

ProMinent® Equipment Catalogue

Products for:

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

Issued by:

ProMinent Dosiertechnik GmbH

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5-11
69123 Heidelberg · Germany
Telephone: +49 6221 842-0
Fax: +49 6221 842-617
info@prominent.com
www.prominent.com

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all previous catalogues and
price lists.

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Chapter 1 Solenoid-driven metering pumps

Chapter 2 Motor-driven metering pumps

Chapter 3 Process metering pumps

Chapter 4 Dosing systems

Chapter 5 Tanks and transfer pumps

Chapter 6 Panel-mounted measuring/
control stations

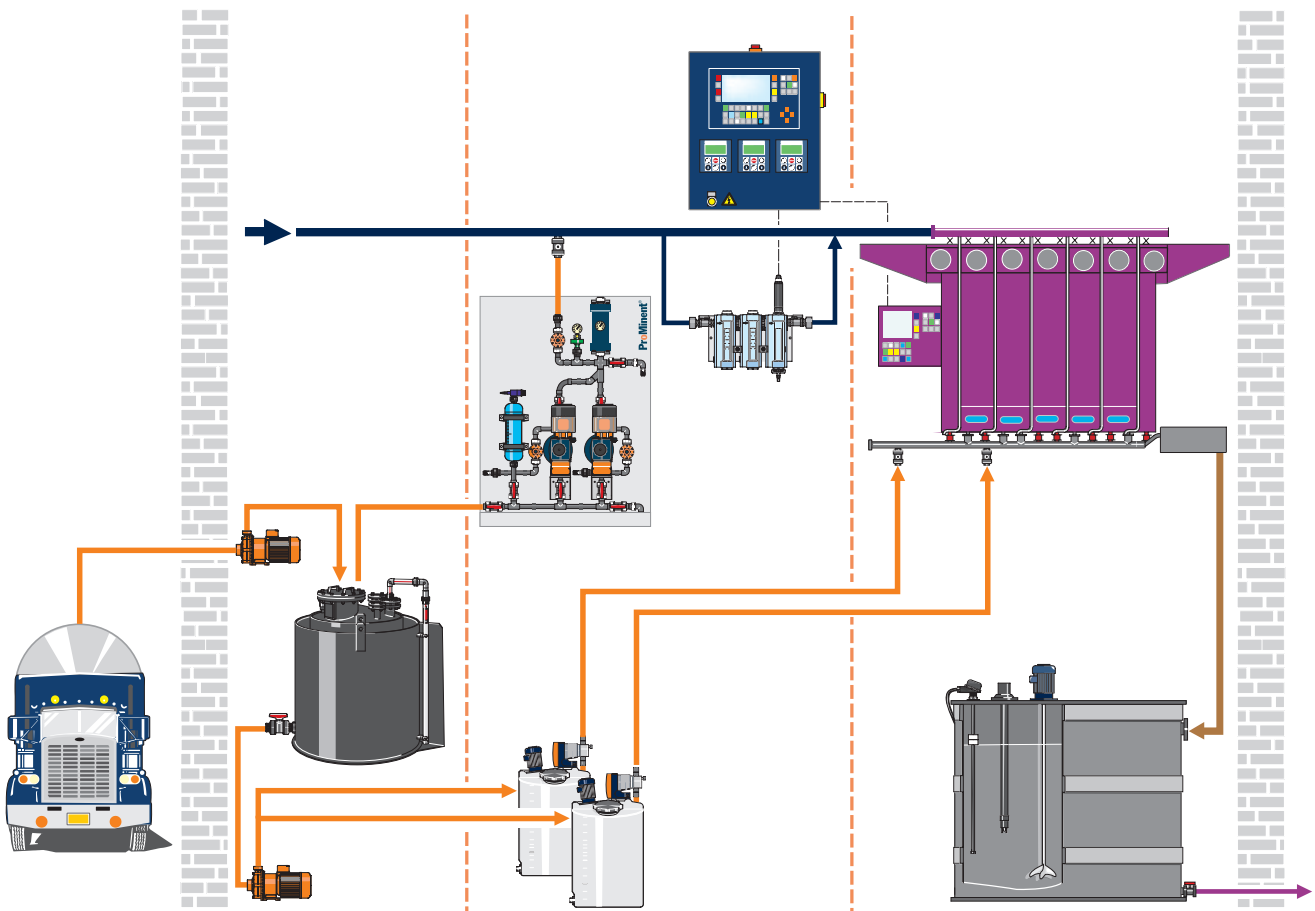
Chapter 7 DULCOTEST[®] sensor technology

Chapter 8 Measuring and control technology

Chapter 9 Domestic water plant

Overview Chemical Fluid Handling

Optimum Interaction Of All Components



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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

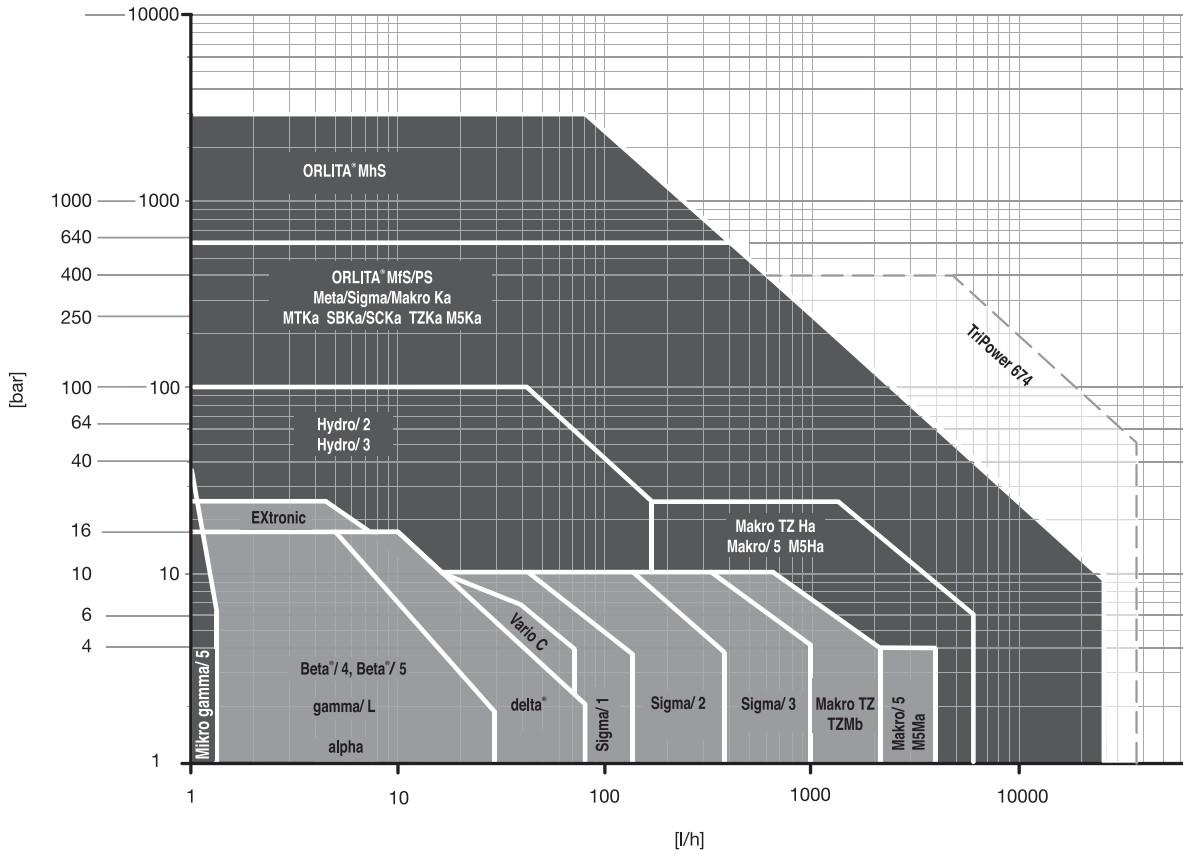
pH-correction or specialist detoxification ensures that wastewater can be safely disposed of via the public drainage system.

