure rating: PN 4, other pressure ratings available on request.

Connection DN 65-200: loose flanges PN 10.



pk_7_044
Static mixer

Recommended flow m ³ /h	Flange connection DN mm	Length mm	Order no.
15-25	65	350	1007841
25-35	80	450	1007842
35-50	100	550	1007843
50-90	125	650	1007864
90-160	150	800	1007865
160-250	200	1000	1007866
250-350	200	1000	1007867

Higher flows on request.

Stainless steel version: on request

Ozone pumping devices

Complete ozone pumping devices consist of booster pump, injector and mixer and are assembled to suit specific project requirements. Design and technical details on request.

Vent valves

Vent valves made from stainless steel 1.4571 in ozone-resistant version for mounting on reaction tanks.

Suitable for BONA types	Connector	Pressure bar	Order no.
1B	R 3/4" internal x R 1/2" external	0.5 – 6.0	302525
1A, 1D	R 1" internal x R 1/2" external	0.5 – 6.0	302526
to 3A, 3D	R 1" internal x R 3/4" external	0.5 – 2.0	303845

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

2.6.5

Residual Ozone Gas Destructor

Residual ozone gas destruction is used to remove traces of ozone gas from the exhaust air coming from the reaction tank. Because the exhaust air from the reaction tank still contains water, the pipework should be suitably routed so as to ensure that the water is drained off at the inlet side.

As the exhaust air after the residual ozone gas destructor is still up to 100 % saturated with water vapour, and because small temperature fluctuations, even on the outlet side, can lead to flowback of condensate, a suitable drainage connection must be provided here too.

The exhaust air from any downstream filter plant that may be fitted can also be routed via this ozone gas destruction unit.

PVC version

Residual ozone destructor based on activated carbon granules in a PVC housing.

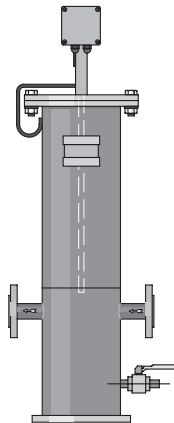
	Type	Ozone quantity g/h	Order no.
Residual ozone destructor 3 L	10	10	879022
Residual ozone destructor 14 L	40	40	1004267
Residual ozone destructor 30 L	100	100	879019
Residual ozone destructor 60 L	200	200	879018

Note:

The stated ozone quantities refer to quantities added to the raw water. The residual ozone destructor is designed for the normal residual ozone concentration found in swimming pool applications. It may only be used in plants with air as operating gas and a maximum added quantity of 1.5 g of ozone/m³treated water.

Stainless steel version

Residual ozone destructor based on a maintenance-free MnO catalytic converter with integrated heating, 230 V, 50-60 Hz. Connections Rp 1/2" or flanges to DIN 2642, PN10. Types 18 to 110 m³/h also fitted with Rp 1/2" ball valve as condensate drain.



pk_7_073

Residual ozone destructor

Max. gas flow m ³ /h	Heating power W	Dimensions H x W x D mm	Connector	Order no.
1.5	100	700 x 110 x 180	Rp 1/2"	1018440
8.0	100	735 x 110 x 235	Rp 1/2"	1018406
18.0	140	1,154 x 275 x 240	DN 25	1019155
28.0	140	1,154 x 300 x 259	DN 25	1021037
40.0	500	1,156 x 330 x 264	DN 25	1026335
73.0	500	1,158 x 400 x 320	DN 32	1019971
110.0	500	1,160 x 450 x 375	DN 40	1027238

Note:

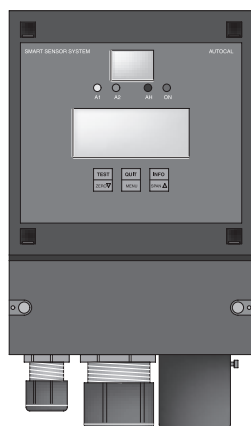
The catalytic residual ozone destructor must only be used in chlorine-free gas flows. The PVC version must therefore be used for swimming pool applications.

2 OZONFILT® And Bono Zon® Ozone Plants

2.6.6

Room Air Monitoring

Gas detectors GMA 36 ozone and oxygen



pk_7_004_1
 Gas warning devices GMA 36

Calibratable gas warning devices with digital display of the detected gas concentration. 2 relay outputs for issue of infringements of warning and alarm thresholds, to switch external alarm sounder and for interlocking with the ozone plant. The warning message relay is self resetting, the alarm relay is a latching type and must be acknowledged at the device. 1 self-resetting relay for connection to an alarm horn is switched on fault conditions and when the alarm limit is exceeded.

The ozone sensor responds to all strongly oxidising gases, hence it responds to chlorine gas or chlorine dioxide too.

The GMA 36 oxygen warning device is intended for installations where an unacceptably high oxygen enrichment of the ambient air is possible.

Technical Data

Type		Ozone	Oxygen
Warning at approx.	ppm/vol%	0.3	23.0
Alarm at approx.	ppm/vol%	0.5	25.0
Permissible ambient temperature	°C	-15...45	-15...45
Protection class housing		IP 54	IP 54
Dimensions (without PGs, without sensor) H x W x D	mm	247 x 135 x 95	247 x 135 x 95
Supply	V/Hz	85 – 264/50 – 60	85 – 264/50 – 60
Power consumption	W	5	5
Warm-up phase max.	s	150	20
Relay contact "Warning", self-resetting	V/A	230/1	230/1
Relay contact "Alarm", latching	V/A	230/1	230/1
Relay contact "Horn", latching, can be acknowledged	V/A	230/1	230/1
Sensor measuring principle		electrochemical	electrochemical
Sensor service life (depending on environmental cond.)	Years	2–3	2–3

	Type	Order no.
Gas warning device Type GMA 36	Ozone	1023155
Gas warning device Type GMA 36	Oxygen	1023971

Spareparts

	Order no.
Replacement sensor for chlorine, chlorine dioxide, ozone	1023314
Replacement sensor for oxygen	1023851
Replacement sensor for gas warning devices in the Life CGM range	1003009

Mounting kit

	Order no.
Mounting kit for direct mounting of the CGM 1060 and GMA 36 ozone warning devices on the housing of the OZVa plants	1004248
Support bracket for mounting kit for all types of OZVa except OZVa 1/2 with transparent mixing system	1005854

2 OZONFILT[®] And Bono Zon[®] Ozone Plants

Warning light and horn

Combined horn and red warning lamp. IP 33 enclosure made from impact-resistant ABS. Dome made from clear polycarbonate. Connected load: 230 V AC, 50 mA. Supplied complete with B 15 d / 7 watt bulb.

Warning light and horn	Order no. 1010508
-------------------------------	-----------------------------

Gas tracing pump

Hand operated, non-continuously working test tube pump for fast and accurate measurement of ozone gas. Complete with 10 No. ozone gas test tubes 0.05-5 ppm in carrying case.

Gas tracing pump	Order no. 1025533
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Potassium iodide starch paper

Roll with 4.8 m test strip for leak detection on pipelines carrying ozone gas.

Potassium iodide starch paper	Order no. 1025575
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2.6.7

Personal Protection Needs

Gas mask

Ozone-resistant, full-face respiratory protective mask with panoramic window shield to EN 136 Class 3. Medium size with EN 148-1 threaded pipe connection. Complete with combination filter NO-P3 and carrying case..

Gas mask	Order no. 1025574
-----------------	-----------------------------

Warning label

Warning label in accordance with the "Guidelines for the use of ozone for water treatment" ZH 1/474, issued by the central office of the industrial safety associations. Version supplied as a combined adhesive label with markings as follows: warning sign, ozone plant room indication and prohibited activity signs.

Warning label	Order no. 740921
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Emergency stop switch

For installation near the door of the ozone plant room. IP 65 PVC enclosure.

Emergency stop switch	Order no. 700560
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3 Chlorine Dioxide Plants Bello Zon®

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3 Chlorine Dioxide Plants Bello Zon®

3.1 Chlorine Dioxide In Water Treatment

Chlorine dioxide is an extremely reactive gas, which – because of its instability – cannot be stored, and must only be produced in the required quantities in special plants on the site where it is to be used.

Chlorine dioxide offers a number of advantages for water disinfection compared with chlorine, the disinfectant mainly used. The disinfecting power of chlorine dioxide actually increases slightly with increasing pH, whereas with chlorine the disinfecting power reduces. Chlorine dioxide remains stable in the pipeline system over a long period and ensures microbiological protection of the water for many hours, or even several days. Ammonia and ammonium, which cause significant chlorine depletion, are not attacked by chlorine dioxide, so that the dosed chlorine dioxide is fully available for bactericidal action. Chlorophenols, compounds with intense odours, which can be produced during water chlorination in some circumstances, are not formed when chlorine dioxide is used. Trihalomethanes (THMs), a group of substances, which, like their best known example, chloroform, are suspected of being carcinogenic, are produced when chlorine reacts with natural water components (humic acids, fulvic acids, etc.). Measured THM concentrations, if present at all, are drastically reduced when chlorine dioxide is used as an alternative disinfectant.

Advantages of chlorine dioxide:

- Disinfection power is independent of pH.
- High residual effect thanks to long-term stability in the pipeline system.
- Reduction of the biofilm in pipelines and tanks, hence reliable protection of entire water systems against legionella contamination.
- No reaction with ammonia or ammonium.
- No formation of chlorophenols and other intense odour compounds which can be produced in water chlorination.
- No formation of THMs and other chlorinated hydrocarbons, no increase in the AOX value.

3.1.1 Chlorine Dioxide Applications

For every new project, our engineers can draw on the experience that we have continually accumulated since 1976, in the following applications:

Municipal drinking water and waste water plants

- Disinfection of drinking water
- Disinfection of waste water

Hotels, hospitals, retirement homes, sports facilities, etc.

- Combating legionella in cold and hot water systems
- Water disinfection in air conditioning system cooling towers

Food and beverages industry

- Disinfection of product and industrial water
- Bottle cleaning, rinsing and pasteuriser
- Cold sterile bottling
- Disinfectant in CIP systems
- Condensate water treatment in the milk industry
- Washing water treatment for fruit, vegetables, seafood, fish, and poultry

Horticulture

- Disinfection of irrigation water in plant growing

Industry

- Cooling water treatment
- Combating legionella in cooling circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers
- Combating slime in the paper industry

3 Chlorine Dioxide Plants Bello Zon[®]

3.2 Bello Zon[®] Plant Technology

Bello Zon[®] chlorine dioxide generating plants and metering systems work according to the chlorite/acid process. These plants generate a chlorine dioxide solution free of chlorine based on the reaction of sodium chlorite solution with hydrochloric acid.

Decades of experience with Bello Zon[®] chlorine dioxide plants have shown that an extraordinary yield of 90 to 95 % is achieved with the process parameters chosen (with reference to stoichiometric ratios).

In most applications, the metering is proportional to the flow, i.e. flow-dependent on the signal from an inductive or contact flow meter or parallel with a delivery pump.

In circulation systems, such as e.g. bottle washing machines, cooling circuits, where a chlorine dioxide loss has only to be supplemented, the addition can also be controlled via a chlorine dioxide measurement depending on the measured value.

Features

- Precise and reproducible chlorine dioxide production thanks to calibratable metering pumps for the initial chemicals.
- Ease of operation thanks to microprocessor control with display of all relevant operating parameters and error messages in full text.
- Display of the current production quantity as well as the flow rate of the connected flow meter for CDV and CDK.
- Integrated measurement of ClO₂ and chlorite as well as controlling of ClO₂.
- Highest level of safety provided as standard thanks to design and operation in accordance with DVGW specifications W 224 and W 624.

Bello Zon[®] CDL Legio Zon[®]

Ideal for small water quantities and for both continuous and discontinuous treatment: The specialist in combating legionella and other pathogens supplies up to 12 g/h. The complete system with integrated metering pump is simple and safe to use thanks to its chlorine dioxide concentration of 2 g/l. An easy to understand user interface with self-explanatory menu navigation makes it simple to operate.

Bello Zon[®] CDV

The ideal system for medium to large water quantities - for the production of 15 to 2,000 g/h of chlorine dioxide. The continuous treatment is safe and simple thanks to the use of diluted chemicals.

Bello Zon[®] CDK

This plant produces chlorine dioxide for large water quantities - 150 to 10,000 g/h. The continuous water treatment is particularly economic thanks to the use of concentrated chemicals.

ProMaqua provides all advice and support services needed for the safe use of a chlorine dioxide plant:

- Evaluation of the situation at site by trained, competent field sales staff.
- In our water laboratory, all important water parameters, which are required for an optimal plant design, can be analysed.
- Planning of the plant.
- Commissioning and plant service by our trained service technicians.

3 Chlorine Dioxide Plants Bello Zon®

3.3 Performance Overview Of Chlorine Dioxide Systems

Type	Output						Application				
	1	5	10	100 g/h	2	10	200 kg/h				
CDL	█							✓	✓		
CDV	█							✓	✓	✓	✓
CDK			█							✓	✓
SVP Pure®				█						✓	✓
								Food and beverages industry	Legionella combating	Municipal drinking and waste water treatment	Industry (cooling tower, waste/process water, etc.)

P_PMA_BEZ_0006_SW_G

Chlorine dioxide is establishing itself more and more as a universal disinfectant in applications such as disinfecting drinking water and industrial water, washing food or in the treatment of cooling water and waste water. Its effect independent of the pH value of the water ensures systems remain free of biofilms.

- Efficient disinfection in connection with best eco-compatibility
- Safe and reliable plant technology
- World-wide availability of know-how and service

3 Chlorine Dioxide Plants Bello Zon[®]

3.3.1 Questionnaire On The Design Of A Chlorine Dioxide Plant

Use of the chlorine dioxide plant:

- for disinfection of
 - Drinking water
 - Industrial water
 - Process water in the food industry
 - Waste water
 - Cooling water
 - _____
- for oxidation of
 - Iron, manganese, nitrite, sulphide etc.
 - Swimming pool water
 - Odour
 - _____
- _____

Water values:

- Max. water flow rate _____ m³/h Maximum water pressure _____ bar
- Water flow rate constant fluctuating from _____ m³/h to _____ m³/h
- pH value _____ Iron (Fe²⁺) _____ mg/l
- Temperature _____ °C Manganese (Mn²⁺) _____ mg/l
- Solid fraction _____ mg/l Nitrite (NO₂⁻) _____ mg/l
- Alkalinity K_{S4,3} _____ mmol/l Sulphide (S²⁻) _____ mg/l
- TOC (total organic carbon) _____ mg/l

Response time to application:

_____ m³ volume reaction tank or _____ minutes residence time in entire system.

Type of metering:

- constant
- flow-proportional
- depending on measured value

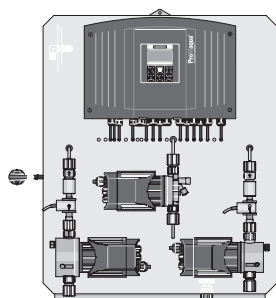
Desired amount of metering: _____ mg/l

Desired concentration after chlorine dioxide metering: _____ mg/l

Other requirements:

3 Chlorine Dioxide Plants Bello Zon®

3.4 Bello Zon® Chlorine Dioxide Plants Type Legio Zon®



pk_7_075_V2
 Legio Zon® (without cover)

The Bello Zon® plants Legio Zon® are fully pre-mounted and are delivered ready for connection. A stylish cover protects against incorrect operation. Legio Zon® has an integrated metering pump whose capacity is matched to system requirements.

- Generation of 0-10 g/h of chlorine dioxide in batch mode, equally suitable for both continuous and discontinuous operation
- High level of safety in accordance with DVGW specifications W 224 as well as W 624 and no hazardous operating conditions thanks to the optimal chlorine dioxide concentration (2 g/l)
- High stability of the generated chlorine dioxide solution lasting over several days
- High operational safety thanks to automatic restart following a mains failure, automatic monitoring functions and maintenance messages
- Controller with menu-guided operation, flushing and service functions

The following optional accessories are available

- Corrosion-resistant metering point with integrated mixing elements
- Pressure-retaining valve
- Drip pan for 1 chemicals container 25 l and 10 l each
- Photometer for determination of chlorine dioxide and chlorite
- Ready-to-use chemicals in 25 l or 10 l containers

Technical Data

Type	Dosing capacity g/h	Max. operating pressure bar	Capacity of dosing pump ClO ₂	Operating temp. °C	Dimensions (approx.) H x W x D (mm)	Weight (approx.) kg	Power consumption (max.)	
							230 V A	110/115 V A
CDL5	0-5	10	3 l/h (10 bar) 3.4 l/h (5 bar)	10-40	650 x 550 x 310	24	2.7	8.4
CDL10	0-10	7	7.1 l/h (7 bar) 8.4 l/h (3,5 bar)	10-40	650 x 550 x 370	28	2.7	8.4

Inputs:

- Water meter (contact or frequency)
- External digital input (can be configured for pause, shock dosage, high dosage or manual)
- External fault

Outputs:

- Operating alarm relay
- Warning relay
- Fault alarm relay

3 Chlorine Dioxide Plants Bello Zon®

3.4.1 Identcode Ordering System for Legio Zon® Systems

Chlorine dioxide systems type Legio Zon® CDLa

CDLa	System type
05	CDLa 5 = 5 g/h
10	CDLa 10 = 10 g/h
	Application
0	With integrated metering pump
1	Without integrated metering pump
	Version
P	ProMaqua
J	Japan
H	Switzerland (version conforming to SVGW)*
N	neutral
	Power supply
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
3	100 V, 50/60 Hz (only Japan version)
	Cover
1	With blue cover hood
	Chlorine dioxide pump
0	None
1	With pump 1002
	Injection lance
0	without suction lance
1	Lance for 10/25 l tank
	Language
D	German
E	English
F	French
I	Italian
S	Spanish
J	Japanese
C	Czech

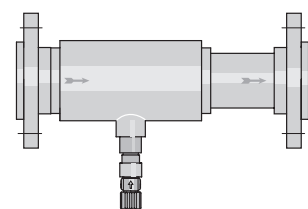
* Version pursuant to SVGW: diluent water connection G 3/4", pressure relief valve type MFV with wall bracket included in the scope of delivery.

3 Chlorine Dioxide Plants Bello Zon®

3.4.2

Accessories And Service Kits For CDL And Legio Zon®

Metering station



pk_7_066

Corrosion-resistant metering station made of PVC-U or PVC-C for warm water applications with integrated mixer elements and maintenance-free PVDF metering valve.