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).



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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.

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

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

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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	C ₂ H ₃ ClCOCH 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														
Diacetonol	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 ₈ 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

ProMinent® Chemical Resistance List

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

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.

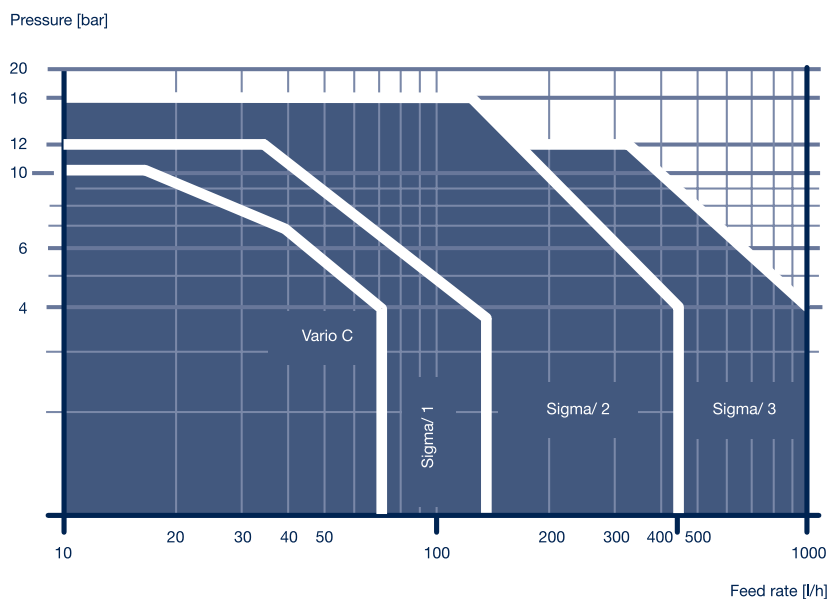
The vast variety of options is specified in the identcode.

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

2.0 Overview Motor Driven Metering Pumps

2.0.2

Selection Guide

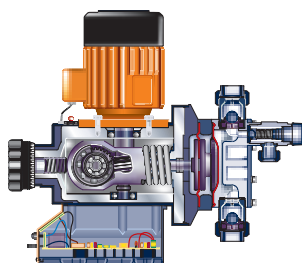


pk_2_diagramm

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

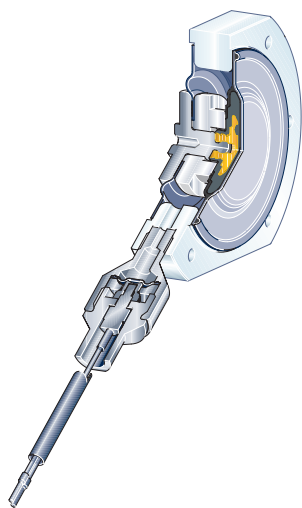
- General: Chemical feed and metering up to 1000 l/h
- Drinking water treatment: Metering of disinfectants
- Cooling circuits: Metering of disinfectants
- Waste water treatment: Metering of flocculants
- Paper industry: Metering of additives
- Plastics manufacturing: Metering of additives



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



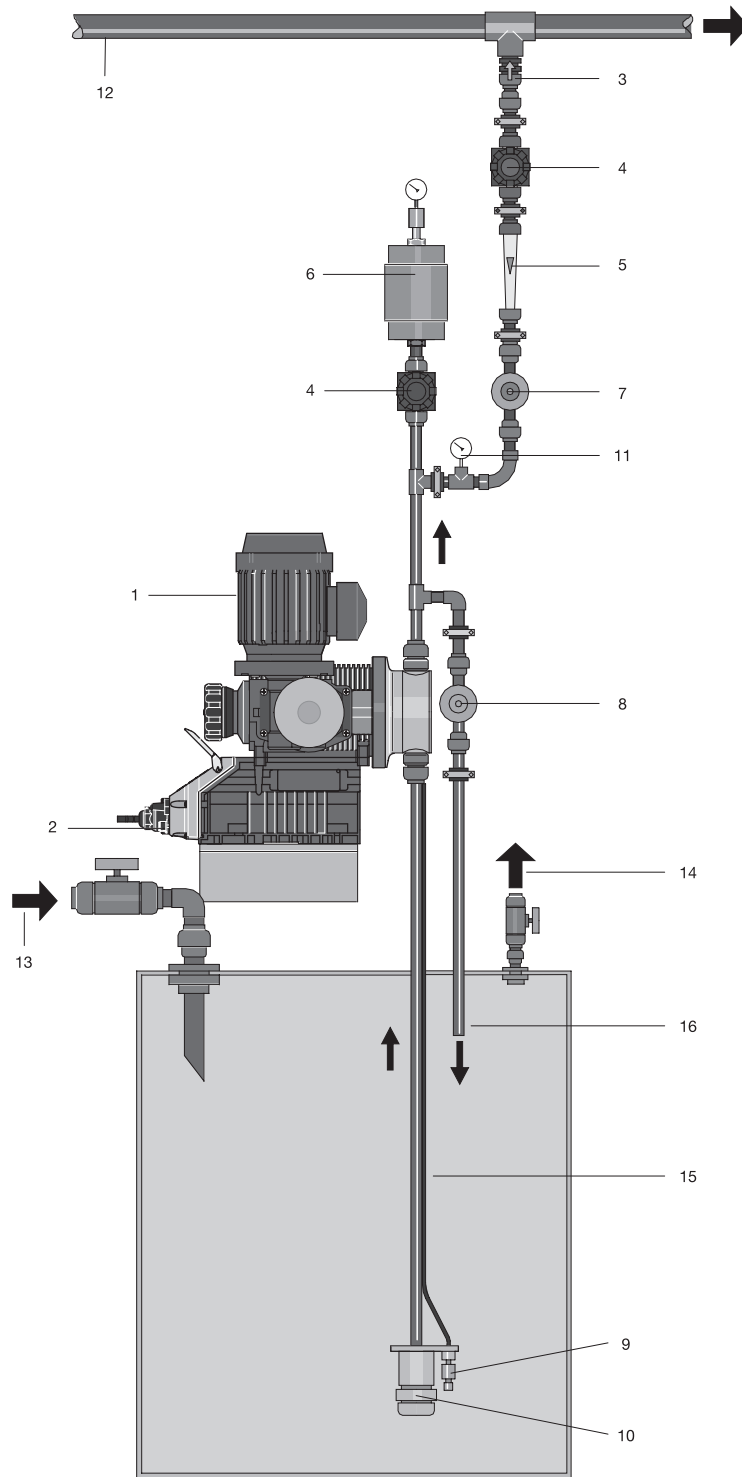
pk_2_112

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).



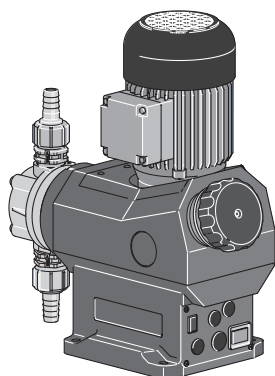
- 1 Metering pump
- 2 Actuation and control options
- 3 Injector valve
- 4 Isolation assembly
- 5 Flow measurement/monitoring
- 6 Pulsation dampener
- 7 Back pressure valve
- 8 Relief valve in bypass line
- 9 Float switch
- 10 Foot valve
- 11 Pressure gauge
- 12 System line
- 13 Filling
- 14 Vent
- 15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



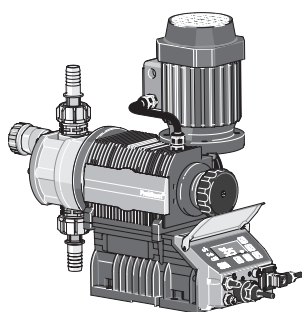
pK_2_105_1

	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.

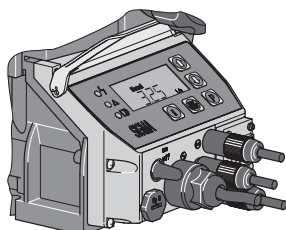
For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps without integrated overload protections.

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)



pk_2_104
Sigma Controller

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.

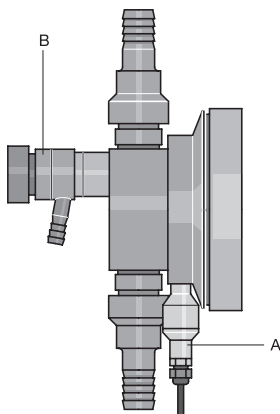
Central or decentral adjustment is possible with PROFIBUS® and/or an integrated process timer.



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

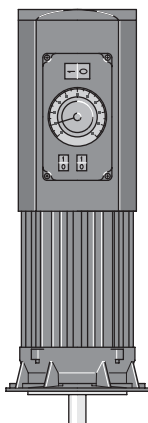
External control with 0/4-20 mA (see pk_2_103)

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

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	12 20	10022	10 26	07042	7 50
		12035	12 42	10044	10 53	04084	4 101
		10050	10 50	07065	7 65	04120	4 120
		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

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.

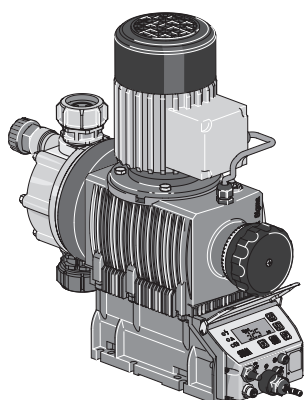
Customised motors or customised motor flanges are available on request.

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.

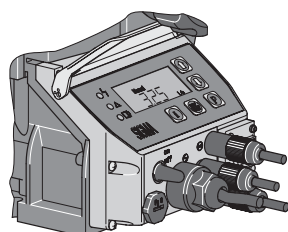
For safety-technical reasons, suitable overflow guards are to be installed in all motor metering pumps without integrated overload protections.

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.

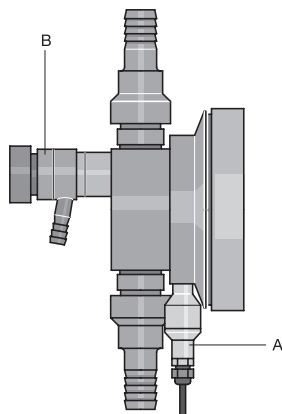
Central or decentral adjustment is possible with PROFIBUS® and/or an integrated process timer.



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. adm. 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:

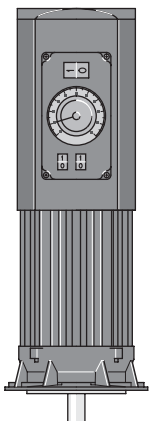
* For the Sigma types 07120, 07220 and 04350, the liquid ends are fitted with DN 25 (G 1 1/2) valves. Since DN 20 is normally large enough for the piping of these versions (see technical data, connection suction/pressure side), the connecting parts identified in the Identcode (e.g. inserts) are already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

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

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

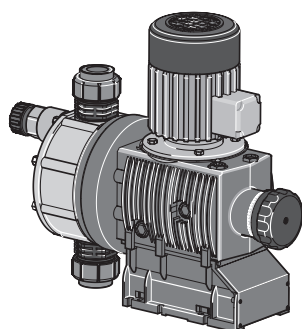
	for material	Gaskets	Order no.
ETS overflow valve 4 bar	PVT/SST	FPM-A / EPDM	1031199
ETS overflow valve 7 bar	PVT/SST	FPM-A / EPDM	1031200
ETS overflow valve 10 bar	PVT	FPM-A / EPDM	1031201
ETS overflow valve 16 bar	SST	FPM-A / EPDM	1031203

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)

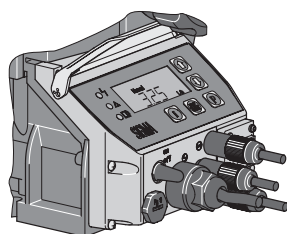
The ProMinent® Sigma/ 3 microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

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® nd/ 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.

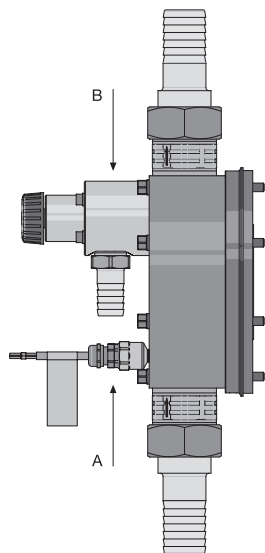
The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no leakages to the outside occur if the diaphragm ruptures. When the diaphragm ruptures, metering medium enters between the diaphragm layers and thus triggers a mechanical indication or an alarm 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

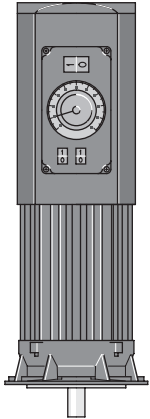
60 Hz performance data apply for S3Ca pump types (due to internal 60 Hz operation).

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			
	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

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

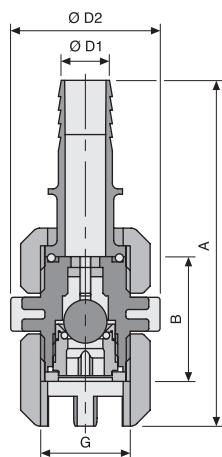
Identcode characteristic		Voltage supply			Remarks
S	3 ph, IP 55	220-240 V/380-420 V	50 Hz	0.37 kW	
		250-280 V/440-480 V	60 Hz	0.37 kW	
M	1 ph AC, IP 55	230 V ±5%	50/60 Hz	0.55 kW	
N	1 ph AC, IP 55	115 V ±5 %	60 Hz	0.55 kW	
L1	3 ph, II2GEEExelIT3	220-240 V/380-420 V	50 Hz	0.37 kW	
L2	3 ph, II2GEEExdIICT4	220-240 V/380-420 V	50 Hz	0.37 kW	with PTC, speed adjustment range 1:5
P1	3 ph, II2GEEExelIT3	250-280 V/440-480 V	60 Hz	0.37 kW	
P2	3 ph, II2GEEExdIICT4	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, II2GEEExdIICT4	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

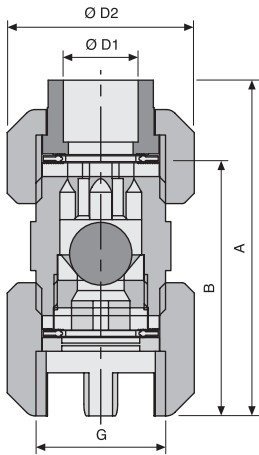
PVT foot valve

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

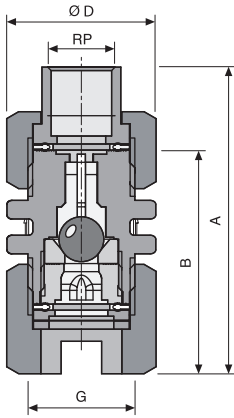
	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	59	40	101	16	809466
DN 15*	1	66	47	142	20	924517
DN 20	1 1/4	81	57			803725
DN 25	1 1/2	86	64			803726
DN 32**	2	98	74			1006434
DN 40	2 1/4	116	89			1004205