	Material	installation length mm	Order no.
Metering station CDL DN 50	PVC-U	450	1027611
Metering station CDL DN 65	PVC-U	400	1026490
Metering station CDL DN 80	PVC-U	400	1027612
Metering point CDL DN 100	PVC-U	470	1034693
Metering station CDL DN 65	PVC-C	400	1029326
Metering station CDL DN 80	PVC-C	400	1029327

Temperature/pressure resistance – metering station CDL

Water temperature (°C)	maximum permissible operating pressure (bar)	
	PVC-U	PVC-C
40	12	12
50	7	9.5
60	4.5	7.5
70	–	5
80	–	3

Pressure relief valve

Type MFV pressure relief valve with wall mounting bracket and 6x4 mm hose connection for installation in chlorine dioxide metering line.

	Order no.
Pressure relief valve MFV with wall mounting bracket	1027652

Safety bund for chemical containers

Bund with two separate compartments for 1 No. 25 l Bello Zon® acid and 1 No. 10 l Bello Zon® chlorite chemical container.

Dimensions (HxWxD): 290 x 700 x 350 mm

	Order no.
Safety bund for chemical container CDL	1026744

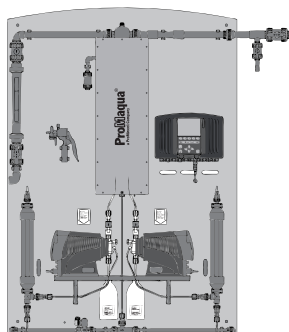
Service kits for Legio Zon®

The kits contain all parts subject to wear and tear that need to be replaced at regular service intervals. The 1-year kit should be used every year and the 3-year kit in addition every 3 years.

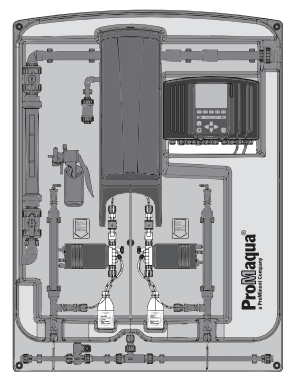
	Order no.
1-year service kit for Legio Zon® CDL5	1027263
3-year service kit for Legio Zon® CDL5	1027417
1-year service kit for Legio Zon® CDL10	1031549
3-year service kit for Legio Zon® CDL10	1031550
1-year service kit for pressure relief valve	1029442

3 Chlorine Dioxide Plants Bello Zon®

3.5 Bello Zon® Chlorine Dioxide Plants Type CDVc



P_PMA_BEZ_0008_SW
CDVc 600-2000 (figure shows optimum configuration)



P_PMA_BEZ_0009_SW
CDVc 20 - 240 (figure shows optimum configuration)

Complete chlorine dioxide systems Bello Zon® CDVc ready for connection serve the production, metering and monitoring of 20 to 2,000 g/h of chlorine dioxide. A completely newly developed reactor concept ensures an innovative production and metering of chlorine dioxide. Instead of the PVC hitherto used in the industry, PVDF is used for the first time. This results in a higher operating safety and a better purity of the generated chlorine dioxide. The stroke length of the ProMinent® metering pumps of the newest generation are monitored online. Hazardous operating conditions because of incorrect stroke length adjustments of the pumps are thus excluded.

The central plant control manages the precise production of the chlorine dioxide. Chlorine dioxide and chlorite sensors DULCOTEST® can be directly connected. The chlorine dioxide in the treated water as well as its main by-product chlorite can thus be monitored and documented online. Using the integrated PID controller, the chlorine dioxide concentrations in the water can be adjusted automatically depending on the measurement. All status messages and measured values are documented in the integrated data logger and visualised in the clear colour display via the screen recorder.

The plants meet all the requirements of the DVGW specifications W 224 and W 624 with regard to design and operation and are designed for operation with pre-diluted chemicals Bello Zon® chlorite (9 % NaClO₂) and acid (7.5 % HCl).

In the bypass version for storage module, the plants are designed for filling of intermediate storage tanks for ClO₂ solution. For this purpose, the plants include a water supply line consisting of shut-off valve, pre-filter, pressure reducer, solenoid valve (alternatively 230 V or 24 V), water meter, and needle valve. The float flow meter integrated in the bypass line is designed for the low flow rate required to produce a stock solution of 500 - 2,000 ppm ClO₂.

Advantages

- Efficient operation thanks to production, metering, and monitoring of ClO₂ with only one plant
- Highest operating safety and purity of the produced ClO₂ thanks to PVDF reactors
- Highest operating safety thanks to stroke length-monitored pumps
- Perfect quality management thanks to integrated storing of all operating parameters and measured values
- Automatic monitoring of operating parameters and maintenance dates
- Easy and safe operation thanks to clear menu navigation with full text

Features

- Capacity range: 20-2,000 kg/h ClO₂
- PVDF reactor
- Stroke length monitoring for metering pumps
- Control with large colour display, integrated data logger and screen recorder
- Measurement, documentation, and visualisation of ClO₂ and chlorite

Technical Data

Type	Chlorine dioxide dosing capacity*		Max. operating pressure	Operating temp.	max. suction lift of dosing pump**	Dimensions*** H x W x D (mm)	Weight*** kg	Power consumption (max.) ****	
	min.-max./hour	min./day						230 V	115 V
	g/h	g/d	bar	°C	mWG		A	A	
CDVc 20	1-20	6.4	8	10-40	1.8	1,344 x 1,002 x 200	26	2.7	0.9
CDVc 45	2-45	16.0	8	10-40	2.0	1,344 x 1,002 x 200	27	2.7	0.9
CDVc 120	6-120	40.0	8	10-40	3.0	1,344 x 1,002 x 200	28	2.7	0.9
CDVc 240	12-240	80.0	8	10-40	3.0	1,342 x 1,000 x 248	45	2.7	1.2
CDVc 600	30-600	140.0	8	15-40	3.5	1,711 x 1,200 x 273	75	2.8	1.4
CDVc 2000	100-2,000	468.0	5	15-40	2.0	1,900 x 1,400 x 370	120	4.1	3.2

* The metering figures refer to 5 bar backpressure and an ambient temperature of 20 °C. The minimum capacity/hour is based on the fact that when the plant is operating at below 5 % of the nominal capacity, continuous metering is no longer possible because of the then low pumping frequency of the metering pumps. When plants are not operating continuously, the reactor content must be changed at least twice a day. The stated minimum capacity/day should thus not be undershot.

** Suction height at 100 % stroke length

*** without bypass pump, flushing valve and water supply line

**** 230 V values with bypass pump, 115 V values without bypass pump

3 Chlorine Dioxide Plants Bello Zon®

3.5.1 Identcode Ordering System For CDVc Plants

CDVc	System type, metering output ClO₂
02	CDVc 20= 20 g/h
04	CDVc 45= 45 g/h
06	CDVc 120= 120 g/h
08	CDVc 240= 240 g/h
10	CDVc 600= 600 g/h
14	CDVc 2000= 2,000 g/h (available from 2nd quarter of 2009)
	Type
P	ProMaqua
	Power supply
U	100-230 V ± 10 %, 50/60 Hz (for version without suctioning)
A	230 V ± 10 %, 50/60 Hz (for version with bypass 04)
B	100-115 V ± 10 %, 50/60 Hz (not available for version with „bypass“ 04 or 06)
	Bypass version
00	without bypass
02	Bypass PVC-U with float flow meter
04	Bypass PVC-U with float flow meter and bypass pump (not CDVc 2000)
06	Bypass PVC-U for storage module with water supply 230 V (only CDVc 45-600)
07	Bypass PVC-U for storage module with water supply 24 V (only CDVc 45-600)
	Suction unit
0	without reactor housing with suctioning, without calibrating device, but with measuring cylinder
1	without reactor housing with suctioning, without calibrating device
2	with reactor housing with suctioning, without calibrating device, with measuring cylinder (only in version operating voltage A or B).
3	with reactor housing with suctioning, with calibrating device
	Suction lance, suction fitting, chemicals
0	none
1	Suction lance for 5-60 l container (only CDV 20-600)
2	Suction lance for 200 l container (only CDV 20-600)
3	Flexible suction fitting up to 5m with two-phase level switch (only CDV 20-600 g/h)
4	Suction lance for 25 l tank with 2 drip pans 40 l without leakage sensor (only CDV 20-600 g/h)
	Mechanical design
0	Standard
	Preset language
DE	German
EN	English
FR	French
IT	Italian
ES	Spanish
	Control
0	Basic version
1	With measuring and control properties (only in connection with version inputs and outputs 1 or 3)
2	With measuring and control properties, data logger and screen recorder (only in connection with version inputs and outputs 1 or 3)
	Extended in- and outputs
0	none
1	2 analogue inputs, freely configurable for controller output and flow rate
2	1 analogue output, freely configurable
3	2 analogue inputs and 1 analogue output, freely configurable
	Communication interfaces
0	None
	Approvals
01	CE-mark
	Temperature monitoring
0	without temperature monitoring
	Hardware
0	Standard
	Software
0	Standard

3 Chlorine Dioxide Plants Bello Zon[®]

3.5.2

Spare Parts Kits For Bello Zon[®] Chlorine Dioxide Plants Type CDV

The spare parts kits include all parts subject to wear, which are to be replaced in the course of regular maintenance.

Replacement part kit for CDVc plants

	Order no.
Replacement part kit compl. CDVc 20	1034758
Replacement part kit compl. CDVc 45	1034759
Replacement part kit compl. CDVc 120	1034760
Replacement part kit compl. CDVc 240	1034761
Replacement part kit compl. CDVc 600	1034762
Replacement part kit compl. CDVc 2000	1034763

Spare parts kits for CDVb plants

	Order no.
Spare parts kit compl. CDVb 15	1022252
Spare parts kit compl. CDVb 35	1022253
Spare parts kit compl. CDVb 60	1022264
Spare parts kit compl. CDVb 120	1022265
Spare parts kit compl. CDVb 220	1024614

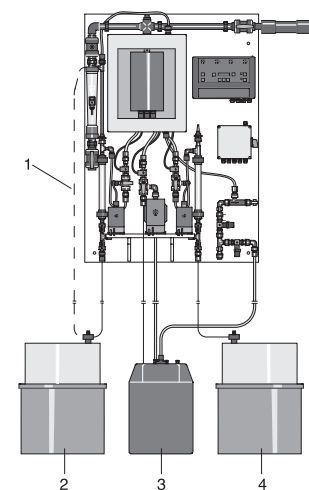
Spare parts kits for CDVa plants

	Order no.
Spare parts kit compl. 230 V CDVa 35	791842
Spare parts kit compl. 230 V CDVa 60	791913
Spare parts kit compl. 230 V CDVa 120	791915
Spare parts kit compl. 230 V CDVa 220	740824
Spare parts kit compl. 230 V CDVa 400	740765
Spare parts kit compl. 230 V CDVa 600	740826
Spare parts kit compl. 230 V CDVa 2000	1005333
Spare parts kit compl. 115 V CDVa 35	791860
Spare parts kit compl. 115 V CDVa 60	791914
Spare parts kit compl. 115 V CDVa 120	791916
Spare parts kit compl. 115 V CDVa 220	740825
Spare parts kit compl. 115 V CDVa 400	740819
Spare parts kit compl. 115 V CDVa 600	740827
Spare parts kit compl. 115 V CDVa 2000	1005344

Additional spare parts are listed in the operation instructions for the plants.

3 Chlorine Dioxide Plants Bello Zon®

3.6 Bello Zon® Chlorine Dioxide Plants Type CDK



pk_7_008

- 1 Ventilation line
- 2 Hydrochloric acid 30-33 %
- 3 Water
- 4 Sodium chlorite 25 %

Type CDKa with calibration vessel

Bello Zon® plants are fully pre-assembled and are very easy to operate.

- Display with indication of chlorine dioxide quantity produced and the water flow in the main water pipeline.
- Dosing pumps for conveying the chemicals and simultaneous dosing of the chlorine dioxide.
- Particularly economical operation through the use of concentrated chemicals
- Dosing can be automated very easily by connection of a contact flowmeter, analog signal or controller output, e.g. from a chlorine dioxide measuring system.
- Bypass line with pressurised dosing valve for pre-dilution of the concentrated chlorine dioxide solution produced in the plant.
- All necessary safety elements in accordance with German directives (DVGW specification W 624) are integrated in the plant:

- monitoring of the chemical quantities
- monitoring of the bypass water
- exhausting of the reactor chamber

The suction lances, premixer and bypass pumps required must be ordered for each plant as a necessary accessory.

Special gas-tight suction lances fitted with a ventilation connection have been developed for the CDK plants. The hydrochloric acid ventilation is connected to the reactor housing, so that the corrosive vapours formed can be safely disposed off. The suction lances incorporate level monitoring with a pre-warning.

Two versions of CDK plant are available, with or without calibration vessels. The calibration vessels perform several functions. They can be used to measure pump capacity in litres, or to collect chemicals released during the ventilation process, without the vapours from the concentrated hydrochloric acid escaping into the atmosphere. In addition, when the plant is running, the calibration vessels act as a collection tank for gas bubbles which can form in the suction line. However, their main use is to ensure correct operation of the dosing pumps and dosing monitoring system when the plant is restarted after a shutdown period.

Chemicals used: hydrochloric acid, fluoride-free and technically pure in accordance with

EN 939 concentration 30...33 % by wt. and sodium chlorite solution with a sodium chlorite content of 300 g/l (= 24.5 %) in accordance with EN 938. When used for drinking water treatment, these chemicals must not contain any contaminants in concentrations such that the drinking water can still be harmful to public health after the treatment is completed.

The following optional accessories are available:

- Analog output for remote monitoring or computer display
- Safety bund (with leakage monitoring)
- Day tank with automatic top-up control for connection to the main storage tank depot
- Photometer for determination of chlorine dioxide and chlorite

3 Chlorine Dioxide Plants Bello Zon[®]

Technical Data

Type	Chlorine dioxide dosing capacity*			Max. operating pressure bar	Operating temp. °C	max. suction lift of dosing pump** mWS	Size H x B x T (mm)	Weight***		Power consumption (max.)	
	max./hour	min./hour	min./day					230 V	115 V	A	A
	g/h	g/h	g/d								
CDKa 150	150	10	74	10	10–40	1.7 / 1.3	1,350 x 950 x 380***	60	5.2	9.5	
CDKa 420	428	20	74	8	15–40	0.9 / 7.0	1,350 x 950 x 380***	62	2.7	5.1	
CDKa 750	750	40	124	8	15–40	1.3 / 7.0	1,610 x 1,100 x 380***	82	7.7	13.8	
CDKa 1500	1,500	75	280	7	15–40	1.9 / 7.0	1,850 x 1,300 x 430***	135	6.8	12.8	
CDKa 6000	5,900	300	940	2	15–40	4.0 / 5.0	3,060 x 1,500 x 480****	420	3.5	6.7	
CDKa 10000	9,800	500	1,425	2	15–40	3.0 / 5.0	3,060 x 1,500 x 480****	450	3.5	6.7	

* The dosing figures relate to 5 respectively 2 bar back pressure and an ambient temperature of 20 °C. The minimum capacity/per hour is based on the fact that when the plant is operating at below 5 % of the nominal capacity, continuous dosing is no longer possible, due to the then low pumping frequency of the dosing pumps. When plants are not operating continuously, the reactor contents must be changed at least twice a day. The plant should not, therefore, be operated below the stated minimum capacity/day.

** Suction lift at 100 % stroke length. 1st Value: Chemicals pump, 2nd value: water pump

*** without premixer.

**** Dimensions of two-part version: 2x (2180 x 1100 x 488)

3 Chlorine Dioxide Plants Bello Zon®

3.6.1 Identcode Ordering System For CDKa Plants

CDKa		System type	
1		CDKa 150 = 150 g/h	
3		CDKa 420 = 420 g/h	
4		CDKa 750 = 750 g/h	
5		CDKa 1,500 = 1,500 g/h	
7		CDKa 6,000 = 6,000 g/h	
8		CDKa 10,000 = 9,800 g/h	
		A with installed calibration vessels	
		B without installed calibration vessels	
		C with installed calibration vessels on two-part wall plate (CDKa 7 and 8 only)	
		Power supply	
0		230 V, 50/60 Hz	
1		115 V, 50*/60 Hz * CDKa 420-6000 only available with 115 V, 50 Hz	
		Injection lance	
0		no suction lance	
1		variable suction lance for 60 l container (container height 500-700 mm)	
2		flexible suction assembly up to 5 m with 2-stage level switch	
3		intermediate container for acid and chlorite (CDKa 7 and 8 only)	
4		intermediate container for acid and chlorite with PLC-controlled top-up process (CDKa 7 and 8 only)	
		Bypass version	
0		without bypass monitoring	
2		with float type flowmeter	
		Controlling variables input	
0		none	
1		contact, pulse range 0-4 Hz	
2		analog (0/4-20 mA) and contact	
		Flow input	
0		none	
1		contact, pulse range 0-4 Hz contact water meter	
2		frequency, max. 10 kHz	
3		analog flowmeter (0/4-20 mA) and contact (selectable)	
		Language	
D		German	
E		English	
F		French	
I		Italian	
S		Spanish	
		Analog output	
0		none (standard equipment)	
1		analog (0/4-20 mA) for computer or remote indication	
		Remote control input	
0		none	
1		contact (pause function)	
2		analog (0/4-20 mA)	
3		contact and analog (0/4-20 mA)	

3 Chlorine Dioxide Plants Bello Zon[®]

3.6.2

Spare Parts Kits For Bello Zon[®] Chlorine Dioxide Plants Type CDK

The spare parts kits include all parts subject to wear, which are to be replaced in the course of regular maintenance.

	Order no.
Spare parts kit compl. 230 V CDKa 150	740740
Spare parts kit compl. 230 V CDKa 420	740743
Spare parts kit compl. 230 V CDKa 750	1000172
Spare parts kit compl. 230 V CDKa 1500	1000856
Spare parts kit compl. 230 V CDKa 6000	1004814
Spare parts kit compl. 230 V CDKa 10000	1006647
Spare parts kit compl. 115 V CDKa 150	740741
Spare parts kit compl. 115 V CDKa 420	740744
Spare parts kit compl. 115 V CDKa 750	1000173
Spare parts kit compl. 115 V CDKa 1500	1000855
Spare parts kit compl. 115 V CDKa 6000	1004815

Additional spare parts are listed in the operation instructions for the plants.

3 Chlorine Dioxide Plants Bello Zon®

3.7 Bypass Line Accessories

Premixers made from PVC

The premixers of Types CDVb 15-120 are fully integrated in the plant, provided they were ordered by Identity Code. The premixer on the CDVb 220 can also be ordered by Identity Code, but is supplied loose with the plant. On all other plants, the premixer can be ordered partly by Identity Code or partly as a separate order. The standard delivery package of the premixer includes all PVC couplings, screw hose clips and other fixing materials. On the CDVa 2000 and CDKa 1500-10000, the pre-mixer is in two parts.

Plant	Volume l	Length mm	Connection nominal diameter	Order no.
CDVb 220, CDKa 150	1.5	594	DN 25	740649
CDVa 400, CDKa 420	4.5	756	DN 25	740650
CDVa 600, CDKa 750	7.0	1,306	DN 32	740832
CDVa 2000, CDKa 1500	13.4	2x1,316	DN 40	1001000
CDKa 6000/10000	13.4	2x1,330	DN 50	1003121

Bypass pump

Pressure-increasing pumps made of cast iron (GG) or stainless steel (SS) for operation in the bypass line. Electrical version 220-230 V, 50 Hz, with integrated overload protection.

When selecting the suitable bypass pump, the required bypass throughput is to be considered. The following flow data are recommended for the different plants:

Plant type	Bypass line	Diameter (mm)	Flow rate (m ³ /h)
CDV 15 -, CDV 600	DN 25	32	1 - 4
CDKa 150 -, CDKa 420	DN 25	32	1,5 - 3
CDKa 750	DN 32	40	3 - 4
CDKa 1500 -, CDVa 2000	DN 40	50	6 - 10
CDKa 6000 -, CDKa 10000	DN 50	63	8 - 10

PVC should be used as material for the bypass. The thickness should correspond at least to the pressure range PN 10, better PN 16 (bar).

Technical Data

Type	Material	Connection suction/discharge side inch	Pump capacity at 2 bar m ³ /h	Nominal rating W	Nominal current A	Order no.
CH 2-30	GG	RP 1" / 1"	2.50	480	2.3	791389
CHI 2-30	SS	RP 1" / 1"	2.50	540	2.6	791535
CH 4-30	GG	RP 1¼" / 1"	4.00	840	3.9	740829
CHI 4-30	SS	RP 1¼" / 1¼"	4.75	820	3.7	740830
CH 8-30	GG	RP 1½" / 1¼"	9.00	970	4.3	1000842
CHI 8-20	SS	RP 1½" / 1½"	9.00	1,350	6.2	1000843

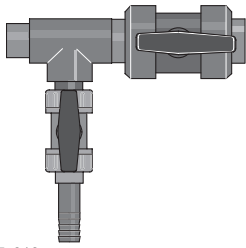
Accessories

	Order no.
Bracket for bypass pump	791474
Angle-seat valve PVC DN 25 for throttling the bypass pump	1001877

3 Chlorine Dioxide Plants Bello Zon®

Flushing assembly

To allow the reactor and premixer to be flushed clear for maintenance purposes or after a long shutdown period, a flushing valve must be installed downstream of the chlorine dioxide plant. The complete flushing assembly consists of a DN 25 PVC shut-off valve and a DN 20 PVC flushing valve with hose grommet. It is already included in the scope of delivery of all new plants as standard.

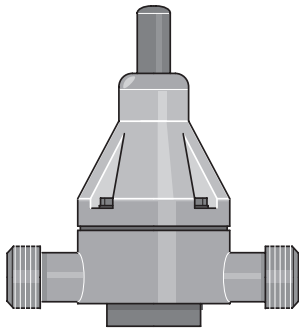


pk_7_013
Flushing assembly

	Order no.
Flushing assembly PVC-U, EPDM, DN 25	1033405

Ball-check valve

On installations with long bypass lines, especially if the pipe slopes downwards and the dosing point is below the Bello Zon® plant, as well as on installations with fluctuating back pressure, a back pressure resistant ball-check valve must be fitted.



pk_2_031_1
Ball-check valve

Type	Nominal diameter	Connector	Material	Order no.
DHV-RM	DN 25	G 1 1/2"	PVC (PC1)	1000050
DHV-RM	DN 32	G 2"	PVC (PC1)	1000051
DHV-RM	DN 40	G 2 1/4"	PVC (PC1)	1000052
DHV-RM	DN 50			on request

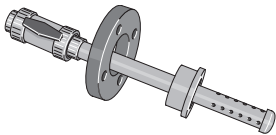
Vent valve

PVC-U bleed valve for bypass line as a vacuum breaker to prevent uncontrolled siphoning of the chemicals when the bypass line is under vacuum. Opening pressure approx. -0.5 bar.

	Order no.
Vent valve B 895 d32 DN 25	1001260

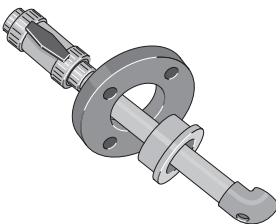
PVC-U chlorine dioxide dosing point

For uniform distribution of the chlorine-enriched bypass water in the main water pipeline, an injection pipe must be used to optimise the mixing and distribution of the chlorine dioxide. The injection pipes must be shortened to the required length on site. The standard delivery package includes Tangit cleaner and adhesive for this, together with a DN 25 ball valve as an isolation valve. The injection pipe is fitted in a DN 50 DIN flange installed by a third party.



pk_7_011_2
Injection pipe from DN 100

	Order no.
Injection pipe for pipe diameters up to DN 80	1018754
Injection pipe for pipe diameters from DN 100	1018753



pk_7_012_2
Injection pipe to DN 80

3 Chlorine Dioxide Plants Bello Zon®

3.8 Chemicals Supply Accessories

Suction lances and accessories

Suitable suction lances and assemblies must be ordered by identity Code for CDVb and CDKa plants, or they can be individually planned, as with CDVa plants. Suction lances here have a rigid construction that can be precisely matched to the chemicals container. Suction assemblies consist of flexible suction pipes. All suction lances and assemblies are equipped with foot valves to prevent the body contents draining out when the container is changed.

		Order no.
PVC fixed-length suction lance for 25 and 30 l canister.	PVC fixed-length suction lance for 200 l canister	791237
PVC fixed-length suction lance for 200 l canister	With 2-stage level switch and 8/5 mm suction hose for CDVa 400	791567
Adjustable-length (660-1040 mm) PVC suction lance for 500 l container	With 2-stage level switch and 8/5 mm suction hose for CDVa 400	791613
PVC suction lance DN 10 for installation in drums/containers up to 1000 l capacity.	The suction lance is shortened to the correct length on site (max. 1340 mm) and is intended for direct connection to the pump. Without level switch, suitable for CDVa 600	790387
PVC suction lance DN 15 for installation in drums/containers up to 1000 l.	Suction lance may be adapted (shortened) on site (max. 1340 mm). It is used in direct connection to the pump. Without float switch, for CDVa 2000	790391
PVC fixed-length suction lance for 60 l canister, gas-tight version	The gas exchange of the canister takes place via a suspended gas pipe, which is connected to the reactor chamber of the CDKa. With 2-stage level switch and 6/4 mm suction hose for CDKa 150-420	740049
Suction assembly	With 2-stage level switch, foot valve and weight. Length 5 m, with 6/4 mm suction hose for CDKa 150-420	740661
Suction assembly	With 2-stage level switch, foot valve and weight. Length 5 m, with 8/5 mm suction hose for CDKa 750-1500	1000132

Suction air chamber for CDVa and CDVb plants

To prevent gas bubbles in the suction line of the chemicals.

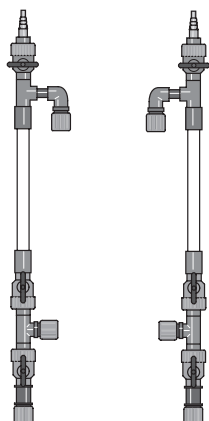
The CDVc plants in the version "with calibration device" already include the function "Suction aid".

	Order no.
Acid side: suction air accumulator with fixings	1001820
Chlorite side: suction air accumulator with fixings	1001821

Heating system for chemical lines

to preheat the chemical suction lines at low temperature

	Order no.
Diameter suction hose 6/4 mm	1001636
Diameter suction hose 8/5 mm	1001637
Diameter suction hose 12/9 mm	1001638
Diameter suction hose 19/16 mm	1001639



pk_7_010

3 Chlorine Dioxide Plants Bello Zon®

Safety bunds for chemicals containers

Usable capacity l	Type	Order no.
40	without leakage monitor	791726
40	with leakage monitor	791728
70	without leakage monitor	740309
70	with leakage monitor	740308
140	without leakage monitor	740723
140	with leakage monitor	1003190

Scope of delivery:

- without leakage monitor: one pan
- with leakage monitor: two pans + level switch + electronics card for Bello Zon® control (CDVa, CDVb, CDKa)

Leakage monitor for CDVc plants

Name of the item	Order no.
Level switch with litz wire 5 m	1003191

consisting of 1 level switch which is to be installed in the safety drip pans 40, 70 or 140 l without leakage monitor and to be connected to the control of the Bello Zon® CDVc.

Drip pan with grating to install two 200 l barrels

Material	Weight	External dimension	Effective area	Collecting volume
	kg	WxDxH mm	WxD mm	l
Polyethylene	ca. 22	1,230 x 820 x 435	1,160 x 750	220

Meets the requirements of the German Water Resources Act (WHG) and possesses a general building supervision approval of DIBt, Berlin.

Name of the item	Order no.
Drip pan with grating	1027211

Bello Zon® Acid

Component 1 for Bello Zon® chlorine dioxide production plants.

Name of the item	Order no.
Bello Zon® Acid 25 l	1027594
Bello Zon® Acid 200 l	950131
Bello Zon® Acid 500 l*	950132

* loan container

Bello Zon® Chlorite

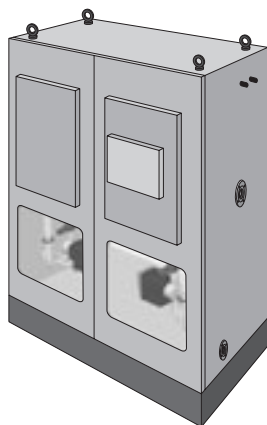
Component 2 for Bello Zon® chlorine dioxide production plants.

Name of the item	Order no.
Bello Zon® Chlorite 10 l	1026422
Bello Zon® Chlorite 25 l	1027595
Bello Zon® Chlorite 200 l	950136
Bello Zon® Chlorite 500 l*	950137

* loan container

3 Chlorine Dioxide Plants Bello Zon®

3.9 Chlorine Dioxide Plants Type SVP-Pure®



P_PMA_BEZ_0010_SW

Chlorine dioxide plants SVP-Pure® serve the production and metering of up to 200 kg/h of chlorine dioxide. The chemical basis for chlorine dioxide generation is the reaction of sodium chlorate with hydrogen peroxide and sulphuric acid proven in paper industry to produce largest amounts of chlorine dioxide. In the Purate® process patented by Eka Chemicals, a ready-for-use mixture of chlorate and hydrogen peroxide (Purate®) is transformed with sulphuric acid and metered in a bypass water flow. Depending on the design of the injector integrated in the plant, direct metering into the water flow to be treated is possible up to a backpressure of 2 bar. Plants of the type AD use 78 % sulphuric acid. Plants of the type MSA have an integrated dilution phase such that 78 - 98 % sulphuric acid can be used.

Apart from the technical equipment, a safety concept accompanying the installation and operation ensures highest possible operating safety. Eka Chemicals provides verification and consultation for each project already in the planning phase. Audits are carried out before any commissioning and during current operation which are to monitor the safety-technical condition of the plants.

Advantages

- Most economic method to generate large amounts of chlorine dioxide
- High yield of > 95 % and short response time, thus low reactor volume
- Compact plant design, all components in a closed control cabinet
- Maximum operating safety thanks to low reactor volume and numerous safety devices
- Easy and safe operation thanks to clear menu navigation by touch panel
- Easy integration into central control systems

Features

- Capacity range: 2.5-100 kg/h ClO₂
- Powder-coated metal cabinet with corrosion-resistant bottom lining made of plastics
- Integrated pre-dilution phase for sulphuric acid > 78 % including PTFE heat exchanger (only types MSA)
- Reactor with HALAR lining
- Injector matched to project-specific flow and backpressure
- Control Siemens Simatic S7 with large 10.4" colour touch panel
- Power control internal manually or externally controller output- or flow-dependent via 0/40-20 mA signal
- Voltage supply single-phase 230 V, 50/60 Hz, 16 A

Leistungsübersicht

		AD-2	AD-8	AD-18	AD-32	AD-52	AD-100
			MSA-8	MSA-18	MSA-32	MSA-52	MSA-100
Output	kg/h	0.3-2.5	1-8	2-18	3-32	5-52	10-100

3 Chlorine Dioxide Plants Bello Zon®

3.10 Safety Accessories And Analysis

Gas warning device GMA 36 – chlorine dioxide

The gas warning device Type GMA 36 for chlorine dioxide is designed as a compact measurement and switching unit for monitoring the surrounding air for dangerous concentrations of chlorine dioxide.



pk_7_004_1
Gas warning devices GMA 36

Technical Data

Type	Chlorine dioxide
Warning at approx.	0.1ppm/vol%
Alarm at approx.	0.3ppm/vol%
Permissible ambient temperature	-15...45°C
Protection class housing	IP 54
Dimensions (without PGs, without sensor) H x W x D	247 x 135 x 95mm
Supply	85 – 264 / 50 – 60V/Hz
Power consumption	5 W
Warm-up phase max.	150 s
Relay contact "Warning", self-resetting	230 / 1V/A
Relay contact "Alarm", latching	230 / 1V/A
Relay contact "Horn", latching, can be acknowledged	230 / 1V/A
Sensor measuring principle	electrochemical
Sensor service life (depending on environmental cond.)	2–3Years

Note: The sensor responds to all oxidising gases

	Order no.
Gas warning device GMA 36 – chlorine dioxide	1023156

Spare parts

		Order no.
Replacement sensor	for chlorine, chlorine dioxide, ozone	1023314
Replacement sensor	for gas warning devices in the Life CGM range	1003009

Warning label in accordance with Safety Rules for chlorine dioxide

"Chlorination of water", Appendix 3 Sheet 3, soft PVC film, yellow/black, 300 x 200 mm, self-adhesive.

	Order no.
Warning label	607320

Acid fume separator

Acid fume separator SDA-90 filled with 0.7 l of acid-absorbing granules for absorption of hydrochloric acid fumes. Connection: DN 25 PP coupling with G 1/2" union nut.

	Order no.
Acid fume separator	1009987
Replacement pack of absorbent material 0.7 l	1010500

3 Chlorine Dioxide Plants Bello Zon®

Reactor chamber vent valve

Vent valve for reactor space, adjustable, instead of vent line, which is led to open air (already included in standard delivery package on CDVb).

	Order no.
Reactor chamber vent valve	791801

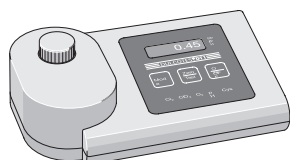
Safety bunds for the chemicals containers, see Chap. 3.6

Photometers DT1, DT2 and DT4

- portable, compact photometer
- simple operation with text support
- safe, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H₂O₂, bromine, ozone, pH and cyanuric acid
- calibratable

Technical Data

Ranges DT1	0.05 ... 6.0 mg/l free chlorine (DPD1) +total chlorine (DPD1+3) 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
Ranges DT2B	0.05 ... 2.0 mg/l fluoride 0.05 ... 6.0 mg/l free chlorine and total chlorine 0.05 ... 11.0 mg/l chlorine dioxide
Ranges DT4	0.03 ... 2.5 mg/l chlorite 0.05 ... 11 mg/l chlorine dioxide 0.05 ... 6 mg/l chlorine
Measuring tolerance	Dependant upon measured value and measuring method
Battery	9 V battery (approx. 600 x 4-minute measurement cycles)
Permissible ambient temperature	5...40 °C
Relative humidity	30 ... 90 % (non-condensing)
Material	Housing material: ABS Keypad: Polycarbonate
Dimensions L x W x H (mm)	190 x 110 x 55
Weight	0.4 kg



pk_5_021
Photometer

		Order no.
DT1 Photometer	complete with carrying case	1003473
DT2B Photometer	complete with carrying case	1010394
DT4 Photometer	complete with carrying case	1022736

The standard delivery package for the photometers includes accessories, cuvettes and reagents

3 Chlorine Dioxide Plants Bello Zon[®]

Consumables for analysis

	Order no.
DPD 1 buffer, 15 ml	1002857
DPD 1 reagent, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets R 263 (100 in each)	305531
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l for calibration of photometer (fluoride detection)	1010382
3 off spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 off spare cells for fluoride detection (DT2A and B)	1010396
DPD reagents set, 15 ml each: 3 x DPD 1 buffer, 1 x DPD 1 reagent, 2 x DPD 3 solution	1007567
Chlorine dioxide tablets Nr. 1 R 127	501317
Chlorine dioxide tablets Nr. 2 R 128	501318

DPD reagents for measurement of excess chlorine, ozone or chlorine dioxide in the water, in conjunction with a Lovibond comparator.

	Amount	Order no.
DPD tablets No. 1	100 No.	501319
DPD tablets No. 2	100 No.	501320
DPD tablets No. 3	100 No.	501321
DPD tablets No. 4	100 No.	501322

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

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4 Electrolysis Plants Dulco® Zon And CHLORINSITU®

4.1 Dulco® Zon Electrolysis Plants

In electrolysis, chlorine, hydrogen and sodium hydroxide are produced at site by passing an electric current through salt water.

In tubular cell electrolysis (types CHLORINSITU® II), the electrochemical reaction takes place in one chamber, so that the produced chlorine gas immediately reacts with sodium hydroxide to form sodium hypochlorite. A saturated brine is used as saline solution which is produced in a separate salt dissolving tank from salt of defined quality. The advantage of tubular cell electrolysis is the simple design of the apparatus. The disadvantage is the relatively poor yield which leads to a high entrainment of chloride in the water to be treated and the relatively low chlorine concentrations in the reaction mixture.