* with union nut and insert;

** PVDF/Teflon

SS foot valve

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

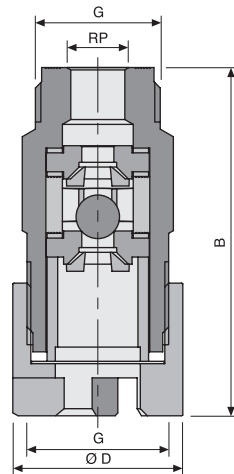


P_AC_0204_SW

	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

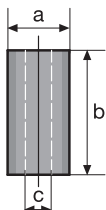
Foot valve SS for high pressure pumps



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

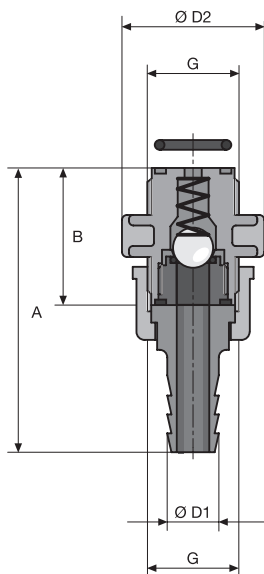
2.5.2 Injection Valves

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.

PPE injection valve

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



pk_2_029

	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).

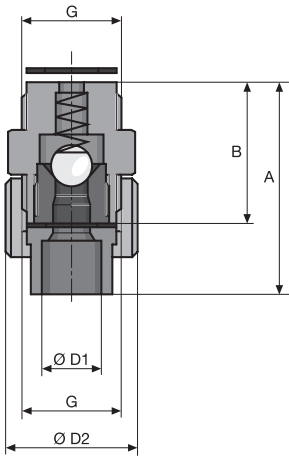
	G	B mm	Ø D2 mm	A mm	Ø D1 mm	Order no.
DN 10*	3/4	40	36	84	16	1029476
DN 15*	1	43	48	110	20	1029477
DN 20	1 1/4	55	52			1029478
DN 25	1 1/2	61	56			1029479
DN 32	2	68	70			1002783
DN 40	2 1/4	85	81			1029480

* 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

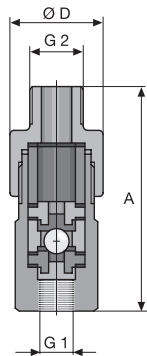
SS housing, PTFE seals spring loaded with ball check (1.4571/1.4581). (Priming pressure approx. 0.5 bar)

	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

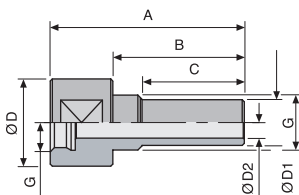
1.4571 housing and valve spring. 1.4401 ball, PTFE seals. (Priming pressure approx. 0.1 bar)



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.

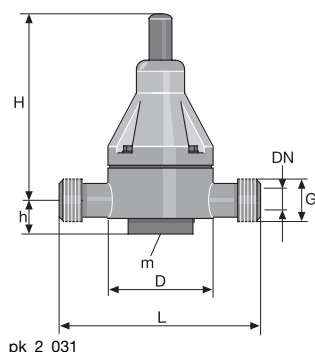
The DH "RM" range of valves replace the "S" and "SR" range.

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

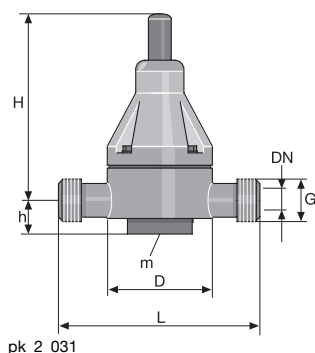
Adjustable pressure 0.5 – 10 bar



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

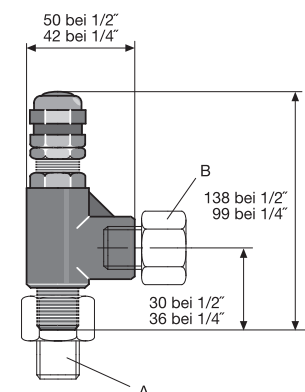
² PTFE (white)

³ Packing ring PTFE/FPM

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



pk_2_032

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

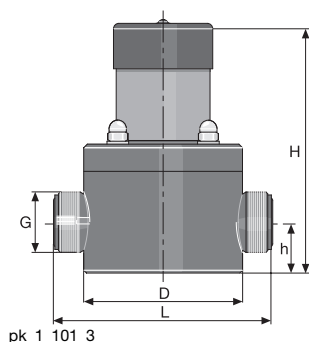
Recommended use up to 300 l/h

	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!

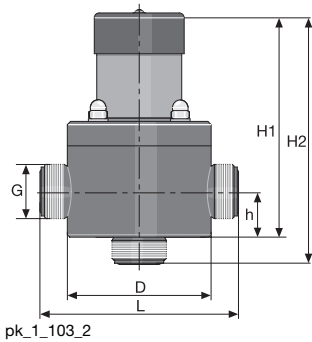
Areas of application: Metering pumps Vario, Sigma/ 1, Sigma/ 2, Sigma/ 3

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

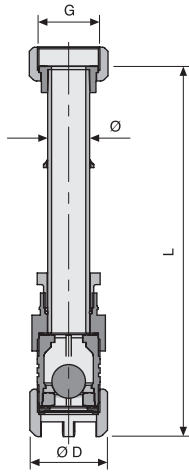
Type	G	Nominal diameter	Order no.
PPE	G 3/4	DN 10	1009893
PPE	G 1	DN 15	1009899
PPE	G 1 1/2	DN 25	1009911
PPB	G 3/4	DN 10	1009895
PPB	G 1	DN 15	1009901
PPB	G 1 1/2	DN 25	1009913
PCE	G 3/4	DN 10	1009894
PCE	G 1	DN 15	1009900
PCE	G 1 1/2	DN 25	1009912
PCB	G 3/4	DN 10	1026446
PCB	G 1	DN 15	1026448
PCB	G 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

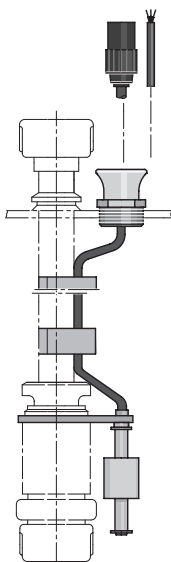
Temperature range: - 10 °C to 65 °C

IP rating: IP 67

Switching mode: for level shortage 2 x NC

Material:

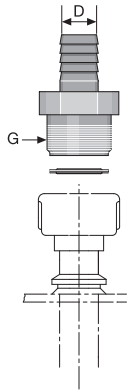
Body level switch PVDF, float PE, mounting strap PVDF, cable bracket PE, anti-kink device PE, cable PE.



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



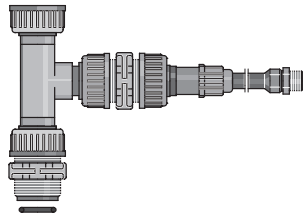
pk_2_140

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.

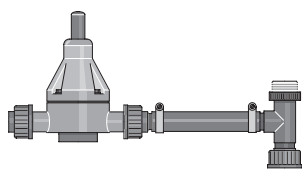
Flushing device PCB*

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

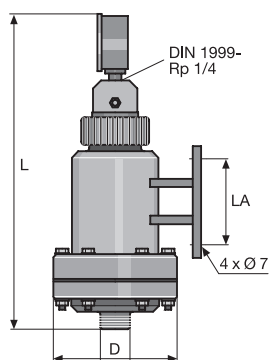
Connection	G	Order no.
G 3/4 - DN 10	3/4	809991
G 1 - DN 15	1	809992

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

pk_2_038

Volume (l)	Max. operating pressure	Operating temperature
0.5/1	10 bar	25 °C
	6 bar	40 °C
2.5/5	6 bar	25 °C
	4 bar	40 °C

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 In-line	0.2	16	G 1 – DN 15	1033446
PD In-line	0.5	10	G 1 – DN 15	1026736
PD In-line	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.