In membrane electrolysis, the electrochemical reaction takes place in two electrode chambers separated by a membrane, so that the formation of the chlorine and sodium hydroxide is physically separated. The plants of the types CHLORINSITU® III brings the reaction mixtures of both electrode chambers together again after the electrochemical reaction to produce a stock solution of sodium hypochlorite which can be stored intermediately and metered as needed. In case of the plants of the types MCEa and CHLORINSITU® IV, the chlorine is directly added to the water to be treated where it dissolves as hypochloric acid. In the plants of the types CHLORINSITU® IV plus, the excess chlorine gas is bound with the sodium hydroxide to form sodium hypochlorite similar to CHLORINSITU® III and stored intermediately. The plants must thus only be designed for medium chlorine demand because capacity peaks are compensated from the intermediate storage. In all plants of the types CHLORINSITU® IV, the sodium hydroxide is stored intermediately and metered for pH value correction as needed.

The advantage of membrane plants is the high yield and the prevention of entrainment of chloride from the electrolytic cell to the water to be treated. In plants for the production of sodium hypochlorite, the high yield results in solutions which have a significantly higher chlorine content than when produced by tubular cell electrolysis.

- Disinfection based on natural sodium chloride
- No handling of hazardous chemicals
- Economical method thanks to efficient salt and energy consumption
- Ultrapure chlorine thanks to production at site and short intermediate storage periods
- Chlorine generation and pH corrector with one single plant (CHLORINSITU® IV)
- Highest operating safety thanks to design as vacuum plants

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

4.2 Performance Overview

	MCEa	Chlorinsitu II	Chlorinsitu III	Chlorinsitu IV	Chlorinsitu IV plus
Output [g CL ₂ /h]	5000				
	2000				
	1000				
	500				
	200				
	100				
50					
20					
Production of HOCl	✓			✓	✓
Production of NaOCl		✓	✓		✓
Drinking water		✓	✓	✓	✓
Process water		✓	✓	✓	✓
Swimming pool water	✓	✓	✓		✓

P_PMA_EL_0002_SW_G

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

4.2.1 Questionnaire On The Design Of An Electrolysis Plant

Use of the electrolysis plant:

- for disinfection of
 - Drinking water
 - Industrial water
 - Cooling water
 - Swimming pool water
 - _____

Water values:

- | | | | |
|---------------------------------|-----------------------------------|---|--|
| Max. water flow rate | _____ m ³ /h | Maximum water pressure | _____ bar |
| Water flow rate | <input type="checkbox"/> constant | <input type="checkbox"/> fluctuating from | _____ m ³ /h to _____ m ³ /h |
| pH value | _____ | Iron (Fe ²⁺) | _____ mg/l |
| Temperature | _____ °C | Manganese (Mn ²⁺) | _____ mg/l |
| Solid fraction | _____ mg/l | Nitrite (NO ₂ ⁻) | _____ mg/l |
| Acid capacity K _{S4,3} | _____ mmol/l | Sulphide (S ²⁻) | _____ mg/l |
| Total hardness | _____ mmol/l | TOC (total organic carbon) | _____ mg/l |
| Total hardness | _____ °dH | Ammonia | _____ mg/l |

Response time to application:

_____ m³ volume reaction tank or _____ minutes residence time in entire system.

Type of metering:

- constant
- flow-proportional
- depending on measured value

Desired dosing rate: _____ mg/l

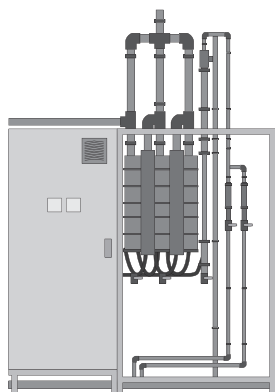
Disinfection method used up to now:

Consumption of disinfectant up to now: _____ kg/week

Other requirements:

4 Electrolysis Plants Dulco® Zon And CHLORINSITU®

4.3 Tubular Cell Electrolysis Plants CHLORINSITU® II



P_PMA_EL_0003_SW

Electrolysis plants of the types CHLORINSITU® II produce sodium hypochlorite with a concentration of 5 g/l. For this process, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery. This solution is then diluted correspondingly and electrolysed in a membrane-free cell. The resulting solution is collected in a storage tank and from there metered with separate metering pumps as needed. Because of the moderate pH value of approx. 9, the pH value of the treated water is significantly less affected than when using commercially available sodium hypochlorite (pH 12-13.5). The generated hydrogen is diluted with fresh air through an ATEX-certified ventilator and discharged safely. Both the salt dissolving and the diluent water come from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for remote diagnosis and troubleshooting.

Electrolysis plants of the types CHLORINSITU® II are specifically suitable for applications where a robust and clearly arranged technology is required, and where an entrainment of sodium chloride into the water to be treated has no influence.

- Robust, simple technology
- Compact, space-saving design
- Safe plant control with remote diagnosis via modem
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

Technical Data

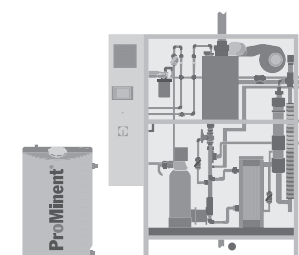
Type/ output g/h	Voltage supply	Power Uptake kW	Salt con- sumption kg/h	Process water consumption l/h	Dimensions L x W x H (mm)	Brine tank l	Recommended capacity storage tank l
50	3 x 400 V	0.78	0.2	11	1,050 x 600 x 1,550	80	300
100	3 x 400 V	1.15	0.4	22	1,050 x 600 x 1,550	80	500
150	3 x 400 V	1.53	0.6	32	1,050 x 600 x 1,550	200	700
200	3 x 400 V	1.90	0.8	43	1,050 x 600 x 1,550	200	1000
300	3 x 400 V	2.65	1.1	65	1,050 x 600 x 1,550	200	1500
400	3 x 400 V	3.40	1.5	86	1,500 x 800 x 2,000	200	2000
500	3 x 400 V	4.15	1.9	108	1,500 x 800 x 2,000	380	2500
600	3 x 400 V	4.90	2.3	129	1,500 x 800 x 2,000	380	3000
800	3 x 400 V	6.40	3.0	172	1,500 x 800 x 2,000	380	3500
1000	3 x 400 V	7.90	3.8	215	1,500 x 800 x 2,000	520	4500
1200	3 x 400 V	9.40	4.6	258	1,500 x 800 x 2,000	520	5500
1400	3 x 400 V	10.90	5.3	301	1,500 x 800 x 2,000	520	6000
1600	3 x 400 V	12.40	6.1	344	1,500 x 800 x 2,000	520	7000

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, ATEX-certified bleeding system and side salt dissolving tank with level monitor. Level sensors to monitor the storage tank for sodium hypochlorite to be provided by the customer. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

4 Electrolysis Plants Dulco® Zon And CHLORINSITU®

4.4 Membrane Electrolysis Plants CHLORINSITU® III



P_PMA_EL_0004_SW

Electrolysis plants of the types CHLORINSITU® III generate sodium hypochlorite with a concentration of 20-25 g/l without major entrainment of sodium chloride from the electrolytic cell to the finished product. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery which is then electrolysed in a membrane cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber and chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is bound with sodium hydroxide, collected in a storage tank as sodium hypochlorite and from there metered with separate metering pumps as needed. Because of the moderate pH value of approx. 9, the pH value of the treated water is significantly less affected than when using commercially available sodium hypochlorite (pH 12-13.5). The generated hydrogen is diluted with fresh air through an ATEX-certified ventilator and discharged safely. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured. The efficiency of the electrolysis is monitored by an integrated pH measurement of the sodium hydroxide production.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for remote diagnosis and troubleshooting.

Electrolysis plants of the types CHLORINSITU® III are specifically suitable for applications where an ultrapure and low-chloride sodium hypochlorite is required.

- Robust, simple technology
- Compact, space-saving design
- Safe plant control with remote diagnosis via modem
- Low-chloride sodium hypochlorite with high chlorine concentration
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

Technical Data

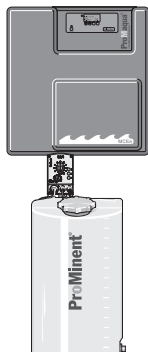
Type/ output	Voltage supply	Power Uptake	Salt con- sumption	Process water con- sumption	Cooling water con- sumption	Dimensions L x W x H (mm)	Brine tank	Recommended capacity storage tank
g/h		kW	kg/h	l/h	l/h		l	l
50	3 x 400 V	0.90	0.1	2.4		1,250 x 600 x 1,550	80	100
75	3 x 400 V	1.00	0.2	3.6		1,250 x 600 x 1,550	80	100
100	3 x 400 V	1.10	0.2	4.8		1,250 x 600 x 1,550	80	200
200	3 x 400 V	1.50	0.4	9.7		1,250 x 600 x 1,550	80	300
300	3 x 400 V	1.90	0.6	15	100	1,250 x 600 x 1,550	200	400
400	3 x 400 V	2.30	0.8	19	100	1,250 x 600 x 1,550	200	500
500	3 x 400 V	2.70	1.1	24	100	1,250 x 600 x 1,550	200	600
600	3 x 400 V	3.10	1.3	29	100	1,250 x 600 x 1,550	200	700
1000	3 x 400 V	4.70	2.1	48	100	1,700 x 600 x 2,000	380	1200
1500	3 x 400 V	6.70	3.2	73	100	1,700 x 600 x 2,000	380	1800
2000	3 x 400 V	8.70	4.2	97	200	1,800 x 1,200 x 2,000	520	2500
2500	3 x 400 V	10.70	5.3	121	200	1,800 x 1,200 x 2,000	520	3000
3000	3 x 400 V	12.70	6.3	145	200	2,300 x 600 x 2,000	520	3300
3500	3 x 400 V	14.70	7.4	169	200	2,300 x 600 x 2,000	520	4000

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring, ATEX-certified bleeding system and side salt dissolving tank with level monitor. Level sensors to monitor the storage tanks for sodium hypochlorite to be provided by the customer. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

4.5 Membrane Electrolysis Plants MCEa



pk_7_048_1_V2

Electrolysis plants of the types MCEa generate ultrapure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery which is then electrolysed in a membrane cell. Sodium hydroxide and hydrogen are produced in the cathode chamber and ultrapure chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is suctioned off through an injector included in the scope of delivery and dissolved in the water to be treated as hypochloric acid. The generated hydrogen is discharged through a bleeding line, the scaled down residual brine is disposed of together with the sodium hydroxide. Thanks to the moderate pH value and the low quantity, a direct discharge in the drains is possible. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured.

The microprocessor controller integrated in the plant digitally indicates the present output and monitors all important functions. All operating and error messages are shown in full text on the clear display. The output can be controlled manually or externally.

Electrolysis plants of the types MCEa are specifically suitable for smaller private or hotel swimming pools.

- Robust, simple technology
- Compact, space-saving design
- Safe vacuum plant technology
- Production and metering of ultrapure hypochloric acid
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

Technical Data

Type/output g/h	Voltage supply	Power Uptake kW	Salt con- sumption kg/h	Process water consumption l/h	Dimensions L x W x H (mm)	Brine tank l
12	230 V/50 Hz	0.06	1.3	0.5	755 x 300 x 740	100
24	230 V/50 Hz	0.10	3.0	1	755 x 300 x 740	100
48	230 V/50 Hz	0.26	6.0	2	820 x 300 x 740	100

Scope of delivery:

Chlorine electrolysis plant mounted on wall plate ready for connection with integrated microprocessor control and softener. Electrolytic cell with vacuum monitor, side salt dissolving tank with level monitor. Injector with manometer matched to the plant.

	Order no.
Dulco [®] Zon MCEa 12	1008913
Dulco [®] Zon MCEa 24	1008914
Dulco [®] Zon MCEa 48	1008915

Accessories

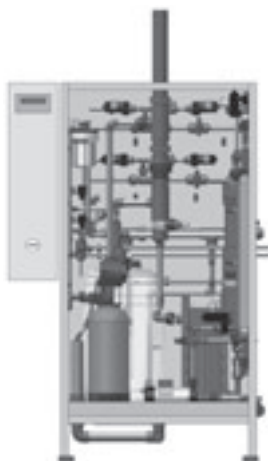
Maintenance kit

comprising all regularly replaced consumables for electrolysis system and brine pump

	Order no.
Annual maintenance MCEa 12/24/48	1006715
3-yearly maintenance MCEa 12/24	1020419
3-yearly maintenance MCEa 48	1020420

4 Electrolysis Plants Dulco® Zon And CHLORINSITU®

4.6 Membrane Electrolysis Plants CHLORINSITU® IV



P_PMA_EL_0005_SW

Electrolysis plants of the types CHLORINSITU® IV generate ultrapure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery which is then electrolysed in a membrane cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber and ultrapure chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is suctioned off through an injector included in the scope of delivery and dissolved in the water to be treated as hypochlorous acid. The chloride-free sodium hydroxide is stored intermediately and can be transferred into the water through the same injector to adjust the pH value. To achieve this, an external pH value controller is directly connected to the plant's control. The generated hydrogen is diluted with fresh air through an ATEX-certified ventilator and discharged safely, the scaled down residual brine is disposed of. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured. The efficiency of the electrolysis is monitored by an integrated pH measurement of the sodium hydroxide production.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for remote diagnosis and troubleshooting. The chlorine metering and the pH value correction are controlled as standard through contact inputs; analogue inputs are optionally available.

Electrolysis plants of the types CHLORINSITU® IV are suitable for all applications which require metering of hypochlorous acid with simultaneous pH value correction.

- Robust technology
- Compact, space-saving design
- Safe vacuum plant technology
- Production and metering of ultrapure hypochlorous acid without intermediate storage
- Chlorination and pH value adjustment with one single plant
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

Technical Data

Type/ output	Voltage supply	Power Uptake	Salt con- sumption	Process wa- ter con- sumption	Cooling wa- ter con- sumption	Dimensions L x W x H (mm)	Brine tank	Recommended capacity storage tank
g/h		kW	kg/h	l/h	l/h		l	l
100	230 V	1.10	0.2	0.8		1,050 x 600 x 1,550	80	
150	3 x 400 V	1.30	0.3	1.3		1,050 x 600 x 1,550	80	
200	3 x 400 V	1.50	0.4	1.7		1,050 x 600 x 1,550	200	
300	3 x 400 V	1.90	0.6	2.5		1,050 x 600 x 1,550	200	
400	3 x 400 V	2.30	0.8	3.4		1,050 x 600 x 1,550	200	
500	3 x 400 V	2.70	1.1	4.2		1,050 x 600 x 1,550	200	
600	3 x 400 V	3.10	1.3	5		1,050 x 600 x 1,550	200	
750	3 x 400 V	3.70	1.6	6.3		1,500 x 600 x 2,000	380	
1000	3 x 400 V	4.70	2.1	8.4		1,500 x 600 x 2,000	380	
1250	3 x 400 V	5.70	2.6	11		1,500 x 600 x 2,000	380	
1500	3 x 400 V	6.70	3.2	13		1,500 x 600 x 2,000	380	
1750	3 x 400 V	7.70	3.7	15		1,500 x 600 x 2,000	380	
2000	3 x 400 V	8.70	4.2	17	200	2,300 x 600 x 2,000	520	
3000	3 x 400 V	10.70	5.3	21	200	2,300 x 600 x 2,000	520	
3500	3 x 400 V	12.70	6.3	25	200	2,300 x 600 x 2,000	520	
2500	3 x 400 V	14.70	7.4	29	200	2,300 x 600 x 2,000	520	

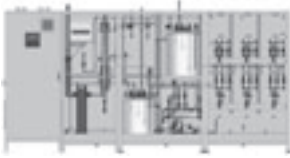
Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring of electrolysis, ATEX-certified bleeding system and side salt dissolving tank with level monitor. The scope of delivery also includes a central injector system matched to the plant to meter chlorine gas and sodium hydroxide, inclusive of a booster pump. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

4.7

Membrane Electrolysis Plants CHLORINSITU[®] IV plus



P_PMA_EL_0006_SW

Electrolysis plants of the types CHLORINSITU[®] IV plus generate ultrapure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery which is then electrolysed in a membrane cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber and ultrapure chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is processed further in two ways. As with the plants CHLORINSITU[®] IV, it is suctioned off through an injector included in the scope of delivery and dissolved in the water to be treated as hypochloric acid. If the complete production output is not needed, excess chlorine gas can also be bound with the produced sodium hydroxide as is the case with the plants of the types CHLORINSITU[®] III and stored intermediately as sodium hypochlorite. The plant thus does not have to be adjusted to the maximum demand of chlorine gas but can be adjusted to the average daily demand. Peaks of demand are covered by the additional metering of sodium hypochlorite from the intermediate storage. As with chlorine gas, metering will be carried out through a central injector system.

The chloride-free sodium hydroxide is also stored intermediately and can be transferred into the water to be treated through the central injector system to adjust the pH value. To achieve this, an external pH value controller is directly connected to the plant's control. The generated hydrogen is diluted with fresh air through an ATEX-certified ventilator and discharged safely, the scaled down residual brine is disposed of. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured. The efficiency of the electrolysis is monitored by an integrated pH measurement of the sodium hydroxide production.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for remote diagnosis and troubleshooting. The chlorine metering and the pH value correction are controlled as standard through contact inputs; analogue inputs are optionally available.

Electrolysis plants of the types CHLORINSITU[®] IV plus are a specifically economic alternative for all applications which require metering of hypochloric acid with simultaneous pH value correction.