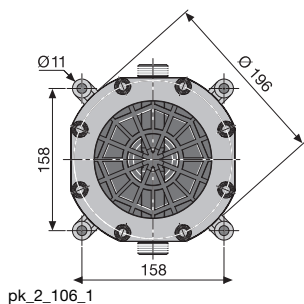
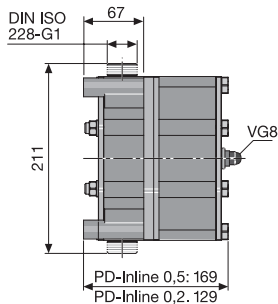
Caution: Nitrogen should be used as the filler gas in connection with combustible liquids. On no account fill with oxygen!

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

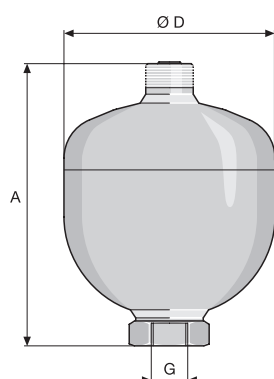
Consisting of PTFE-formed composite seal, insert/adapter and union nut.

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

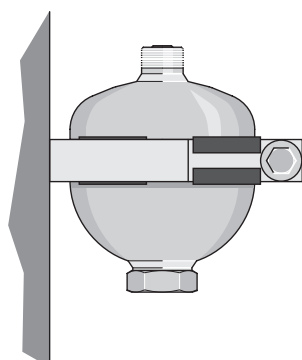
2.5 Hydraulic/Mechanical Accessories



pk_2_101
 Admissible operating temperature: -10 to +80 °C
 Other accumulator/pulsation dampener materials available on request..

Stainless steel pulsation damper

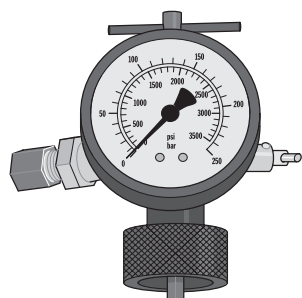
Volume l	Max. Pressure bar	Diaphragm material	Connector G	A mm	Ø D mm	Order no.
0.16	180	NBR	Rp 1/2	124	74	1008609
0.16	180	Butyl	Rp 1/2	124	74	1008610
0.16	180	FPM	Rp 1/2	124	74	1008611
0.32	160	NBR	Rp 1/2	137	93	1008612
0.32	160	Butyl	Rp 1/2	137	93	1008613
0.32	160	FPM	Rp 1/2	137	93	1008644
0.75	140	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



pk_2_102

Mounting clamp for stainless steel pulsation damper

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



pk_2_116

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

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.

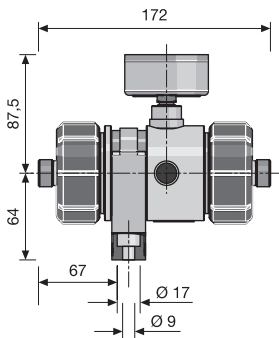
Important notice: The pulsation damper must be used in conjunction with a relief valve.

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.

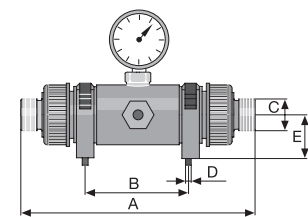
FPM = Fluorine Rubber

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

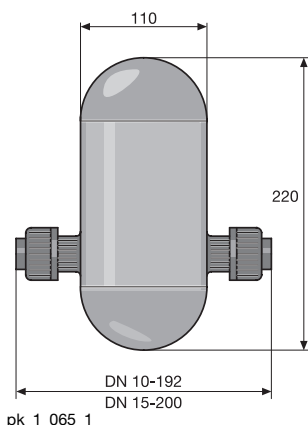
Pulsation dampers with no diaphragm separating the gas cushion and the chemical. They are used to produce minimal pulsation metering and to reduce flow resistance in long pipes and when metering viscous liquids.

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

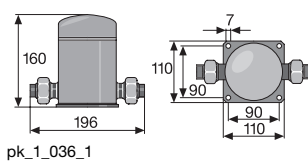
20 °C - max. operating pressure 10 bar

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

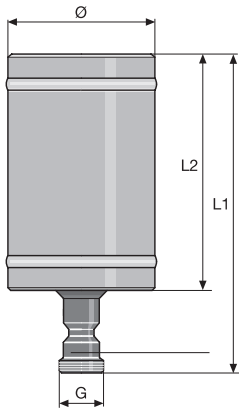
SS in-line pressure accumulator

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

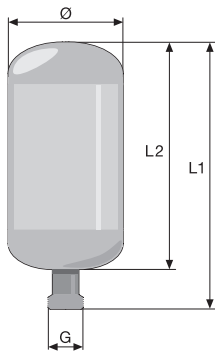
Volume l	Connection	Ø mm	L1 mm	L2 mm	Order no.
2	G 1 1/4 – DN 20, without connection parts	140	290	220	243211
4	G 1 1/2 – DN 25, without connection parts	160	410	320	243212

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

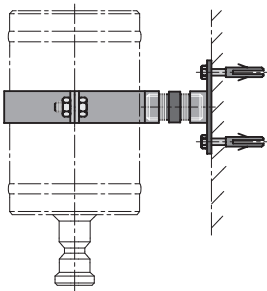


pk_2_033

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

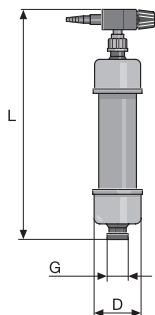


pk_1_061

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.

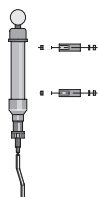
Max. operating pressure 2 bar at 40 °C operating temperature.

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).

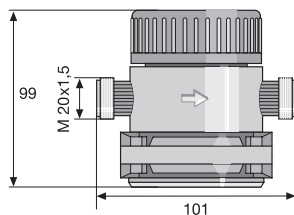
Material	Seal material	Order no.
PVC	EPDM	790019

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

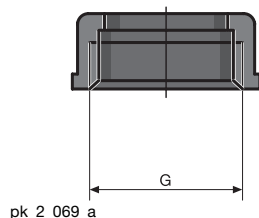
Connections parts to be ordered separately.

* **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

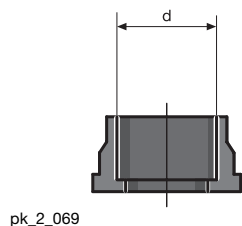
2.5.9 Connector Parts, Seals, Hoses

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

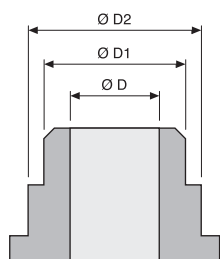


	Material	Connection	Order no.
fusion socket	PP	d 12 - DN 8	800666
	PP	d 16 - DN 10	358603
	PP	d 20 - DN 15	358604
	PP	d 25 - DN 20	358605
	PP	d 32 - DN 25	358606
	PP	d 40 - DN 32	358607
	PP	d 50 - DN 40	358608
	PP	d 63 - DN 50	358609
	PVDF	d 16 - DN 10	358803
	PVDF	d 20 - DN 15	358804
	PVDF	d 25 - DN 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.