- Robust technology
- Compact, space-saving design
- Safe vacuum plant technology
- Simultaneous production and metering of ultrapure hypochloric acid and sodium hypochlorite
- Chlorination and pH value adjustment with one single plant
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

4 Electrolysis Plants Dulco®Zon And CHLORINSITU®

Technical Data

Type/ output	Voltage supply	Power Uptake	Salt consumption	Process water consumption *	Cooling water con- sumption	Dimensions LxWxH	Brine tank	Recommended capacity stor- age tank
g/h		kW	kg/h	l/h	l/h	mm	l	l
100	230 V	1.10	0.2	11		1,050 x 600 x 1,550 + 800 x 600 x 1,550	80	150
150	3 x 400 V	1.30	0.3	16		1,050 x 600 x 1,550 + 800 x 600 x 1,550	80	200
200	3 x 400 V	1.50	0.4	22		1,050 x 600 x 1,550 + 800 x 600 x 1,550	200	250
300	3 x 400 V	1.90	0.6	33		1,050 x 600 x 1,550 + 800 x 600 x 1,550	200	400
400	3 x 400 V	2.30	0.8	43		1,050 x 600 x 1,550 + 800 x 600 x 1,550	200	500
500	3 x 400 V	2.70	1.1	54		1,050 x 600 x 1,550 + 800 x 600 x 1,550	200	600
600	3 x 400 V	3.10	1.3	65		1,050 x 600 x 1,550 + 800 x 600 x 1,550	200	700
750	3 x 400 V	3.70	1.6	81		1,500 x 600 x 2,000 + 1200 x 600 x 2,000	380	850
1000	3 x 400 V	4.70	2.1	108		1,500 x 600 x 2,000 + 1200 x 600 x 2,000	380	1100
1250	3 x 400 V	5.70	2.6	136		1,500 x 600 x 2,000 + 1200 x 600 x 2,000	380	1400
1500	3 x 400 V	6.70	3.2	163		1,500 x 600 x 2,000 + 1200 x 600 x 2,000	380	1700
1750	3 x 400 V	7.70	3.7	190		1,500 x 600 x 2,000 + 1200 x 600 x 2,000	380	2000
2000	3 x 400 V	8.70	4.2	217	200	2,300 x 600 x 2,000 + 1200 x 600 x 2,000	520	2200
2500	3 x 400 V	10.70	5.3	271	200	2,300 x 600 x 2,000 + 1200 x 600 x 2,000	520	2800
3000	3 x 400 V	12.70	6.3	325	200	2,300 x 600 x 2,000 + 1200 x 600 x 2,000	520	3300
3500	3 x 400 V	14.70	7.4	379	200	2,300 x 600 x 2,000 + 1200 x 600 x 2,000	520	3900

* The process water consumption depends on the ratio between chlorine gas and stock production. Here, the value for a ratio 50 % : 50 % is given.

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring of electrolysis, ATEX-certified bleeding system and side salt dissolving tank with level monitor. Level sensors to monitor the storage tanks for sodium hypochlorite to be provided by the customer. The scope of delivery also includes a central injector system matched to the plant to meter chlorine gas, sodium hypochlorite and sodium hydroxide, inclusive of a booster pump. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

4 Electrolysis Plants Dulco[®]Zon And CHLORINSITU[®]

4.8 Gas Warning Device For Monitoring For Chlorine Gas

The Type GMA 36 chlorine gas warning device is a compact measurement and switching unit designed for monitoring the surrounding air for dangerous concentrations of chlorine gas.

Gas warning device type GMA 36

For chlorine monitoring



pk_7_004_1
Gas warning devices GMA 36

Type	Chlorine
Warning at approx.	2.0ppm/vol%
Alarm at approx.	4.0ppm/vol%
Permissible ambient temperature	-15...45°C
Protection class housing	IP 54
Dimensions (without PGs, without sensor) H x W x D	247 x 135 x 95mm
Supply	85 – 264 / 50 – 60V/Hz
Power consumption	5 W
Warm-up phase max.	150 s
Relay contact "Warning", self-resetting	230 / 1V/A
Relay contact "Alarm", latching	230 / 1V/A
Relay contact "Horn", latching, can be acknowledged	230 / 1V/A
Sensor measuring principle	electrochemical
Sensor service life (depending on environmental cond.)	2–3Years

Note: The sensor reacts to all oxidising gases.

	Order no.
GMA 36 chlorine gas detector	1023157

Spare parts

		Order no.
Replacement sensor	for chlorine, chlorine dioxide, ozone	1023314
Replacement sensor	for gas warning devices in the Life CGM range	1003009

5 Membrane Technology

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5 Membrane Technology

5.1 Overview Membrane Technology

Membrane technology in water treatment

Membrane technology in water treatment is a process to remove particles and salts ensuring lowest operating costs. ProMaqua® offers in this field versatile and high-quality solutions. This is supplemented by the further broad ProMinent® product range to form complete, customer-specific solutions from one source.

Membrane treatment is a physical process to separate substances with the help of semi-permeable membranes. There exist four types of processes, depending on the size of the particles/molecules to be removed:

- Microfiltration
- Ultrafiltration
- Nanofiltration
- Reverse osmosis

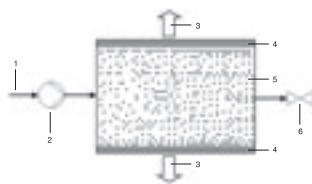
The following table shows the separation limits of the individual processes:

	Microfiltration	Ultrafiltration	Nanofiltration	Reverse osmosis
Particle size	> 0,1 mm > 500,000 Da	0.1 - 0.01 mm 1,000 - 500,000 Da	0.01 - 0.001 mm 100 - 1,000 Da	< 0.001 mm < 100 Da
Particle type	Suspended particles, colloidal turbidity, oil emulsions	Macromolecules, bacteria, cells, viruses, proteins	Low-molecular organic compounds	Ions

The ProMaqua experts with their detailed industry knowledge are not only able to compile the optimal system for the relevant application but also deliver complete water treatment solution from one single source, supported by the broad ProMinent product range.

5 Membrane Technology

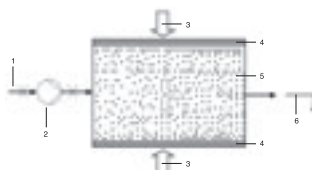
5.2 Performance Overview Of ProMaqua® Ultrafiltration



pk_7_filtration

- 1 Feed
- 2 Pump
- 3 Filtrate
- 4 Membrane
- 5 Capillaries
- 6 Valve

Schematic diagram of dead-end operation, filtration



pk_7_rueckspuelen

- 1 Feed
- 2 Pump
- 3 Backwash water
- 4 Membrane
- 5 Capillaries
- 6 Backwash water

Schematic diagram of dead-end operation, backwashing

Ultrafiltration is a membrane process which is increasingly used in water treatment to separate undesired water components. Parasites, bacteria, viruses and high-molecular organic substances as well as other particles are retained.

The applications of ultrafiltration are wide spread and may include different types of water.

Typical applications include drinking water, river water, process water, swimming pool water, seawater and waste water.

The tasks range from drinking water purification to meet physical and microbiological limit values in accordance with the German Drinking Water Ordinance up to the pre-treatment of seawater for desalination by reverse osmosis.

The systems are matched to a specific task by individually selecting the membrane type and the operating mode. ProMinent ProMaqua® uses extremely robust and resistant UF membranes and the dead-end principle to facilitate an optimisation with regard to investment costs, required space and operating costs. With this selection, all raw waters with the exception of waste water can be filtered largely without using chemicals.

The dead-end operation represents the standard operating mode. The raw water flows into the capillaries. The pure water (filtrate) passes through the membrane while the other constituents are retained on the surface of the membrane.

The constituents form a layer on the membrane. The membrane is backwashed fully automatically in regular intervals to remove the layer.

Ultrafiltration systems basically consist of:

- Stainless steel rack
- Pre-filter to protect the membranes, if required. This filter can be designed as a backwashing filter optionally.
- UF membrane modules
- Pneumatically controlled valves made of high-quality materials
- Electronic pressure measurement
- Filtration pump and backwash pump with frequency converter made of suitable high-quality materials
- Magnetically inductive flow metering to control the flow rates for filtration and backwashing.
- Integrated filling system for the backwash water tank. The backwash water tank can be integrated in small systems.
- PCL control with touch screen panel or microprocessor control unit for Dulcoclean® UF eco systems. The PLC control simultaneously monitors all important parameters as e.g. pressure, pressure difference and flow rates. This ensures that the membranes are optimally protected. The control of pre- and post-treatment processes can also be integrated, if required.

Advantages of ultrafiltration systems

- Filtrate values smaller than 0.01 NTU possible independent of raw water turbidity.
- Molecular weight cut off of the membranes (MWCO) approx. 100 kDa (kilodalton).
- Excellent retention rate for bacteria and viruses (99.999 % for bacteria and 99.99 % for viruses referred to MS2 phages).
- Very easy to use and easy to combine with other systems thanks to PLC control with touch screen.
- Optimal operating processes thanks to modern measuring and control technology.
- Complete solutions with perfectly matched pre- and post-treatment are also available on request.

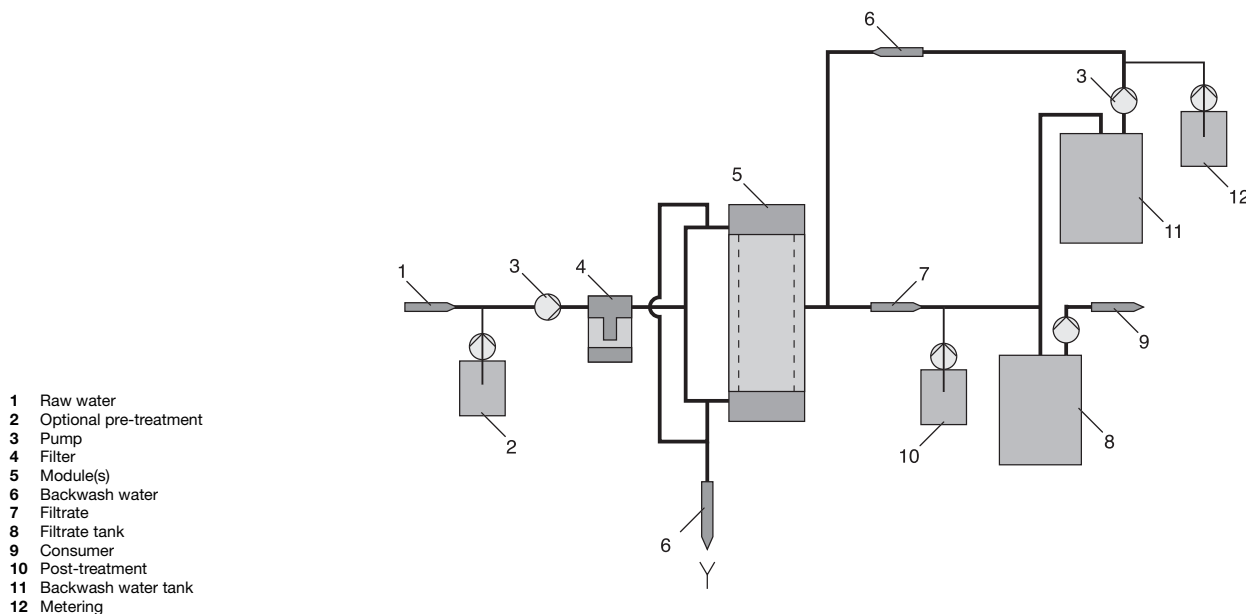
Ultrafiltration systems are available with a filtration capacity ranging from 1 to 90 m³/h at a water yield of > 96 %/h.

5 Membrane Technology

Areas of application of ultrafiltration systems

Typical areas of application include the removal of particles, turbidity and pathogens in public or private drinking water supplies. Ultrafiltration is predominantly used for the treatment of freshwater, in particular surface water, spring water or well water. In principle, brackish water and seawater can also be treated, e.g. as pre-treatment for a following desalination by nanofiltration or reverse osmosis. Further areas of application include the treatment of swimming pool water, process water from the food and beverage industry.

A typical general system layout is shown below:



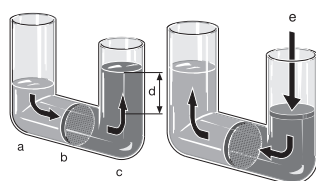
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Our engineers are using their wide experience in the water treatment to determine the ultrafiltration system which is adapted to the specific raw water requirements. If desired and/or required, the best-suited pre- and post-treatment is also determined. For this purpose, numerous further ProMinent and ProMaqua products are available. Thus, the customer is offered a complete package of solutions from one single source.

The filtration capacity of the standard ultrafiltration systems ranges from 1 to 90 m³/h. Other capacities are available on request. Please contact us, we will be glad to assist you.

5 Membrane Technology

5.3 Performance Overview Of Nanofiltration



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- a diluted solution (permeate)
- b semi-permeable membrane
- c concentrated solution (concentrate)
- d hydrostatic head corresponding to the osmotic product
- e pressure

Osmosis

Nanofiltration

Nanofiltration is based on the same principle as reverse osmosis. The difference: The cutoff limit is slightly lower. Although ions are still held back by this type of membrane filtration, this takes place at a distinctly reduced extent compared to reverse osmosis. Ultimately, operating costs are reduced.

Typical salt retention rates are at 80 – 90 %. Polyvalent ions (e.g. Ca, Mg) are retained more effectively than monovalent ions (e.g. Na, K) so that nanofiltration systems are often used as an alternative to classic water softening facilities.

If a lower salt retention rate is acceptable, nanofiltration systems offer an inexpensively priced alternative to reverse osmosis facilities, as nanofiltration systems can be operated at lower operating pressures. This means a smaller pressure booster pump can be used. Advantage: Lower investment costs and, above all, lower energy costs! The operating costs are drastically reduced compared to conventional water softening as intricate and expensive routine regeneration with large quantities of salt is rendered completely unnecessary.

ProMaqua offers virtually all reverse osmosis systems also in the form of nanofiltration systems.

In principle, the untreated water to be desalinated by way of nanofiltration is pumped into a chamber which is closed off by a semi-permeable membrane. Unlike the pressure drops in the osmosis system, an artificial pressure is created in the chamber. The membrane is permeable to pure water and smaller ions. All other water constituents are held back. Partially desalinated water (permeate) and a concentrated solution (concentrate) are produced. For this process, ProMaqua uses high-quality nanofiltration membranes.

Dulcosmose[®] nanofiltration systems basically consist of:

- Stainless steel or PP rack
- 5 µm prefilter
- Inlet solenoid valve made from suitable, high-quality materials corresponding to salt content of untreated water
- Pressure switch to protect the high-pressure pump
- High-pressure pump made from suitable, high-grade materials corresponding to salt content of untreated water
- Low-pressure membranes designed as spiral wound modules integrated in glass fibre-reinforced plastic pressure vessels
- Variable-area flow meter and pressure gauge
- Stainless steel control and regulating valves for pressure and concentrate flow control
- ProMaqua[®]-own conductivity measurement cell and control system with versatile programming options also for controlling external components of the pre-treatment and post-treatment facilities
- A semiautomatic chemical cleaning system is integrated as required

Advantages of Dulcosmose[®] nanofiltration systems

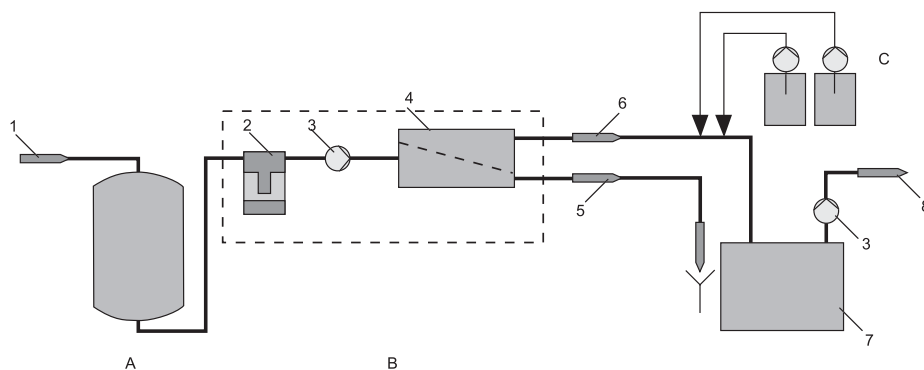
- Easy and safe operation ensured by ultramodern microprocessor control with integrated conductivity measurement and plain text display of operating status
- Efficient operation with a permeate yield of up to 80 % and up to 90 % separation of dissolved ions
- Low energy requirements through the use of low energy nanofiltration membranes
- Long service life of membranes thanks to integrated cleaning concept
- Well-designed, service-friendly system structure on stainless steel or PP racks
- Low investment and operating costs as optimised components specifically matching the individual application are used
- On request, complete solutions with precisely matching pre-treatment and post-treatment facilities such as ProMinent[®] metering, measurement and control technology, i.e. simple networking, perfect function and overall monitoring of various system components

5 Membrane Technology

Applications of Dulcosmose® Nanofiltration systems

Typical applications include desalination installations in public or private drinking water supply systems, in the chemical and pharmaceuticals industry, food and beverage industry, metal-processing industry, electroplating as well as in boiler feed water treatment. A typical system layout is shown in the following:

- 1 Raw water
- 2 Filter
- 3 Pump
- 4 Module(s)
- 5 Concentrate
- 6 Permeate
- 7 Permeate tank
- 8 Consumer
- A Pre-treatment
- B Nanofiltration
- C Post-treatment



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Nanofiltration is predominantly used for the treatment of fresh water.

However, the system can also be used to treat brackish water and seawater, e.g. as a pre-treatment stage for further desalination in a reverse osmosis system.

Our engineers are using their wide experience in the water treatment to determine the nanofiltration system which is adapted to the specific raw water requirements. If required and/or necessary, the most suitable pre-treatment and post-treatment facilities are also selected from a comprehensive range of suitable ProMinent® and ProMaqua® products. In this way, a complete package is assembled for the customer with all components from under one roof. ProMaqua®'s extensive experience gained in the construction of specialised systems and complete solutions ranges from rack-mounted systems through to systems installed in standard transport containers.

The permeate output of the Dulcosmose® standard nanofiltration systems ranges from 1 to 50 m³/h. Other output ratings are available on request.

5 Membrane Technology

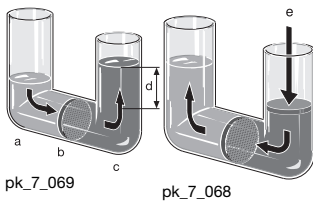
5.4 Performance Overview Reverse Osmosis

Reverse osmosis is the part of membrane treatment with the highest separation performance. It is the reverse of the natural process of osmosis and hence is used as a method for desalination of aqueous solutions. Today, using suitable high-performance membranes, over 99 % of all salts can be removed from an aqueous solution.

The raw water to be desalinated is introduced into a chamber which is sealed by a semi-permeable membrane. An artificial pressure is created in the chamber, opposing the osmotic pressure gradient. The membrane is only permeable to pure water, and not to the ions and other particles dissolved in it, so part of the raw water becomes pure desalinated water (permeate) and part becomes even higher concentrated solution (concentrate). ProMaqua® uses high-grade, low-pressure membranes for this process in its Dulcosmose® reverse osmosis plants.