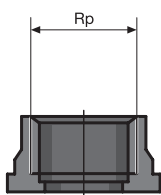
P_AC_0210_SW

	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.

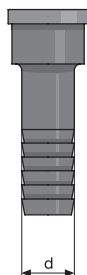


pk_2_069_b

	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

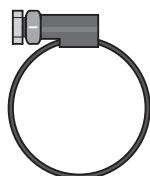


pk_2_046

	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	

	Material	Connection	Order no.
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

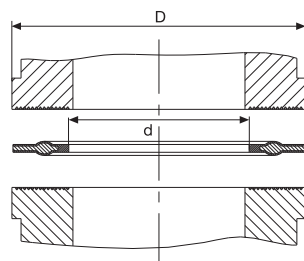
Stainless steel threaded clip

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).

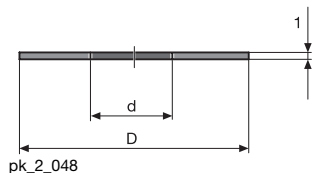


pk_2_130

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

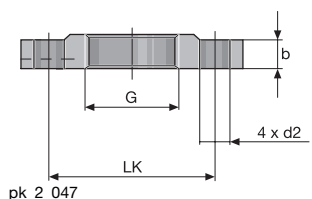
Set of elastomer flat packing seals



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

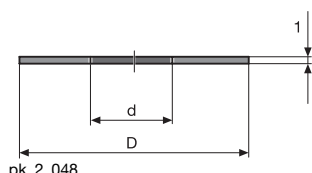


Flange mounting in accordance with DIN 2566 PN 16 for ProMinent® valve sizes. In the case of mounting size 3/4 Inches - DN 10 but increased to DN 15.

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.



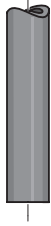
pk_1_028

	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

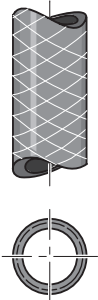
Caution:

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:

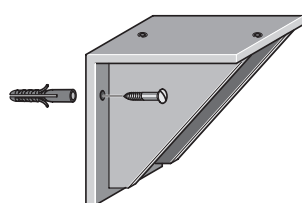
The resistance of soft PVC hoses is not identical with that of hard PVC. Please observe the resistance for PVC soft as well as the cleaning instructions when using the equipment for foodstuff applications (see homepage).

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

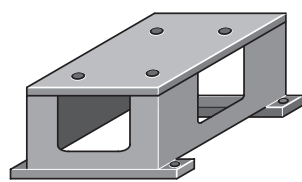


pk_2_036

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
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pk_2_037

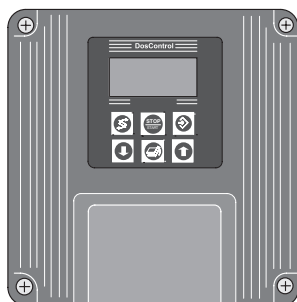
Floor mounting for Sigma, Meta

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

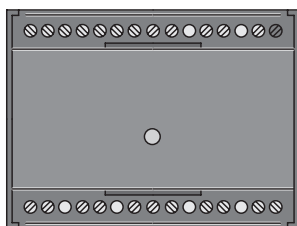
2. as proportional control

- 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

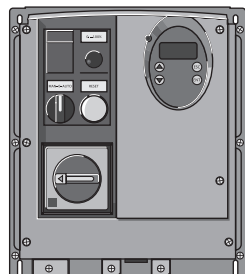
	Order no.
Fourfold contact repeater	914753

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

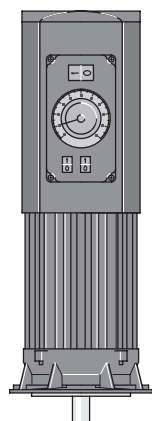
Variable speed motors with integrated speed controller

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

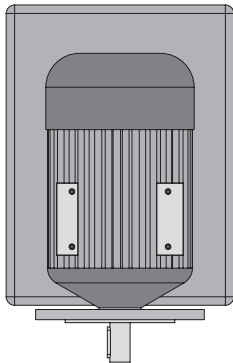
2.6 Electrical Accessories

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



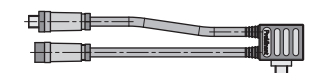
pk_1_055

Profibus adaptor, IP65 protection

from 5-way M12 eurofast to 9-way Sub-D connector, length approx. 300 mm



pk_1_009



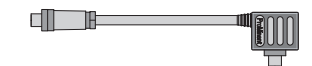
		Order no.
Y-adaptor 2 x M12 x 1 male/female 9-pin, sub D plug	9-pin, sub D plug	1005838
Adapter 1 x M12 x 1 male 9-pin, sub D plug	9-pin, sub D plug	1005839
Y-adaptor 2 x M12 x 1 male/female 9-pin, sub D plug	M12 x 1 male	1024216
Adapter 1 x M12 x 1 male 9-pin, sub D plug	M12 x 1 male	1024219

P_AC_0208_SW

USB adaptor

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

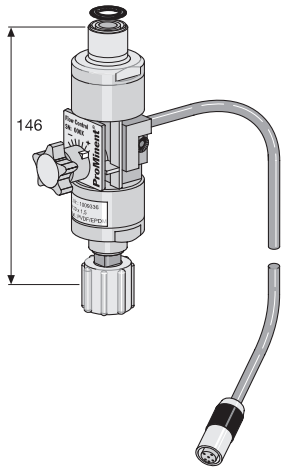
The USB adaptor can be used to transfer timer programmes created using ProTime software to the pump. You will find the ProTime software on our home page.



P_AC_0209_SW

	Order no.
USB Adapter	1021544

2.6 Electrical Accessories



pk_1_086_2

Flow Control adjustable flow monitor

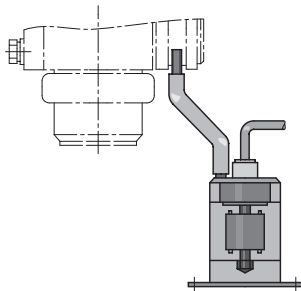
fits series Sigma/ 1 / 2 / 3 in PVT and SST material versions. Supplied complete with connection cable for assembly directly onto the liquid end.

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

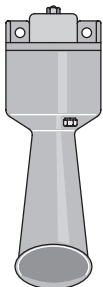
Diaphragm failure indicator

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

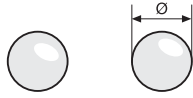
With approximately 0.5-1 bar priming pressure for increased metering reproducibility and prevention of suction and siphoning effect.

	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

2.7 Special Accessories



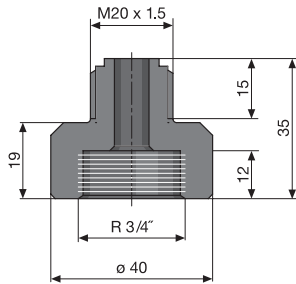
pk_1_102

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.

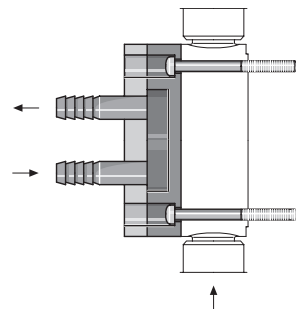


pk_2_058

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

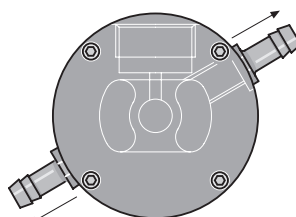


pk_2_059

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

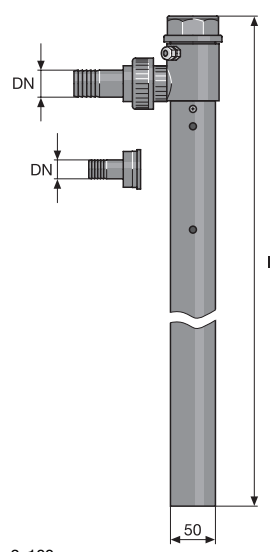
Cooling/heating equipment, plunger metering pumps

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



pk_2_100

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.

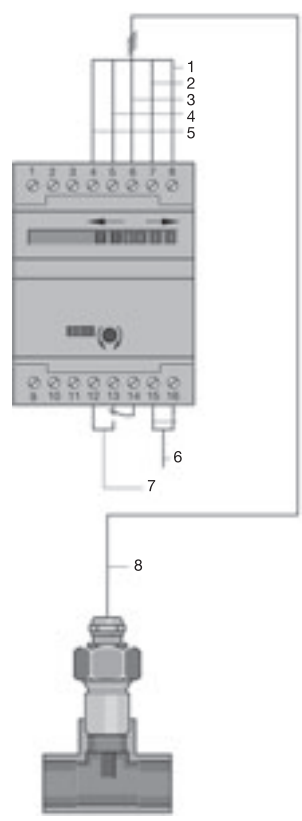
DN 10/15 is fitted with a non-return ball valve (borosilicate glass ball; EPDM seals) and DN 20/25, DN 32 is fitted with an EPDM non-return valve.

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_1_119

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

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

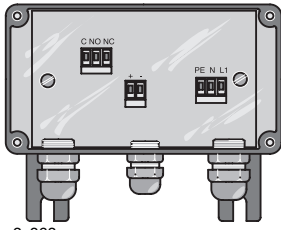
	Order no.
Probe S	792888

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.

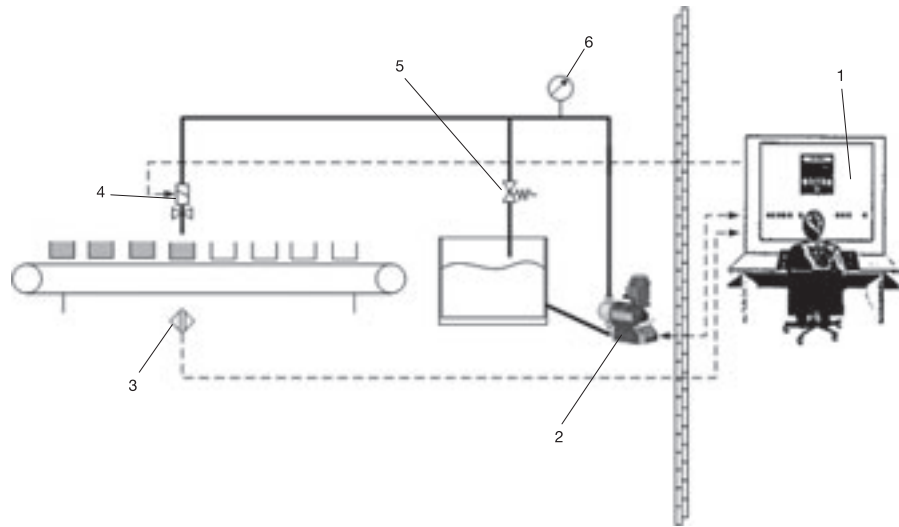
Mains connection: Order no.

Switch amplifier for namur type stroke sensor	230 V/50 Hz	914839
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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

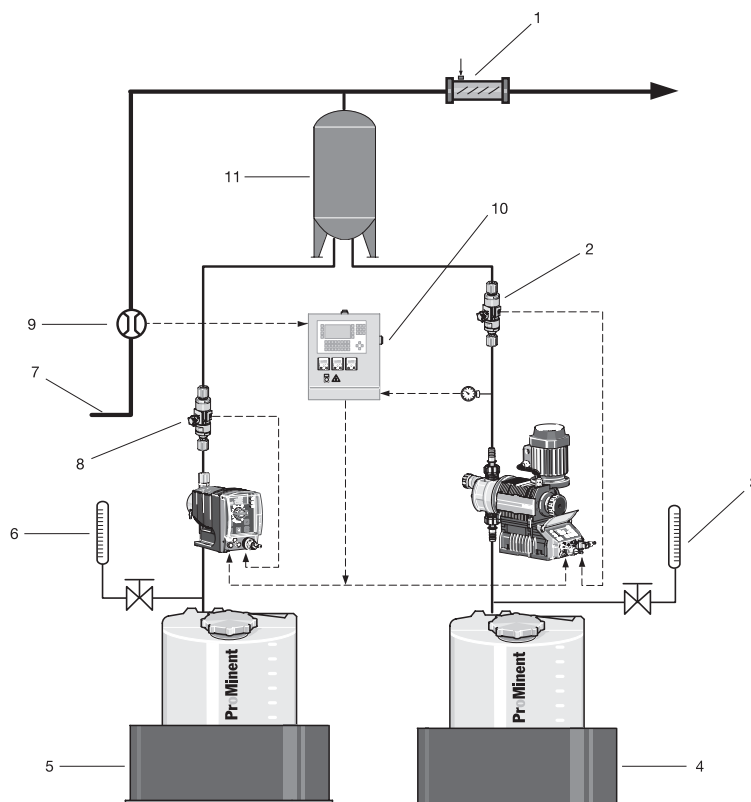
Benefit

- 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).

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

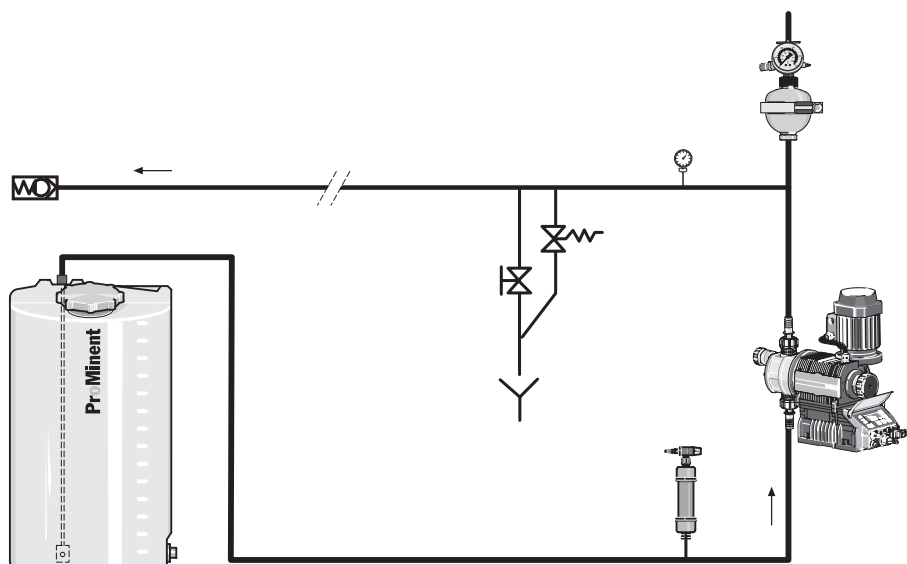
Benefits

- 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

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

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.