Basically, Dulcosmose® reverse osmosis plants consist of:

- frame made from stainless steel or PP
- 5 µm prefilter
- inlet solenoid valve in high-grade material according to salinity of the raw water
- high-pressure pump in high-grade material according to salinity of the raw water
- low-pressure membranes manufactured as spiral-wound modules and fitted in a GRP pressure pipe
- variable area type flow meter and pressure gange
- stainless steel control and regulating valves for pressure and concentrate control
- ProMaqua® own conductivity probe and reverse osmosis control with diverse programming options for control of external components in the pretreatment and post-treatment too
- semi-automated system for chemical cleaning



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a diluted solution (permeate)
b semi-permeable membrane
c concentrated solution (concentrate)
d hydrostatic head corresponding to the osmotic product
e pressure

Osmosis Reverse Osmosis

Advantages of Dulcosmose® reverse osmosis plants

- simple, safe operation using modern microprocessor control with integrated conductivity measurement and real text display of operating status
- efficient operation with pure water recovery of up to 80 % and rejection of over 99 % of dissolved ions
- reduced energy consumption through use of "low-energy" reverse osmosis membranes and energy recovery from the concentrate stream (with sea water desalination)
- long service life of the membranes thanks to integrated cleaning concept and permeate and raw water flushing option
- well-planned, service-friendly layout of the plants on stainless steel or PP frames
- low investment and running costs as suitably optimised components are used for each particular case
- complete solutions are available on request, with precisely matched pretreatment and post-treatment, such as ProMinent® dosing and measurement and control equipment, i.e. simple interlinking, fault-free operation and overall monitoring of the various system components

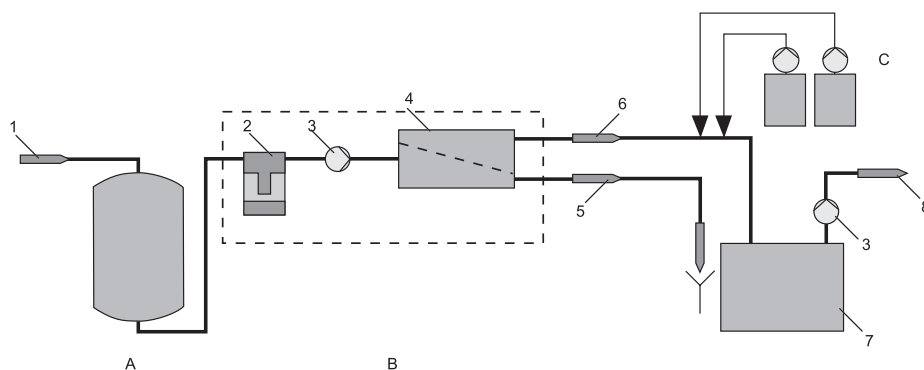
Applications of Dulcosmose® reverse osmosis plants

Typical applications are desalination duties in municipal or private drinking water supply, in the chemical and pharmaceuticals industries, food and beverages industry, metal processing industry, electroplating, in boiler feed water treatment and in power stations, for example.

A typical general plant schematic is shown below:

5 Membrane Technology

- 1 Raw water
- 2 Filter
- 3 Pump
- 4 Module(s)
- 5 Concentrate
- 6 Permeate
- 7 Permeate tank
- 8 User
- A Pre-treatment
- B Reverse osmosis
- C Post-treatment



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Basically, three types of raw water with different salt contents can be considered for desalination:

- drinking water (typically up to 1,000 mg/l)
- brackish water (typically up to 2,000 - 8,000 mg/l)
- sea water (typically higher than 35,000 mg/l)

Our engineers use their years of experience in treatment of this raw water to determine - on the basis of the particular raw water analysis - the optimal variants for the suitable reverse osmosis plant for the customer. At the same time, the most suitable pretreatment and post-treatment stages are selected using other ProMinent® products. So a complete package is put together for the customer, from a single source. One of our specialities here is the supply of complete plants installed in a standard transport container.

ProMaqua also has wide experience in building other special plants, e.g. two-pass plants for higher permeate quality requirement. Please contact us - we'll be happy to advise you.

Range	ecoPRO	TW	BW	SW
50				
25				
10				
5				
2.5				
1				
0.5				
0.25				
0.1				
Salinity of feed water	< 1,000 mg/l	< 1,000 mg/l	< 5,000 mg/l	< 40,000 mg/l

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5 Membrane Technology

5.5 Dulcoclean® Ultrafiltration Systems

5.5.1 Ultrafiltration Systems Dulcoclean® UF eco Range

This range is the compact ProMaqua® ultrafiltration system for residential water supply, hotels, recreation centres, restaurants, or industrial facilities. In connection with a storage tanks, even smaller districts or villages can be supplied with clean drinking water. Dulcoclean® UF eco systems are suitable for the removal of turbidity, particles and microbiological contaminations (bacteria, viruses, parasites). Even for changing raw water composition, the systems provide a consistently turbidity-free filtrate quality - free from pathogens. The retention rate for bacteria and viruses (referred to MS2 phages) is at least 99.999 % or 99.99 % respectively.

An intelligent microprocessor control ensures the fully automatic operation of the system and guarantees minimum energy and water consumption. The intervals and duration of backwashings automatically adapt to the membrane fouling and the water quality. In addition, further peripheral components of your water treatment system can be controlled centrally. A regularly conducted integrity test offers maximum safety.

Plant	Filtration capacity*	Number of membranes	Connected load filtration/	Dimensions
	at 15 °C		backwashing	
	l/h	No.	W	mm
Dulcoclean® eco 1	<1000	1	5 / 8	786 x 149 x 149
Dulcoclean® eco 2	<2100	1	5 / 8	1,268 x 149 x 149
Dulcoclean® eco 3	<2100	2	5 / 35	868 x 267 x 358
Dulcoclean® eco 4	<3900	2	5 / 35	1,368 x 267 x 358

* Filtration performance depends on the water quality and the water pressure upstream of the system. The filtration performance reduces with increasing filtration duration.

Electrical connection	230/115 V, 50/60 Hz, 12/24V DC on request
Operating pressure	2.5 – 5.0 bar
Trans-membrane pressure max.	2.5 bar
Operating temperature	4–40 °C
Membrane type	Robust single bore PES UF membrane
Nominal pore size	15 nm

Complete solutions with perfectly matched pre- and post-treatment are also available on request.

5 Membrane Technology

5.5.2

Ultrafiltration Systems Dulcoclean® UF Range

This range is the universal compact ProMaqua model for modern drinking water treatment. These systems are equipped with a very robust ultrafiltration membrane and operated in an economic dead-end principle. Compared to the cross-flow mode, this process requires significantly less water and energy. Backwashing processes are performed in regular intervals to prevent a blocking of the modules. Matched to the existing raw water quality, the backwashing is supported by chemicals as required. Thanks to the alternating supply of raw water from the top and the bottom, the capillary is evenly flushed at all points during backwashing. This ensures a particularly effective cleaning. The system is controlled by a PLC and operated via a user-friendly touch panel. Frequency-controlled filtration and backwash pumps ensure the flow-controlled operation at minimum energy consumption. Thanks to the numerous different control options, the system offers a high level of flexibility and operating safety. Variations and changes in the raw water quality can thus be easily compensated for. All relevant operating parameters are detected electronically.

The Dulcoclean® UF range is suitable for the following values in the feed water:

pH range	3.0 ... 12.0
Free chlorine	max. 1.2 mg/l
Turbidity	0.5 ... 30 NTU
DOC	0.5 ... 12 mg/l
Solid matter content	50 mg/l

Deviating values influence the performance data and require a separate design of the system. Please contact our experts.

Plant	Filtration capacity* at 15 °C	Number of 2.5" and 4" membranes	Connected load	Dimensions H x W x D
	l/h			
Dulcoclean® UF 2	5.4 - 9.0	2	6	2,250 x 600 x 2,600
Dulcoclean® UF 3	8.1 - 13.5	3	8	2,300 x 650 x 3,300
Dulcoclean® UF 4	10.8 - 18.0	4	8	2,300 x 650 x 4,000
Dulcoclean® UF 5	13.5 - 22.5	5	10	2,300 x 650 x 4,500

* Filtrate performance depends on the water quality

Systems with filtration capacity up to 90 m³/h are designed on a project basis. Offers are available on request. Please contact us.

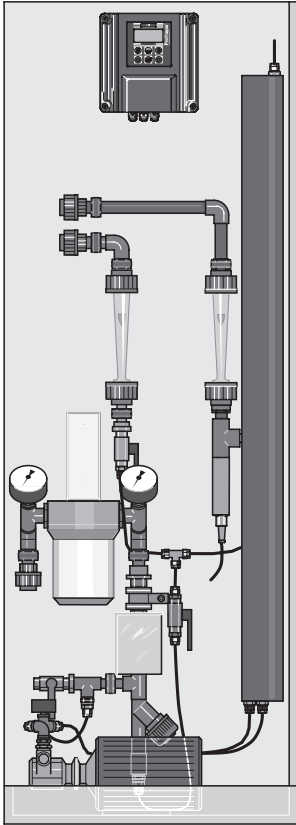
Optionally available are a fully automatic neutralisation system for the treatment of acid and alkaline backwash water, an integrity test as well as customized data logging.

5 Membrane Technology

5.6 Dulcosmose® Reverse Osmosis Plants

5.6.1 Dulcosmose® Reverse Osmosis Plants, ecoPRO

Dulcosmose® reverse osmosis systems ecoPRO range on PP rack; capacity range 100-1,500 l/h



pk_7_062_V2

This range is the economic standard system for modern drinking water desalination. Equipped with the latest generation of „ultra low-pressure“ membranes, these systems guarantee maximum permeate output at low operating pressures and thus low investment and operating costs. The low operating pressures facilitate a cost-effective full PVC piping or piping with pressure hoses.

The system sizes ecoPRO 600-1500 are in addition available with an integrated semi-automatic cleaning system and raw water flushing option.

The ecoPro 100-1500 range was designed for the following values in feed water:

pH range	3.0 ... 10.0
silt density index max.	3
free chlorine	0.1 mg/l
total Fe, Mn	0.2 mg/l
total hardness max.	0.1 °dH
bacteria count max.	100 KBE/ml
turbidity max.	0.5 NTU
COD max.	5 mg/l**

Plants with 2.5" and 4" membranes, salt rejection of the plants 90-95 %

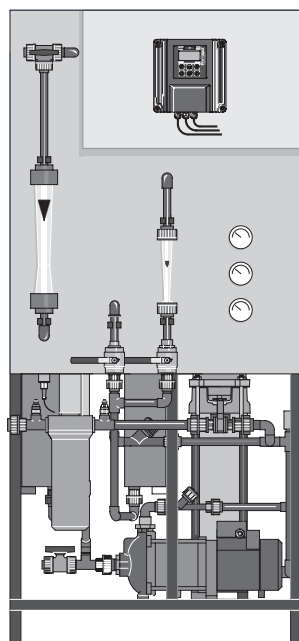
Plant	Permeate capacity at 15 °C water temperature	Number of 2.5" and 4" membranes	Connected load	Dimensions		Max. salt content *
	I/h			H x W x D	mm	
ecoPRO 100	100	1	0.37	1,400 x 500 x 320		650
ecoPRO 200	200	2	0.55	1,400 x 500 x 320		650
ecoPRO 300	300	1	1.10	1,500 x 600 x 400		650
ecoPRO 550	550	2	1.10	1,500 x 600 x 400		650
ecoPRO 600	600	2	1.50	1,850 x 800 x 800		1,000
ecoPRO 900	900	3	1.50	1,850 x 800 x 800		1,000
ecoPRO 1200	1,200	4	1.50	1,850 x 800 x 800		1,000
ecoPRO 1500	1,500	5	2.20	1,850 x 800 x 800		1,000

* differing salinities affect the performance data accordingly

** as O₂

5 Membrane Technology

Dulcosmose® reverse osmosis systems ecoPRO range on powder-coated steel rack; capacity range 1,800-2,700 l/h



pk_7_063_V2

This range is the standard model for modern drinking water desalination. Equipped with the latest generation of „ultra low-pressure“ membranes, these systems guarantee maximum permeate output at low operating pressures and thus low investment and operating costs. The low operating pressures facilitate a cost-effective PVC piping. These systems are also available with an integrated semi-automatic cleaning system and with raw water flushing option.

The ecoPRO 1800-2700 range was designed for the following values in feed water:

salt content max.	1,000 mg/l*
pH range	3.0 ... 10.0
silt density index max.	3
free chlorine	0.1 mg/l
total Fe, Mn	0.2 mg/l
total hardness max.	0.1 °dH
bacteria count max.	100 KBE/ml
turbidity max.	0.5 NTU
COD max.	5 mg/l**

* differing salinities affect the performance data accordingly

** as O₂

Plants with 4" membranes, salt rejection of the plants 90-95 %

Plant	Permeate capacity at 15 °C water temperature l/h	Number of 4" membranes No.	Connected load kW	Dimensions
				H x W x D mm
ecoPRO 1800	1,800	6	2.2	1,750 x 2,500 x 750
ecoPRO 2400	2,400	8	2.2	1,750 x 2,600 x 750
ecoPRO 2700	2,700	9	2.2	1,800 x 3,500 x 750

5 Membrane Technology

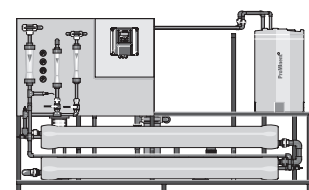
5.6.2

Dulcosmose® Reverse Osmosis Plants, TW Range

This range represents the ProMaqua® universal model for modern drinking water desalination. Equipped with the latest generation of “ultra low-pressure” membranes, these plants achieve maximum permeate capacity at low operating pressures, so ensuring reduced investment and running costs. The low operating pressures allow the use of cost-effective PVC pipework on these systems. In addition these plants are available with integrated semi-automated cleaning system and a permeate and raw water flushing option.

Special customised versions are possible with the TW range. Different pipework materials and different membrane types can be implemented, for increased salt rejection, for example. Measurement and control equipment, e.g. conductivity, redox potential or pH measurement, and dosing equipment (in pretreatment and post-treatment) can easily be integrated in these plants.

The TW range was designed for the following values in the feed water:



pk_7_064

salt content max.	1,000 mg/l*
pH range	3.0 ... 10.0
silt density index max.	3
free chlorine	0.1 mg/l
total Fe, Mn	0.2 mg/l
total hardness max.	0.1 °dH
bacteria count max.	100 KBE/ml
turbidity max.	0.5 NTU
COD max.	5 mg/l**

* differing salinities affect the performance data accordingly

** as O₂

Plants with 8" membranes, salt rejection of the plants 90-95 %

Plant	Permeate capacity at 15 °C water temperature l/h	Number of 8" membranes No.	Connected load kW	Size H x B x T (mm)
PRO 0300TW	3,000	3	3.0	1,800 x 3,000 x 1,000
PRO 0400TW	4,000	4	3.0	1,800 x 3,000 x 1,000
PRO 0500TW	5,000	5	3.0	1,800 x 4,000 x 1,000
PRO 0600TW	6,000	6	4.0	1,800 x 4,000 x 1,000
PRO 0700TW	7,000	6	5.5	1,800 x 4,000 x 1,000
PRO 0800TW	8,000	7	5.5	1,800 x 4,000 x 1,000
PRO 0900TW	9,000	7	7.5	1,800 x 4,000 x 1,000
PRO 1000TW	10,000	8	7.5	1,800 x 4,000 x 1,000
PRO 1100TW	11,000	9	7.5	1,800 x 4,000 x 1,000
PRO 1200TW	12,000	10	7.5	1,800 x 4,000 x 1,000
PRO 1300TW	13,000	11	7.5	1,800 x 4,000 x 1,000
PRO 1400TW	1,400	12	11.0	1,800 x 4,000 x 1,000
PRO 1500TW	15,000	12	11.0	1,800 x 4,000 x 1,000
PRO 2000TW	20,000	18	11.0	1,800 x 7,000 x 1,200
PRO 2500TW	25,000	24	15.0	1,800 x 7,000 x 1,200*
PRO 3000TW	30,000	28	15.0	1,800 x 7,000 x 1,200*
PRO 4000TW	40,000	34	22.0	1,800 x 7,000 x 1,200*
PRO 5000TW	50,000	48	22.0	1,800 x 7,000 x 1,200*

* separate cleaning tank

On request, these plants can also be supplied with different membrane types for other salt rejection, and with measurement and control equipment (conductivity, redox potential, pH measurement) and dosing equipment (in pretreatment and post-treatment).

5 Membrane Technology

5.6.3

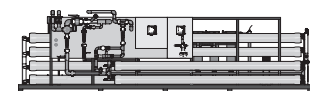
Dulcosmose® Reverse Osmosis Plants, BW Range

This range represents the ProMaqua® standard model for modern brackish water desalination. Equipped with the latest generation of “high rejection low-pressure” membranes, these plants achieve maximum permeate capacity at moderate operating pressures, so ensuring reduced investment and running costs. The ProMaqua® BW range of reverse osmosis plants is piped in PVC on the low-pressure side. The system pipework on the high-pressure side is fabricated in high-grade stainless steel, type DIN 1.4571. ProMaqua® stainless steel pipework systems are welded under shielding gas and root gas atmospheres (TIG) and then passivated in our own pickling bath.

In addition these plants are equipped with integrated semi-automated cleaning system and all permeate and raw water flushing options as standard.

The BW range was designed for the following values in the feed water:

salt content max.	5,000 mg/l*
pH range	3.0 ... 10.0
silt density index max.	3
free chlorine	0.1 mg/l
total Fe, Mn	0.2 mg/l
total hardness max.	water must be chemically stabilised
bacteria count max.	100 KBE/ml
turbidity max.	0.5 NTU
COD max.	5 mg/l**



pk_7_065

* Deviating salt contents have a corresponding influence on the performance data.