2 Sales

2.1 The ProMinent Group

Head Office

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5-11
69123 Heidelberg · Germany
info@prominent.com
www.prominent.com

Telephone: +49 6221 842
Fax: +49 6221 842

+49 6221 6489

-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

Affiliated Companies In Europe

ProMinent Dosiertechnik Ges. mbH
(Austria)
Tel.: +43 7448 30400
office@prominent.at
www.prominent.at

ProMinent Belgium S.A., N.V. **(Belgium)**
Tel.: +32 2 3914280
info@prominent.be
www.prominent.be

ProMinent Fluid Controls BG **(Bulgaria)**
Tel.: +359 2 9631921
office@prominent.bg
www.prominent.bg

ProMinent Dosiertechnik CS s.r.o.
(Czech Republ.)
Tel.: +420 585 757011
info@prominent.cz
www.prominent.cz

ProMinent Systems spol. s.r.o.
(Czech Republ.)
Tel.: +420 378 227 100
info@prominentsystems.cz
www.prominentsystems.cz

ProMinent Finland OY **(Finland)**
Tel.: +358 9 4777890
prominent@prominent.fi
www.prominent.fi

Flow Center Oy **(Finland)**
Tel.: +358 9 2513 7700
sales@flowcenter.fi
www.flowcenter.fi

ProMinent France S.A. **(France)**
Tel.: +33 3 88101510
contact@prominent.fr
www.prominent.fr

Syclope Electronique **(France)**
Tel.: +33 05 59337036
syclope@syclope.fr
www.syclope.fr

ProMaqua GmbH **(Germany)**
Tel.: +49 6221 6489-0
info@promaqua.com
www.promaqua.com

ProMinent Fluid Controls (UK) Ltd.
(Great Britain)
Tel.: +44 1530 560555
info@prominent.co.uk
www.prominent.co.uk

ProMinent Hellas Ltd. **(Greece)**
Tel.: +30 210 5134621
info@prominent.gr
www.prominent.gr

ProMinent Magyarország Kft. **(Hungary)**
Tel.: +36 96 511400
prominent@prominent.hu
www.prominent.hu

ProMinent Fluid Controls Ltd. **(Ireland)**
Tel.: +353 71 9151222
info@prominent.ie

ProMinent Italiana S.R.L. **(Italy)**
Tel.: +39 0471 920000
info@prominent.it
www.prominent.it

ProAcqua **(Italy)**
Tel.: +39 0464 425222
info@proacqua.it
www.proacqua.it

Idrosid s.r.l. **(Italy)**
Tel.: +39 0461 534623
info@idrosid.it
www.idrosid.it

ITECO s.r.l. **(Italy)**
Tel.: +39 0461 242220
iteco@itecoitalia.com
www.itecoitalia.com

ProMinent Office Kaunas **(Lithuania)**
Tel.: +370 37 325115
prominent1@takas.lt

ProMinent Fluid Controls Ltd. **(Malta)**
Tel.: +356 21693677
info@pfc.com.mt

ProMinent Verder B.V. **(Netherlands)**
Tel.: +31 30 6779280
info@prominent.nl
www.prominent.nl

ProMinent Dozotechnika Sp. z o.o.
(Poland)
Tel.: +48 71 3980600
info@prominent.pl
www.prominent.pl

ProMinent Portugal Control de Fluídos,
Lda. **(Portugal)**
Tel.: +351 21 9267040
geral@prominent.pt
www.prominent.pt

ProMinent Dositechnika OOO **(Russia)**
Tel.: +7 495 7874501
evg.bogatykh@prominent.ru
www.prominent.ru

Proshield Ltd. **(Scotland)**
Tel.: +44 1698 260260
pcp@proshield.co.uk

ProMinent Slovensko s.r.o.
(Slovak Republ.)
Tel.: +421 2 48200111
prominent@prominent.sk
www.prominent.sk

ProMinent Gugal S.A. **(Spain)**
Tel.: +34 972 287011/12
prominent@prominentSpain.com
www.prominent.es

ProMinent Dosertechnik AB **(Sweden)**
Tel.: +46 31 656600
info@prominent.se
www.prominent.se

Tomal AB **(Sweden)**
Tel.: +46 0 346-713100
info@tomal.se
www.tomal.se

ProMinent Dosiertechnik AG **(Switzerland)**
Tel.: +41 44 8706111
info@prominent.ch
www.prominent.ch

Voney AG **(Switzerland)**
Tel.: +41 031 992 21 67
www.voney-ag.ch

ProMinent Office Kiev **(Ukraine)**
Tel.: +380 44 5296933
prominent@i.com.ua

2 Sales

Affiliated Companies Worldwide

ProMinent Algeria (Algeria)

Tel.: +213 21 54 84 74
prominent_algerie@yahoo.fr

ProMinent Argentina S.A. (Argentina)

Tel.: +54 11 4742 4009
info-ar@prominent.com

ProMinent Fluid Controls Pty. Ltd. (Australia)

Tel.: +61 2 94500995
sales@prominentfluid.com.au
www.prominentfluid.com.au

ProMinent Fluid Ctrls. (BD) Ltd. (Bangladesh)

(Bangladesh)
Tel.: +8802 8319047
info@prominent-bd.com
www.prominent-bd.com

ProMinent Brasil Ltda. (Brazil)

Tel.: +55 11 43610722
prominent@prominent.com.br
www.prominent.com.br

ProMinent Fluid Controls Ltd. (Canada)

Tel.: +1 519 8365692
info@prominent.ca
www.prominent.ca

ProMinent Bermat S.A. (Chile)

Tel.: +56 2 3354 799
slagos@prominentbermat.cl
www.prominentbermat.cl

ProMinent Fluid Controls China Co. Ltd. (P.R. of China)

Tel.: +86 411 87315738
dr.r.hou@prominent.com.cn
www.prominent.com.cn

Heidelberg ProMinent Fluid Controls (India)

Tel.: +91 80 23578872
prominent@hpfccindia.com
www.prominentindia.com

ProMinent Co. Ltd. (Japan)

Tel.: +81 3 5812 7831
hosotani@prominent.co.jp
www.prominent.co.jp

ProMinent Korea Co. Ltd. (Republic of Korea)

Tel.: +82 31 7018353
info@prominent.co.kr
www.prominent.co.kr

ProMinent Office Kazakhstan (Kazakhstan)

Tel.: +7 3272 504130
prominent@ducatmail.kz

ProMinent Fluid Controls (M) Sdn. Bhd. (Malaysia)

Tel.: +603 806 825 78
richard@pfc-prominent.com.my
www.pfc-prominent.com.my

ProMinent Fluid Controls de México, S.A. de C.V. (Mexico)

Tel.: +52 442 2189920
ventas@prominent.com.mx
www.prominent.com.mx

ProMinent Fluid Controls (Far East) Pte. Ltd. (Singapore)

Tel.: +65 67474935
pfc@prominent.com.sg
www.prominent.com.sg

ProMinent Fluid Controls Pty. Ltd. (South Africa)

Tel.: +27 11 866039341
jock.bartolo@prominentfluid.co.za

ProMinent Fluid Controls (Taiwan) Ltd. (Taiwan)

Tel.: +886 7 8135122
richard@prominent.com.tw
www.prominent.com.tw

ProMinent Fluid Controls (Thailand) Co. Ltd. (Thailand)

Tel.: +66 2 3760008
pfc@prominent.co.th
www.prominent.co.th

ProMinent Tunesia (Tunisia)

Tel.: +216 79 391 999
prominent_tunisie@yahoo.fr

Aquatrac Instruments, Inc. (USA)

Tel.: +1 800 909 9283
support@aquatrac.com
www.aquatrac.com

ProMinent Fluid Controls, Inc. (USA)

Tel.: +1 412 7872484
sales@prominent.us
www.prominent.us

ProMinent Juffali FZC (United Arabian Emirates)

Tel.: +97 1655 72626
a.sadaqa@prominentfzc.ae
www.prominentfzc.ae

Distributors Worldwide

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Sudan

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Uganda

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Addresses of distributors are available from ProMinent Dosiertechnik GmbH · Im Schuhmachergewann 5-11 · 69123 Heidelberg · Germany

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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 inseparably 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 Dosierertechnik GmbH. By delivering the device, the ownership in the delivered devices shall pass on to ProMinent Dosierertechnik. 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 Dosierertechnik GmbH

Valid 11/2007