** as O₂

Plants with 8" membranes, salt rejection of the plants 95-98 %

Plant	Permeate capacity at 25 °C water temperature	Number of 4" and 8" membranes	Connected load	Size H x B x T (mm)	
				I/h	No.
PRO 0200BW	2,000	9	4	1,800 x 3,500 x 750	
PRO 0300BW	3,000	3	6	1,800 x 3,000 x 1,000	
PRO 0400BW	4,000	4	8	1,800 x 3,000 x 1,000	
PRO 0500BW	5,000	5	8	1,800 x 4,000 x 1,000	
PRO 0600BW	6,000	6	8	1,800 x 4,000 x 1,000	
PRO 0700BW	7,000	7	8	1,800 x 4,000 x 1,000	
PRO 0800BW	8,000	8	8	1,800 x 4,000 x 1,000	
PRO 0900BW	9,000	9	11	1,800 x 4,000 x 1,000	
PRO 1000BW	10,000	10	15	1,800 x 4,000 x 1,000	
PRO 1100BW	11,000	11	15	1,800 x 4,000 x 1,000	
PRO 1200BW	12,000	12	15	1,800 x 5,000 x 1,000	
PRO 1300BW	13,000	13	15	1,800 x 5,000 x 1,000	
PRO 1400BW	14,000	14	15	1,800 x 5,000 x 1,000	
PRO 1500BW	15,000	15	19	1,800 x 5,000 x 1,000	
PRO 2000BW	20,000	21	19	1,800 x 6,000 x 1,200	
PRO 2500BW	25,000	26	30	1,800 x 6,000 x 1,200*	
PRO 3000BW	30,000	29	30	1,800 x 6,000 x 1,200*	
PRO 4000BW	40,000	42	37	1,800 x 7,000 x 1,200*	
PRO 5000BW	50,000	51	45	1,800 x 7,000 x 1,200*	

* separate cleaning tank

On request, these plants can also be supplied with different membrane types for other salt rejection, and with measurement and control equipment (conductivity, redox potential, pH measurement) and dosing equipment (in pretreatment and post-treatment).

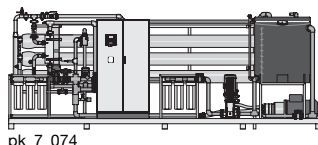
5 Membrane Technology

5.6.4 Dulcosmose[®] Reverse Osmosis Plants, SW Range

This range is the standard model for modern sea water desalination. Equipped with the latest generation of "high rejection low-pressure" membranes, these plants achieve maximum permeate capacity at moderate operating pressures, so ensuring reduced investment and running costs. The SW range of reverse osmosis plants is piped in PVC on the low-pressure side. Because of the high NaCl content, the system pipework on the high-pressure side is fabricated from extra high-grade, corrosion resistant stainless steel, type DIN 1.4539. Stainless steel pipework systems are welded under shielding gas and root gas atmospheres (TIG) and then passivated in our own pickling bath.

In addition these plants are equipped with integrated semi-automated cleaning system and all permeate and raw water flushing options as standard. As an option, the plants can be equipped with a system for energy recovery from the concentrate stream, where the latest generation of pressure exchangers are used.

The SW range was designed for the following values in the feed water:



salt content max.	40,000 mg/l*
pH range	3.0 ... 10.0
silt density index max.	3
free chlorine	0.1 mg/l
total Fe, Mn	0.2 mg/l
total hardness max.	water must be chemically stabilised
bacteria count max.	100 KBE/ml
turbidity max.	0.5 NTU
COD max.	5 mg/l**

* differing salinities affect the performance data accordingly

** as O₂

Plants with 4" and 8" membranes, salt rejection of the plants 99 %

Plant	Permeate capacity at 25 °C water temperature l/h	Number of 4" and 8" membranes No.	Connected load without	Connected load with	Size H x B x T (mm)
			energy recovery kW	energy recovery kW	
PRO 0068SW	680	6	5.5		1,800 x 3,500 x 1,000
PRO 0160SW	1,600	3	11.0		1,800 x 4,000 x 1,000
PRO 0230SW	2,300	4	15.0		1,800 x 4,000 x 1,000
PRO 0270SW	2,700	5	15.0	6.6*	1,800 x 4,000 x 1,000
PRO 0330SW	3,300	6	18.5	8.6*	1,800 x 4,000 x 1,000
PRO 0410SW	4,100	8	22.0	13.2*	1,800 x 5,000 x 1,200
PRO 0550SW	5,500	10	40.5	13.2*	1,800 x 5,000 x 1,200
PRO 0650SW	6,500	12	44.0	17.2*	1,800 x 5,000 x 1,400
PRO 0850SW	8,500	15	60.0	21.5*	1,800 x 6,000 x 1,500
PRO 0900SW	9,000	16	60.0	25.0*	1,800 x 5,000 x 1,500
PRO 1150SW	11,500	20	75.0	34.0*	1,800 x 6,000 x 1,500**
PRO 1350SW	13,500	24	90.0	49.5*	1,800 x 7,000 x 1,500**
PRO 1700SW	17,000	30	110.0	49.5*	1,800 x 7,000 x 1,500**
PRO 2000SW	20,000	36	132.0	71.0*	1,800 x 7,000 x 1,500**
PRO 2350SW	23,500	42	160.0	82.5*	1,800 x 7,000 x 1,200**
PRO 2700SW	27,000	48	160.0	82.5*	1,800 x 7,000 x 1,200**

* energy recovery by pressure exchanger

** separate high-pressure pump and cleaning tank

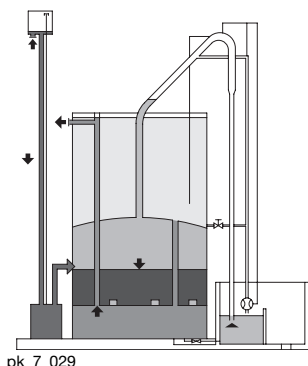
On request, these plants can also be supplied with different membrane types for other salt rejection, and with measurement and control equipment (conductivity, redox potential, pH measurement) and dosing equipment (in pretreatment and post-treatment).

6 Gravity Filter

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6.1	INTERFILT [®] SK	1

6 Gravity Filter

6.1 INTERFILT® SK



pk_7_029

Filtration is one of the most important basic technical processes in water treatment. It is a mechanical separation process in which suspended particles in water are retained in a filter layer (e.g. a layer of sand) through which water is passed.

Raw water is generally filtered through filtration plant using sand as the filter layer.

During the filtration process the pores in the filter layer become blocked by the contaminants removed from the raw water passing through it. This leads to a gradually increasing drop in pressure.

The “back washing phase” begins once the minimum permitted pressure level is reached in the “operating phase”. Here, the impurities are flushed out of the filter layer. During the operating phase, water passes downwards through the filter, during the back-washing phase, it travels back up through the filter layer.

The layer of sludge which has built up on the surface of the filter layer is broken up at the start of the back washing process, creating a fluidised bed.

The rotating motion of the grains of sand removes the dirt particles which have become attached to the surface of the granules and they are carried away from the filter with the rising flow of water.

ProMaqua has built up particular expertise in the field of filtration plant.

Open sand filters with differential pressure controlled back washing and integrated back washing water storage tank, offer significant advantages:

- No control equipment
The filter uses no valves, flow meters, controllers or display equipment for filtration and back washing, or final-rinse functions, in other words, no moving parts.
- No pump
The volume of water required for back washing is held in the storage area inside the filter, which means there is no need for a back washing pump.
- No compressed air, pressurised water or electrical power
All processes are controlled and driven by the filter itself.
- No parts to maintain
No moving parts means no wear.
- No operating personell
The filter works fully automatically and requires no external intervention.

Design

The filtration plant consists of the following key elements:

- Cylindrical tank
- Internal fittings
- Automatic back washing system with injector
- Raw water inlet and feed tank
- Filter nozzles
- Filter material

Material: polyethylene PE-HD

Filter material: filter sands EN 12904, other filter materials on request

Applications

The (SK) Gravity Filter is suitable for practically all filtration tasks and its uses include, for example, partial flow cooling water filtration, river, industrial and potable water treatment, iron removal from well water, waste water purification to reduce suspended solids, COD - BOD₅ and phosphate content (4th purification stage) etc.

Optional additional equipment:

- Cover for the cylindrical tank
- Frost protection insulation with associated electric heating
- Combined air/water backwash
- Backwash water sump made from plastic PE-HD
- Other options on request

6 Gravity Filter

Technical data

Type list and capacity data

Type	Filter diameter mm	Filter capacity m ³ /h	Back wash Water ~ m ³	Weight empty ~ t	Weight in operation ~ t
SK- 9	900	6.5	1.4	1.2	4.5
SK- 12	1,200	11.5	2.5	1.5	7.1
SK- 15	1,500	18.0	4.5	1.9	10.5
SK- 18	1,800	26.0	5.5	2.3	15.0
SK- 21	2,100	35.0	8.5	2.8	19.5
SK- 24	2,400	46.0	10.0	3.0	25.0
SK- 28	2,800	62.0	14.0	3.5	30.0

Flow rate:	3 ... 10 m/h
Backwash intervals: (depending on type and amount of pollutants)	approx. 8 ... 36 h
Head loss:	120 ... 150 mbar
Clean water solids figure: (depending on raw water and filter material)	0 ... 3 mg/l
Backwash flow rate::	
at the start	44 m/h
in the middle	37 m/h
at the end	30 m/h
Cylinder height: (same for all types)	4,500 mm
Overall height: depending on filter diameter	6,500 mm
Backwash and refilling time:	13 ... 15 min.
Filter sand in accordance with EN 12904	
– Height of bed	600 mm
– Grain size range	0.71 ... 1.25 mm
Filter nozzles:	
– Type	Lamellar nozzle
– Material	PPN
– Slot width	0.2 mm

As system components are produced individually according to application, we will inform you of prices on enquiry.

We reserve the right to change components and their construction, as long as these do not affect their performance or function.

- **Service**
- **Sales**

1 Service

You can make full use of our services even if you are not yet one of our customers. Our pre-sales services ensure that you get the optimum solution for your individual needs:

- Advice in choosing the products
- Application and process optimisation
- Project planning

However, our commitment does not end with delivery. We offer you a comprehensive after-sales service, which lasts for the entire service life of your equipment. That maximises your productivity and minimises your operating costs:

- Assembly/installation
- Commissioning
- Maintenance
- Spare parts service
- Repair
- Troubleshooting

Thanks to our worldwide presence in over 100 countries, our service is available wherever you need it.

1.1

Services

Mounting/installation

Quality starts with the correct installation of our systems. That's why we offer you a professional installation by trained service technicians.

We offer the following installation work:

- running pipelines in PE, PVC and PVDF materials
- carrying out electrical installation work
- linking the system to a PLC

If required, we also carry out conversions and plant extensions. Your advantage: plant and installation from a single source.

Commissioning: the right start for your system

Our service technicians will ensure professional system commissioning and start-up. You profit from knowing that the processes are set up correctly and the machine is running optimally from the very outset. Following successful commissioning, the service technician will provide information on the set system parameters and will train the system operators.

Maintenance: an essential requirement for consistently high reliability

Routine preventative maintenance performed by our service technicians increases operational reliability, lowers operating costs and extends the service life of your system. We offer maintenance contracts for this, individually tailored to your needs.

Repairs: on our premises or yours

Whether it's a works repair or an express job on site, you're assured of a professional repair using genuine spare parts.

Troubleshooting: If really something shouldn't work

Of course, queries on the operation of our products or systems do come up from time to time. Maybe the operation is not quite clear, or you'd like to change the process, or make other modifications, perhaps one of our products just isn't working correctly, for whatever reason at all. No problem. Our technical advisers will be pleased to help you. In most cases, your query can be answered over the telephone. If that's not possible, our adviser will take the necessary steps to help you as quickly as possible. This can be by sending in a service technician, despatch of spare or replacement parts, or other measures, depending on the situation.

1 Service

1.2 Service Contacts

For customers from Germany:

Some services are rendered by ProMaqua GmbH.

Services	Telephone +49 6221 6489-	Fax +49 6221 6489-	eMail
Mounting/installation	-402	-400	service@promaqua.com
Commissioning	-402	-400	service@promaqua.com
Maintenance	-402	-400	service@promaqua.com
On-site repair	-402	-400	service@promaqua.com

Repairs	Telephone +49 6221 842-	Fax +49 6221 842-	
for postcode areas 0 ... 4	-328	-441	CustomerCare@prominent.de
for postcode areas 5 ... 9	-308	-441	CustomerCare@prominent.de

For customers from other countries:

Please contact your local ProMinent branch or agency.

1.3 Training

The training programme of ProMinent Academy for Water Technology is mainly geared to customers from Germany.

Customers from other countries are kindly requested to contact the local ProMinent branch or agency. Their home pages are also available for information and contact options under the heading "Company – Locations".

The range of courses offered has been widened this year, and now provides an even more effective opportunity to widen your knowledge of ProMinent® instrumentation, get to know new equipment, and swap experiences.

The courses are divided into free subject seminars and intensive courses for which a charge is made. The subject seminars offer all those responsible for processes, planners, plant engineers and plant constructors, the possibility of getting to know the full ProMinent product programme covering all sectors. Specialised subject seminars on the fields of drinking water, swimming pools and legionella prevention are offered in addition.

The intensive seminars are intended for all users from the operation, maintenance and service field who want to gain more in-depth practical experience with individual items of ProMinent equipment. As well as dosing pump workshops, we also offer workshops on measurement and control equipment, Bello Zon® chlorine dioxide plants and Dulcodes UV systems with DVGW certification (DVGW = German Gas and Water Association).

All training courses are held in our Seminar Centre in Heidelberg, which is equipped with the very latest media equipment and two practical training rooms. So that we can deal with customer needs as individually and comprehensively as possible, we have limited the number of participants per course to 15.

1.4 Training Contacts

Detailed information on the current training programme is available via our home page (www.prominent.com) under the heading „Service“, or direct from our training department.

Address:	ProMinent Dosiertechnik GmbH ProMinent Akademie für Wassertechnologie F.A.O. Mrs. Jeanette Lindenau Im Schuhmachergewann 5-11 69123 Heidelberg
Administration:	Mrs. Jeanette Lindenau
Training manager:	Dr. Klaus Fuchs
Telephone:	+49 6221 842-318 (Mrs. J. Lindenau) +49 6221 842-0 (switchboard)
Fax:	+49 6221 842-453 F.A.O. Mrs. J. Lindenau
E-Mail:	J.Lindenau@prominent.de

For customers from other countries:

Please contact your local ProMinent branch or agency.

ManarFan

2 Sales

2.1 The ProMinent Group

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-0
-433 Management
-617 Sales Chemical Fluid Handling
-419 Exports
-220 Purchasing
-435 Research and Development
-627 EDP/Technical/Legal
-432 Advertising
-400 Sales ProMaqua

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2.2 General Terms And Conditions Of Delivery

The valid General Terms and Conditions, which can be viewed on the ProMinent homepage, become material part of the contract.

I. Scope of application

- (1) The present terms and conditions of delivery shall apply exclusively; deviating conditions or conditions contrary of the customer shall only apply provided the supplier approved of this in writing.
- (2) The present General Terms and Conditions of Delivery shall also apply to subsequent orders and to replacement parts deliveries without necessitating repeated pointing out of this fact.
- (3) Supplements and representations as well as modifications or amendments to a contract concluded in writing or by tel-ex must be in writing.

II. Offer and order confirmation

- (1) Offers shall only be binding provided a time-limit for acceptance is stated in the offer. To be legally binding, offers shall require the written confirmation of the supplier.
- (2) The supplier reserves any titles to and copyrights in figures, drawings, calculations, and other offer documentation and similar information of physical and non-physical type - also in electronic form; these may only be disclosed to third parties on the supplier's written approval and shall be immediately returned to the supplier on request if no order is awarded to the supplier.

III. Scope of deliveries and services

- (1) The deliveries and services are determined based on the mutual written declarations. If no such declarations exist, the written order confirmation of the supplier shall be decisive. For mere sales contracts, the agreed upon delivery provisions shall be interpreted according to the INCOTERMS valid at the conclusion of the contract.
- (2) Data in brochures, catalogues or general technical documentation shall only be binding if reference is made to them in writing.
- (3) The costs for an agreed mounting and assembly, including all and any required ancillary costs such as travel expenses or costs for the transport of tools or personal luggage shall be remunerated separately by the customer, if not otherwise agreed upon.
- (4) If software is part of the delivery scope, the customer shall be granted a non-exclusive right of use in the software. The customer may copy or edit the software only in the legally permissible scope.
- (5) Partial deliveries shall be permissible, provided it is reasonable for the customer, considering the interests of both the supplier and the customer.
- (6) In case of deliveries abroad, the supplier's obligation shall be under the proviso that any necessary export licences are granted.

IV. Prices and terms of payment

- (1) All prices shall be in EURO unless otherwise stated. They shall apply to mere delivery transactions "ex works" (EXW), exclusive of packaging.
- (2) The prices do not include any turnover tax. This tax is itemised separately in the invoice in the statutory amount applicable at the date of invoicing.
- (3) The deduction of discounts shall require a

special agreement in writing.

- (4) If not otherwise shown in the order confirmation, the sales price shall be due for payment 30 days from invoice date without any deduction.
- (5) If the customer does not comply with the date for payment, the customer shall pay default interest in the amount of 8 percentage points above the base interest rate pursuant to §247 German Civil Code from the due date. Payment of further damages remains reserved.
- (6) If not otherwise agreed upon, the delivery of goods for deliveries abroad shall be under the proviso that an irrevocable commercial letter of credit is issued by the customer in favour of the supplier, and confirmed by a German banking institution.
- (7) In case of delayed payment, the supplier may suspend the performance of his own obligations until total payment was received, giving written notice to the customer.
- (8) The customer may only set off claims or assert a right of retention, provided these are undisputed or have become non-appealable.

V. Time-limits for deliveries or services

- (1) With regard to time-limits, the mutual written declarations or, in the absence of such declarations, the written order confirmation of the supplier shall be decisive. The time-limit shall be deemed observed, provided all and any documentation to be provided by the customer are received in time, and all and any required permits, releases, in particular plans, are provided, and the agreed upon terms of payment and other obligations are met by the customer. If these prerequisites are not met in time, the time-limit shall be prolonged reasonably; this shall not apply if the supplier is responsible for the delay.
- (2) If non-observance of the time-limits is the result of force majeure, e.g. mobilization, war, riot or similar events, e.g. strike or lock-out, the agreed upon time-limits shall be prolonged reasonably.
- (3) If mounting and assembly are not part of the agreed upon services, the time-limit shall be deemed observed if the goods ready for operation were shipped or collected within the time-limit. Should the delivery be delayed for reasons for which the customer is responsible, the time-limit shall be deemed observed upon notification of readiness for shipment.
- (4) If the supplier is responsible for the non-observance of the time-limit, the customer, provided the customer suffered an actual loss, may request compensation for delay for each full week of delay of a maximum of 0.5%, however, not exceeding 5% of the price for the part of the delivery which could not be taken into relevant operation because of the delay. Claims for compensation of the customer exceeding the limits stipulated in item 5.4 shall be excluded in all cases of delayed delivery or service, also after expiry of any grace period set to the supplier. This shall not apply to the extent mandatory liability exists in cases of intent, gross negligence or personal injury; a shift

of the burden of proof to the disadvantage of the customer is not given in this case.

- (5) The customer's right to withdraw after ineffectual expiry of a grace period for the supplier shall remain unaffected. The grace period, however, must be reasonable and amount to at least four weeks.
- (6) If shipment or delivery are delayed for more than one month after notice of readiness for shipment on the customer's request, warehouse charges in the amount of 0.5% of the price of the delivery goods, however, not exceeding a total of 5%, may be charged to the customer for each month started. The parties to the contract shall remain free to furnish proof of higher or lower warehouse charges.

VI. Passage of utility and risk; insurance; packaging

- (1) The risk of deliveries and services rendered by the supplier shall pass to the customer as follows, even in case of deliveries freight paid.
 - a) for deliveries without mounting or assembly, even in case of partial deliveries, if these have been shipped or collected. Shipments shall be insured by the supplier against the usual transport risks upon wish and at the expense of the customer. If such insurance exists, the supplier shall be immediately notified about any damages to goods in transit.
 - b) for deliveries with mounting or assembly on the day of acceptance in the customer's operations or, if agreed upon, after perfect test operation.
- (2) If the shipment, delivery, start, performance of mounting or assembly, acceptance in the customer's operations or test operation is/are delayed for reasons attributable to the customer or if the customer delays acceptance for other reasons, the risk shall pass to the customer.
- (3) The shipment is in principle made in standard packagings of the supplier. The latter shall be entitled to choose special types of packaging deemed necessary in the supplier's discretion. The costs of these packagings shall be borne by the customer.

VII. Mounting and assembly

The mounting, assembly and installation of the equipment and devices of the supplier may only be performed by specialists, observing the supplier's guidelines and the applicable technical standards. If mounting and/or assembly are performed by the supplier, the following provisions shall apply, if not otherwise agreed upon in writing:

- (1) The customer shall assume and provide in time at the customer's expense:
 - a) all earthwork, construction work and other different ancillary work, including therefor specialists and auxiliary staff, materials and tools,
 - b) the commodities and materials such as scaffolds, cranes and elevators and other devices, fuels, lubricants, and chemicals required for assembly and commissioning,
 - c) energy and water at the site of use, including connections, heating, and illumina-

nation,

- d) sufficiently large, suitable, dry and lockable rooms at the assembly site for storing machine parts, fixings, materials, and tools etc., and suitable working and recreation rooms for the assembly staff, including appropriate sanitary installations. For the protection of the supplier's property and the assembly staff, the customer shall also take the measures he normally would take to protect his own property.
 - e) protective clothing and protective devices which are necessary because of special circumstances at the assembly site.
- (2) Prior to the start of the assembly work, the customer shall unsolicitedly provide the required information about the position of subsurface energy, gas, water conduits or similar installations as well as the required data on statics.
 - (3) Prior to the start of mounting or assembly, the additions and objects required to start the work must be at the mounting or assembly site and all preparations prior to start of the installation must be advanced such that the mounting or assembly can be started as agreed upon and can be performed without any interruptions. Access routes and the mounting or assembly site must be flattened and clear of any objects.
 - (4) Should mounting, assembly or commissioning be delayed for reasons beyond the control of the supplier, the customer shall bear the costs for waiting time and additionally required travels of the supplier or the assembly staff in an adequate amount.
 - (5) If a plant cannot be installed immediately after delivery, the customer shall be responsible for a proper storage according to the supplier's guidelines.
 - (6) The customer shall provide the supplier with weekly information on the duration of the working hours of the assembly staff and shall immediately confirm the completion of mounting, assembly or commissioning.
 - (7) The commission may only be performed by technicians acknowledged by the supplier and according to the supplier's instructions. The technicians shall be entitled to refuse commissioning of the plant if the operating conditions to be provided by the customer do not guarantee a safe operation of the plant. The customer shall bear the costs of any delay in commissioning incurred to the supplier.
 - (8) Should the supplier request acceptance of the deliveries and services after completion, the customer shall be obliged to do so within two weeks. Otherwise, the acceptance shall be deemed made. The acceptance shall be deemed made, too, if the delivery goods and services - also after completion of an agreed test phase, if any - have been taken in use.

VIII. Warranty

- (1) Should goods delivered or services rendered by the supplier prove to be defective because they do not possess the agreed quality or because they are not suitable for the agreed or usual use, the supplier shall in its discretion either remedy the parts or services concerned or deliver or render them again at no cost within the limitation period, provided the cause of the defect already existed at the time of risk passing.
- (2) Claims for material defects become statute-barred after 12 months, for ProMinent® pump drives and DULCOMETER® controllers the period is 24 months. The time-limit shall start with passing of the risk (item 6).

The above provisions shall not apply to the extent the law mandatorily prescribes longer time-limits according to §§438(1) no. 2 German Civil Code (goods for edifices), §479(1) German Civil Code (right of recourse), and §634a German Civil Code (structural defects). The warranty period may be prolonged up to 60 months in suitable cases, provided the customer concludes a maintenance contract for the corresponding period.

- (3) The customer shall immediately give notice of defects to the supplier.
- (4) In the event of notices of defects, payments of the customer may be retained in the volume which shows a reasonable ratio to the material defects incurred. The customer may retain payments only if a notice of defect is given whose justification is beyond doubt. If the notice of defect is given wrongfully, the supplier shall be entitled to request from the customer compensation for the expenses incurred to the supplier.
- (5) At first, the supplier shall always be given the opportunity to post-perform within a reasonable time-limit. The customer shall grant the supplier the time and opportunity required to do so. Should the customer refuse this, the supplier shall be exempted from the liability for defects.
- (6) If the post-performance fails, the customer - notwithstanding possible claims for damages - may withdraw from the contract or reduce the compensation. The customer may not claim compensation for futile expenses.
- (7) Claims for defects do not exist in case of minor deviations from the agreed or assumed quality, minor impairment of usability, natural wear or damages incurred after passing of the risk because of incorrect or negligible handling, excessive use, unsuitable operating material, faulty construction work, unsuitable subsoil or because of special external influences which are not established in the contract as well as in case of non-reproducible software errors. If the customer or third parties perform improper modifications or repair work, no claims for defects will exist for these and the resulting consequences.
- (8) The supplier shall not bear the additional expenditure, in particular transport, travelling, labour and material costs, which result from the fact that the subject matter of the delivery was later transported to a different location than the customer's branch or the original place of destination, except the transport corresponds to its proper use.
- (9) In all cases, the customer shall be obliged to take any possible and reasonable steps to keep the expense for the purpose of postperformance as small as possible. The supplier shall participate in the costs for a recall campaign only if this is necessary based on the factual and legal situation. The customer shall be obliged to either return defective products or keep them ready for inspection and tests, in the supplier's discretion.
- (10) Claims for recourse of the customer against the supplier shall only exist to the extent the customer did not conclude any agreements with the customers' purchaser which exceed the statutory claims for defects. In addition, item 8.8 shall apply correspondingly to the scope of the right for recourse of the customer against the supplier.
- (11) Furthermore, item 11 (Other claims for damages) also applies to claims for damages. More extensive or other claims than stipulated in the present item 8 of the cus-

tommer against the supplier and its persons employed in performing the obligations because of a material defect shall be excluded.

IX. Industrial property rights and copyright; defects of title

- (1) If not otherwise agreed upon, the supplier shall be obliged to render the delivery free of any industrial property rights and copyrights of third parties (hereinafter called: property rights) solely in the country of the place of delivery. To the extent a third party makes justified claims against the customer because of infringement of property rights by deliveries rendered by the supplier and used according to contract, the supplier shall be liable to the customer within the time-limit stipulated in item 8.2 as follows:
 - a) The supplier shall at the supplier's expense and in the supplier's discretion either obtain a right of use for the deliveries concerned, modify them such that the property right is not infringed or exchange them. Should the supplier not be able to do so under reasonable conditions, the customer shall be entitled to statutory cancellation or reduction rights. The customer may not claim compensation for futile expenses.
 - b) The supplier's obligation to pay damages shall be subject to item 11.
 - c) The above mentioned obligations of the supplier shall only be given provided the customer immediately informs the supplier in writing about claims asserted by third parties, refuses to acknowledge an infringement, and all and any measures of protection and settlement proceedings remain reserved to the supplier. Should the customer discontinue the use of the delivery goods for the purpose of reducing the damage or for other reasons, the customer shall be obliged to inform the third party about the fact that the discontinuance of use does not represent an acknowledgement of the property rights infringement.
- (2) Claims of the customer shall be excluded to the extent the customer is responsible for the property rights infringement.
- (3) Claims of the customer shall furthermore be excluded to the extent the property rights infringement was caused by special standards stipulated by the customer, by use not foreseeable by the supplier or by the fact that the delivery goods were modified by the customer or used in conjunction with products not delivered by the supplier.
- (4) In the event of property rights infringements, the claims of the customer stipulated in item 9.1 a) shall apply, in addition the provisions in item 8.4, item 8.5, and item 8.10 shall apply correspondingly. In case of other defects of title, the provisions of item 8 shall apply correspondingly.
- (5) More extensive or other claims than stipulated in the present item 9 of the customer against the supplier and its persons employed in performing the obligations because of a defect of title shall be excluded.

X. Impossibility; adaptation of contract

- (1) To the extent the delivery is not possible, the customer shall be entitled to claim damages, except the impossibility is attributable to the supplier. The customer's claims for damages, however, shall be limited to 10% of the part of the delivery which cannot be taken into relevant operation because of the impossibility. This limitation shall not apply

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to the extent mandatory liability exists in cases of intent, gross negligence or personal injury; a shift of the burden of proof to the disadvantage of the customer is not given in this case. The customer's right to withdraw from the contract shall remain unaffected.

- (2) In case of temporary impossibility, item 5 (Time-limits) shall apply.
- (3) Should unforeseeable events in the sense of item 5.2 significantly change the economic meaning or the content of the delivery or have a significant effect on the supplier's operations, the contract shall be adapted in good faith. To the extent this is not economically reasonable, the supplier shall be entitled to withdraw from the contract. If the supplier intends to assert this right to withdraw, the supplier, after having obtained knowledge about the scope of the event, shall immediately inform the customer to this effect. This shall also apply if a prolongation of the delivery period was agreed upon with the customer at first.

XI. Other claims for damages

- (1) Any claims for damages and reimbursement of expenses the purchaser may have due to the infringement of primary or collateral duties resulting from the relationship under the law of obligation, from unauthorized action or any other legal reasons, shall be excluded.
- (2) For all products with network connection, the risk of loss or data alteration and the risk of faulty data transmission will be passed to the customer as soon as the first network interface related to the product is crossed. For software products, the risk of loss or data alteration and the risk of faulty data transmission will be passed to the customer as soon as the software is installed. Despite careful control of the data, ProMinent does not assume any liability for data entering the system of the customer or other systems via an open network interface.
- (3) This exclusion does not apply when liability is imperative, e.g. according to the Product Liability Law (Produkthaftungsgesetz), for cases of intent, gross negligence or personal injuries, due to the warranty for the presence of a specific quality or the breach of material contractual obligations. Damage claims asserted on the basis of a breach of material contractual obligations shall be limited to foreseeable damages that are typical to the contract unless there is intent or gross negligence involved or the liability is based on physical injury or a warranty for the presence of a specific quality. No reversal of the burden of proof to the disadvantage of the purchaser is associated with the above provisions.
- (4) Unless longer limitation periods are imperatively prescribed by law, all claims for damages shall be subject to the limitation periods mentioned in sub-paragraph 8.2.

XII. Warranty and product description

- (1) Warranties shall only be effective if made in writing.
- (2) Data described in catalogues, tender documentation and other printed matter as well as general advertising statements do not represent an offer for the conclusion of a warranty agreement.

XIII. Reservation of title

- (1) The supplier reserves the title in the delivery goods (reserve goods) until the customer has made the complete payment due from the business relationship. The reservation of title shall also include the acknowledged

balance, to the extent the supplier enters the claims against the customer in current account (current account reserve).

- (2) If the supplier accepts return of the delivery goods, this shall mean a withdrawal from the contract. Upon return of the goods purchased, the supplier shall be entitled to realise these goods; the realisation proceeds shall be credited to the customer's obligations - minus reasonable realisation fees. In the event the delivery goods are attached, the supplier shall be entitled to withdraw from the contract without setting a time-limit. In case of attachment or other interventions by third parties, the customer shall immediately inform the supplier in writing for the supplier to be able to file action pursuant to §771 German Code of Civil Procedure. To the extent third parties are not able to reimburse the judicial and extrajudicial expenses of an action pursuant to §771 German Code of Civil Procedure to the supplier, the customer shall be liable for the loss incurred by the supplier
- (3) The customer shall be entitled to resell the delivery goods in the proper course of business; however, the customer already now assigns to the supplier all and any claims in the amount of the final invoice amount, including value added tax, which are due to him from the resale against his purchaser or third parties, independent of the fact whether the delivery goods were resold without or after processing. The customer shall be entitled to collect this claim also after its assignment. The supplier's power to collect the claim himself remains unaffected; the supplier, however, agrees not to collect the claim as long as the customer meets his payment obligations properly and is not delinquent. In this case, the supplier may request the customer to disclose the assigned claims and their debtors, to provide the information required for collection, to provide the relevant documentation and to inform the debtor (third party) about the assignment.
- (4) The processing and transformation of the delivery goods by the customer shall always be performed for the supplier. If the delivery goods are processed together with other objects not belonging to the supplier, the supplier shall obtain co-ownership in the new object in the proportion of the value of the delivery goods to the other processed objects at the time of processing. Otherwise, the same provisions as for reserve goods shall apply to the matter created by processing. The customer shall also assign to the supplier the claims for securing the supplier's claims which are due to the customer against a third party by joining the delivery goods with a real property.
- (5) If the delivery goods are mixed inseparately with other objects not belonging to the supplier, the supplier shall obtain coownership in the new object in the proportion of the value of the delivery goods to the other mixed objects at the time of mixing. If the mixing is done such that the matter of the customer is to be deemed a main component, the parties agree that the customer shall assign to the supplier proportional co-ownership. The customer shall keep the sole property or co-property for the supplier. The customer shall insure it in the usual scope against usual risks such as e.g. fire, theft, water, and similar. The customer shall already now assign to the supplier the customer's claims for compensation which are due to him from damages of the above mentioned type against insurers or other third parties, in the amount of the invoice value of the goods.
- (6) If the realisable value of the securities due to

the supplier exceed the supplier's total claims by more than 10%, the supplier shall be obliged to release in the supplier's discretion securities on request of the customer or a third party affected by the excessive security.

XIV. Repair conditions

- (1) The orderer (customer) agrees through a legally binding declaration (Clearance) to subject the devices or parts which are meant for repair or maintenance to a thorough cleaning before shipment in order to exclude any hazard for the independent contractor by re-contaminations. The devices or parts shall thus be sent to the supplier free of any toxic, caustic, microbiologic, explosive, radioactive or other substances detrimental to health.
- (2) If a cost estimate is prepared on order of the orderer, the costs incurred in this connection may be charged to the orderer, independent of the fact whether a repair order is issued subsequently or not. Because the search time for defects is working time, the time expended and to be proven shall be charged to the orderer if an order cannot be executed because:
 - a) the defect complained about could not be determined, observing the rules of technology;
 - b) the order was withdrawn while executing the order;
- (3) The warranty period for all and any workmanship (repairs) as well as for built in material shall be six months. Otherwise, the warranty rules for suppliers and services from item VIII shall apply.
- (4) The payment terms from item IV shall apply. In addition, the following retention of title shall be agreed:
 - a) To the extent the replacement parts or similar built in during repairs do not become material components, the independent contractor shall reserve retention of title in these built in parts until the settlement of all and any claims of the independent contractor from the contract.
 - b) If the orderer delays in payment or does not meet the orderer's obligations from the retention of title, the supplier shall be entitled to request the return of the object for the purpose of removing the built in parts. All and any costs of the return and the removal shall be borne by the orderer.
 - c) If the repair is performed at the orderer's premises, the orderer shall give the supplier the opportunity to perform the removal at the orderer's premises. Labour and travel costs shall be at the expense of the orderer.
- (5) The place of jurisdiction for all disputes arising from this contract shall be the place of business of the contractor, if the person ordering is a merchant. However, the contractor is also entitled to institute legal proceedings at the place of business of the person ordering.

XV. Place of jurisdiction and applicable law

- (1) The place of jurisdiction for all and any disputes arising out of the present contract shall be the supplier's headquarters, provided the customer is a merchant: The supplier, however, shall be entitled to file action at the customer's headquarters.
- (2) German law shall apply to the contractual relationships. The UN Convention on the In-

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ternational Sale of Goods (CISG) shall be excluded.

XVI. Severability

Should any individual provisions of the present contract be legally ineffective, the validity of the remaining provisions shall in no way be affected. This shall not apply if abiding by the contract would constitute an unreasonable hardship for the other party to the contract.

XVII. Terms and conditions for the participation in the exchange device pro-

gramme

- (1) The exchange device programme applies to pumps without Profibus interface and without self-ventilation as well as for amperometric sensors.
- (2) The purchaser agrees with the participation in the exchange device programme that the device is assigned to ProMinent Dosieretechnik GmbH. By delivering the device, the ownership in the delivered devices shall pass on to ProMinent Dosieretechnik. In return, the purchaser shall receive a used, similar and at least equal device.

- (3) Within the scope of each exchange process, a maximum of 5 exchange devices per customer may be ordered.
- (4) Already exchanged devices can no longer participate in the exchange device programme.
- (5) The warranty for exchange pumps shall be 6 months.

ProMinent Dosieretechnik GmbH

Valid 11/2007